

A Cultural Herpetology of Nile Crocodiles in Africa

Simon Pooley

Current affiliation: Department of Geography, Environment and Development Studies, Birkbeck University of London, UK

Research initiated at: Department of Zoology, University of Oxford, UK

E-mail: s.pooley@bbk.ac.uk

Abstract

Human-wildlife conflict is a growing problem worldwide wherever humans share landscapes with large predators, and negative encounters with eight species of the crocodilians is particularly widespread. Conservationists' responses to these adverse encounters have focused on the ecological and behavioural aspects of predators, rather than on the social, political, and cultural contexts, which have threatened their existence in the first place. Few studies have thus far tried to understand the rich, varied, contradictory, and complex relations that exist between particular humans and human societies, and particular predators and groups of predators. It is in the spirit of Brian Morris's explorations of the interactional encounters and co-produced sociabilities that exist between humans and animals in specific places and regions that this paper offers a cultural herpetology (an account of human-crocodile interrelations) of the Nile crocodile (*Crocodilus niloticus* and *C. suchus*) in Africa. It draws on extensive historical documentation of the interactions of humans and crocodiles across Africa to examine how diverse and complex human responses to Nile crocodiles have been, and continue to be, and suggests some implications for improving human-crocodile relations.

Keywords: Africa, Nile crocodile, human wildlife conflict, human-predator relations, wildlife conservation, African culture

INTRODUCTION

Adverse encounters between humans and eight of the 24 currently recognised species of crocodilians (crocodiles, alligators, and the Gharial) are very widespread, from southern USA through Central and South America, across Africa, South Asia and Iran, Southeast Asia including Indonesia and Malaysia, and Australia and Oceania (Pooley 2016b). Of these eight species, Africa's Nile crocodile (*Crocodilus niloticus* and *C. suchus*) is often portrayed as the crocodile involved in the most attacks on humans, with the highest proportion of

fatalities (CSG 2016). Only the saltwater crocodile (*Crocodilus porosus*) rivals it in size, distribution, and man-eating habits.

Across Africa, Nile crocodiles occupy a great diversity of aquatic habitats, and coexist with a great diversity of human cultures in a variety of social and economic contexts. Offering generic advice on avoiding crocodile attacks based on species-level biological and behavioural data, and analysis of attacks based on standardised social science categories like livelihood, age, and gender, has limited utility in explaining the particular circumstances pertaining to local human-crocodile relations. The need for better ways of studying the complex relations that exist between particular humans and human societies, and particular predators and predator populations, has been recognised for some other large predators, most notably the big cats (Cavalcanti et al. 2010; Dickman 2016) and wild canids (Macdonald et al. 2010; Álvares et al. 2011; Marvin 2012).

This paper argues that in order to mitigate human-predator conflicts, it is not sufficient to take a generic technical view 'from nowhere', but it is rather essential to take a place-based view 'from somewhere'. Research in fields like environmental

Access this article online

Quick Response Code:



Website:

www.conservationandsociety.org

DOI:

10.4103/0972-4923.197609

history, geography, and anthropology reminds us that places are never simply physical spaces, and conservationists wishing to intervene in human-predator interactions must be aware of the strata of personal, social, cultural, and political meanings and relationships pre-existing their entry into local relations and practices. These strata deeply influence contemporary relations. This recognition of the importance of understanding the cultural significance accorded to particular places informs an emerging place-based approach to conservation research and practice (Williams et al. 2013).

It is in the spirit of the anthropologist Brian Morris's explorations of the interactional encounters and co-produced sociabilities that exist between humans and animals in specific places and regions that this paper offers a cultural herpetology of Nile crocodiles in Africa. Although there are three currently recognised species of crocodiles native to Africa (the taxonomy is being revised), the focus is on Nile crocodiles as they are the largest species, the only African crocodiles to attack humans deliberately, and are by far the most widely distributed crocodiles across the continent.

In his book *The Power of Animals* (1998), Morris shows "the multiple ways in which Malawian people relate to animals—pragmatic, intellectual, realist, aesthetic, social and symbolic" (noted in Morris 2000: 1). His book *Animals and Ancestors* (2000) explores Malawians' "sacramental attitude to animals". Taken together, the two books "aim to affirm the radical importance of animals in the social and cultural life of Malawian people" (2000: 1). This paper is not an ethnographically rich account focused on a particular region, like Morris's wonderful Malawi studies. Instead, it draws on extensive historical documentation of the interactions of humans and crocodiles across Africa to argue for the necessity of the approach that Morris has pioneered: it reveals just how diverse and complex Africans' interactions with Nile crocodiles have been.

Morris (2006) quotes the colonial administrator and natural history writer Harry Johnston on the alleged universal human revulsion towards insects, and their uselessness to humans. Even as Morris suggests that Europeans' Cartesian estrangement from nature and capitalist emphasis on utility and desire to eliminate useless and harmful creatures condemns the insects to revulsion and persecution, he still insists on the diversity and complexity of Western attitudes to insects.

A similar insistence on the diversity of human-crocodile interactions and resulting diversity of human beliefs about and responses to crocodiles is important because a cursory reading of the European literature on exploration, travel, settlement, and natural history in Africa would suggest that crocodiles were universally despised. These attitudes have deep cultural roots. Herpetology is the branch of zoology concerned with the study of reptiles and amphibians, and the word 'herpetology' is derived from the Greek for 'creeping animal'. The Biblical books of Genesis, Leviticus, and Ezekiel, all damn reptiles and creeping things (Goin and Goin 1962; Douglas 1966; Mackenzie 1988). It is with Morris's corrective example in mind that this paper is entitled a cultural herpetology of

Nile crocodiles in Africa. It sets out some implications of this diversity for conservation-oriented research and practice intended to mitigate negative encounters and relations between humans and Nile crocodiles.

METHODS

This paper provides historical foundations for research on human-crocodile relations in Africa through providing a review of Africans' interactions with Nile crocodiles. Primary sources (see Appendix 1) included narratives of African exploration written by European and American hunters, explorers and missionaries for the century beginning CE 1840.¹ Additional material was gathered through a search of the Newsletters and Proceedings of the International Union for Conservation of Nature (IUCN) Crocodile Specialist Group (CSG) for more recent information on human-crocodile relations in Africa (see Pooley 2016b).

Literature was searched for using: 1) the online databases JStor and Scopus; 2) key conservation, natural history, geography and anthropological journals; and 3) key texts on African exploration and hunting, and Nile crocodiles. Historical sources were accessed in libraries and archives, and online, notably using openlibrary.org and archive.org, and Google Ngram. The online resources allow keyword searching—helpful in long texts which include scattered references, and where indexes are lacking. Texts, which included discussion of Nile crocodiles (beyond passing mentions) were selected, yielding 78 books by 57 authors. The geographic coverage extends across the length and breadth of the natural range of the Nile crocodile in Africa (see Figure 1).

In analysing the accounts of Africans' perceptions of and interactions with crocodiles, it was challenging to discover precisely who was being described, where authors offer generalisations about 'African beliefs' or (for example) 'Bakwena beliefs'. This assumes uniformities across diverse

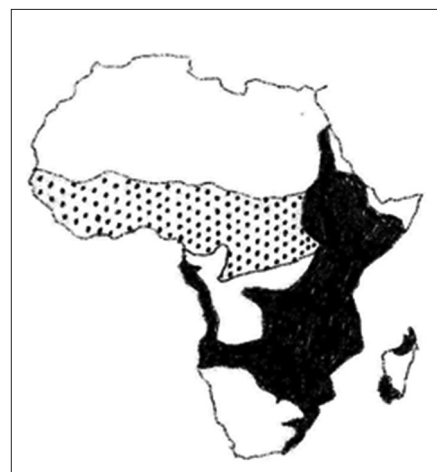


Figure 1
Approximate natural distribution of the two species of Nile crocodile in Africa and Madagascar, *Crocodilus suchus* (dotted) and *C. niloticus* (black). Author's simplification of a map from Shirley et al. (2015: 323)

communities and individuals who would have interacted with, and thought about crocodiles in a diversity of ways. Sources were scoured to determine who the authors' informants, or subjects being described, were, as well as the spatial and temporal context (for key locations see Figures 2-4).

As most of the material came in the form of anecdotes, descriptive passages and natural history notes, a conceptual framework was necessary to organise the material. Morris (2000) provides conceptions of personhood and social reality, which are useful for thinking in a more structured way about the diversity of human-crocodile encounters and human responses to these within cultures, social groups, and even within the individual, and between species. Morris conceives of personhood as “complex, shifting, composite, relational and [involving] multiple identities...” and argues that in “different contexts certain identities may be given primacy”. He also distinguishes between two realms of social reality: 1) social praxis, referring to “the social processes and relations that people are engaged in, which intrinsically incorporates a relationship with the material world”; and 2) culture, meaning “the collective representations and cultural notions of members of a community” (Morris 2000: 42, 46).

What we know about Africans' ideas about and interactions with crocodiles is fragmented in space and time, and available in most cases only from the written accounts of Europeans. Accounts of what Africans thought or did must be understood as filtered through the lenses of the Europeans who recorded them, and many misunderstandings persist today. It is the historian's task to interpret as carefully as possible just these kinds of historical sources, reading carefully against the grain. It is helpful to begin with an account of current understanding of the Nile

crocodile as a biological animal, and then to briefly describe the European cultural lenses through which African beliefs have been reported over the course of the period reviewed here.

BACKGROUND

The Nile crocodile

Linnaeus was the first to use the scientific name *Crocodilus niloticus* (in 1758) as a synonym for all crocodiles. A plethora of namings and renamings of African crocodiles ensued, with Mertens and Wermuth (1955) listing seven subspecies. The names ‘Nile crocodile’ and ‘*Crocodylus* (or *Crocodilus*) *niloticus*’ have been widely used for Africa's largest crocodile since the early 1900s. However, the current taxonomy—which groups all previous suggested subspecies as one species (*C. niloticus*)—has been challenged, with evidence from genetic analyses suggesting it should be split into two species, *Crocodilus niloticus* and *Crocodilus suchus* (Hekkala et al. 2011; Grigg and Kirshner 2015).

Adult Nile crocodiles grow large; males often exceeding 4 m in length. They are opportunistic predators with a varied diet comprising crustaceans, birds, fishes, other reptiles, and (for big adult crocodiles) larger mammals, including humans. Diet varies in accordance with local prey availability. Long-standing portrayals of crocodiles as voracious eaters are incorrect; they are ectotherms, remaining inactive for long periods, regulating their body temperatures through immersion in water or basking on sandbanks. They survive for long periods without eating, particularly during the cooler months of the year. Nile crocodiles are highly social, basking in large congregations,

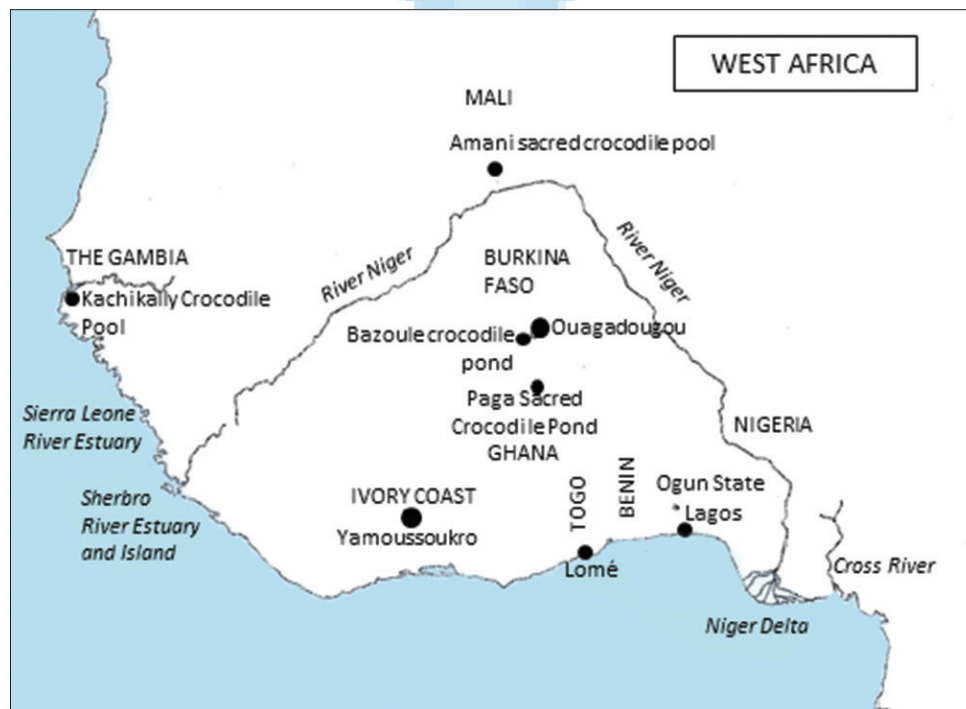


Figure 2
Key locations in West Africa (illustrated by the author)

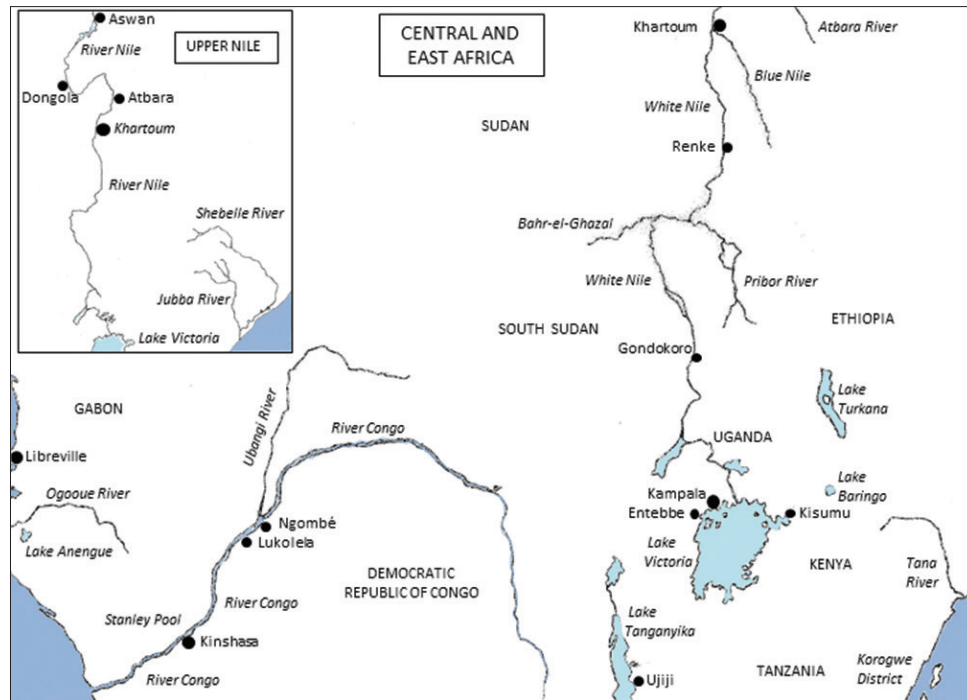


Figure 3
Key locations in Central and East Africa (illustrated by the author)

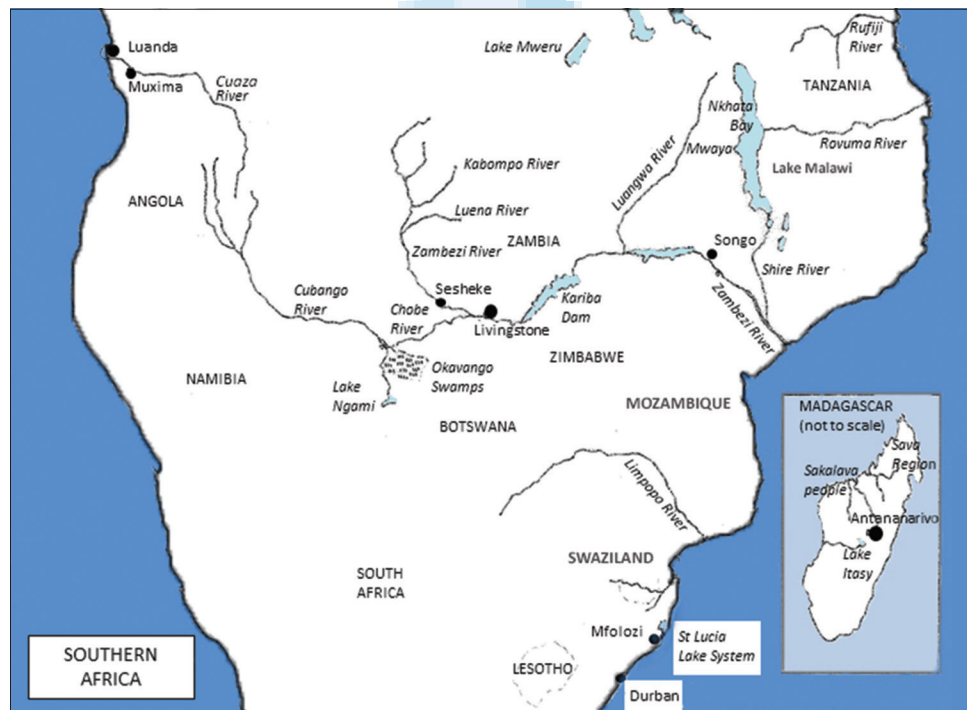


Figure 4
Key locations in Southern Africa and Madagascar (illustrated by the author)

though in breeding season, territories are guarded from other males by dominant bull crocodiles. Mothers guard their nests for up to three months without eating, and assist their hatchlings from the nest to nursery areas in the nearby water, where they watch over their hatchlings for several weeks (Pooley 1982; Grigg and Kirshner 2015).

Nile crocodiles have evolved over millennia to be master predators of aquatic and terrestrial fauna. They are camouflaged and their physiology allows them to see, smell, and hear (all of these senses are acute) while remaining almost fully submerged. Large crocodiles can hold their breath for over an hour. Crocodiles observe where animals (including humans)

regularly cross watercourses, or go to drink or bathe; and when hungry, they will wait patiently near these places for the prey to approach. Crocodiles sight prey, then submerge, and approach silently and invisibly, lunging with great speed and power at the last moment to seize the victim in their powerful jaws. Victims are usually dragged into deeper water and drowned (Pooley 1989; Grigg and Kirshner 2015).

European perceptions of Nile crocodiles, from CE 1840

Crocodiles became prominent in the popular tales of European exploration and hunting in Africa, from the 1850s and the 1860s. The natural history literature, which covered crocodiles in this period, usually included material derived from classical Greek and Roman sources, including sensational stories and myths, most famously the ‘crocodile bird’ alleged to clean crocodiles’ teeth (untrue). Natural history texts of the 1800s represented crocodiles as primitive and lowly creatures, because this was how all reptiles were viewed. Crocodilians feature as the largest, strongest, and fiercest reptiles, and many of these texts include tales of ‘man-eating,’ singling out Nile crocodiles for their ferocity. Well into the 1940s, most natural history articles and book entries on Nile crocodiles included bloodthirsty tales of man-eating (Pooley 2016a).²

McLynn (1992: 188-189) comments that: “It may be an exaggeration to say that every single book of nineteenth-century African exploration featured hair-raising stories about crocodiles, but not by very much. Without question this terrifying saurian was the most feared and detested of all the animals dangerous to man.”

Europeans’ dislike of crocodiles derives principally from: the threat crocodiles posed to humans and ‘useful’ animals; associations made between crocodiles and disease (malarial swamps, and sleeping sickness); and their supposed general lack of utility. For some Europeans, feelings of helplessness and fear engendered by crocodile attacks tipped over into pathological hatred following shocking personal experiences of attacks (Pooley 2016a).

It was only from the mid-1950s, as crocodile populations were decimated by hunters, and more scientific studies were made of their behaviour and ecology, that arguments were made for their conservation (Cott 1954). By the late-1960s the first legislation was promulgated, and the partial rehabilitation of crocodiles’ reputation began with the first commercial farming, pioneered in Rhodesia (now Zimbabwe) from the mid-1960s. Commercial farming became mainstream in Africa from the mid-1980s. From the early 1970s, television documentaries on crocodiles’ parental care, presenting arguments for their ecological importance exposed the public to arguments for the conservation of crocodiles. By the 1980s, local crocodile conservationists like Tony (A.C.) Pooley were more likely to be consulted by the media following crocodile attacks, than the crocodile hunters consulted in earlier times (McGregor 2005; Pooley 2016a). However, even today, crocodiles usually feature in the popular media in connection with attacks on humans, graphically conveying the trauma of such encounters.

FINDINGS

Place-based conservation approaches take local knowledge seriously, considering the cultural, symbolic, and historical significance of places (meaningful locations). Analyses are framed in terms of the contexts in which people derive their identity and meaning, to understand social-ecological system dynamics (Williams et al. 2013). A first consideration in trying to access historical information on African’s relations with crocodiles is that the literature review of primary sources reveals quite different spatialities at work in the encounters between humans and crocodiles recorded in the nineteenth-century European literature on travel and exploration in Africa. In the main, Europeans were en route to somewhere else, and were either crossing rivers, wetlands or lakes in the course of their travels, or in the case of the explorers of the continent’s great rivers, were using waterways as a means of opening up the interior. Crocodiles were an occasional hazard and a temporary inconvenience. On the other hand, in most cases reported, Africans’ encounters were situated in the context of local relations with crocodiles with whom they shared local water resources, and these differed widely from place to place, even along the same rivers.

Geographic variations in African’s relations with crocodile

The historic literature reveals a great diversity of relations between humans and crocodiles across space and time, and offers some explanations for why this was so. In the course of his travels, the Scottish missionary David Livingstone had several times been in the locality when fatal crocodile attacks on local Africans occurred (1866: 122, 337, 452-453). He once counted “sixty-seven of these repulsive reptiles on a single bank” of the Shire River, but noted that, “they are not as fierce as they are in some rivers.” He claimed that crocodiles “are more savage and commit more mischief in the Lecambye River³ than in any other river” (Livingstone 1858: 290). Livingstone attributed this variation in the ferocity of crocodiles towards humans to the availability of prey. This varied by region but also by season. He speculated that hungry crocodiles became a menace to local women drawing water along the Shire River in the wet season because the river was in flood, fish were scarce, and game drank at abundant pools inland.

Some populations of lake-dwelling crocodiles were reported to be exclusively fish-eating and harmless to humans. Reginald Maugham (1914: 265) reported that, “there are said, in portions of British East Africa, to be certain small lakes (Lake Baringo for example) containing these reptiles where it is perfectly safe to bathe as, owing to their invariable habit of devouring fish, they have never been known to take mammals of any description.” Lord Cranworth (1912: 297) concurred that “in Lake Baringo ... natives paddle about among [crocodiles] with disdain and impunity.” In the early 1950s, Guggisberg (1972: 146) encountered the same attitude and behaviour

from Kamasia fishermen on the lake—who asserted that, “the ‘mamba’ [crocodiles] of Baringo are not like those of Kisumu on the Nyanza (Lake Victoria) [which] will eat people.” The East African hunter J.A. Hunter (1957: 100) described watching “perfectly idyllic scenes” on Lake Rukwa in Tanzania “where native fishermen with their nets spread out all round them made pets of the crocodiles, which swam and plunged about in kittenish ecstasy”. On the Sese Islands in Lake Victoria he had “seen crocodiles called by name and come ashore to flap about beside the natives,” and he described “a curious hereditary song-call” used to call these crocodiles.

Thus, there were places—all of the reported examples being on lakes or pools—where Africans and crocodiles coexisted peacefully. In some cases this amounted to mutual tolerance, but in others, there were apparently amicable interactions. The suggestion is that humans were not regarded as food by these crocodiles, nor were the crocodiles regarded as competitors for scarce food resources. In 1930, Stella and E. Barton Worthington visited ‘Crocodile’ (Central) Island in Lake Rudolf (Turkana), Kenya. They relate that “the crocodiles were so little disturbed by our presence, so secure in their certainty of being omnipotent, and so well gorged on fish, that poor things on two legs presented no problem to their minds” (Worthington and Worthington 1933: 38). The other reason for their being “extraordinarily tame” was that no humans visited the island (1933: 124). Elsewhere, the Worthingtons relate (1933: 39), “on account of the toll [the crocodile] takes of human life, native and sportsmen alike regard him as a creditable trophy, and realising this, no crocodile, except on Lake Rudolf, will allow himself to be seen closer than about four hundred yards.”

It has been argued (proof is wanting) that the two species of Nile crocodile—inhabiting respectively the lagoons and wetlands of the forested West and Central African region (*Crocodilus suchus*), and the plains and savannas of eastern Africa (*C. niloticus*) with their seasonal rivers and resulting fluctuations in prey availability, and big game—differ in temperament and habits. *C. suchus* is believed to be smaller and less aggressive and perhaps, therefore, less likely to attack humans (Grigg and Kirshner 2015). Both species inhabited the Nile River in early historical times, and apparently Ancient Egyptian priests selected the smaller more docile species (*suchus*) for ceremonies and temple life (Hekkala et al. 2011). Some Nuer (of south Sudan) are said to have distinguished between two kinds of crocodile: 1) a less dangerous cattle-eating crocodile; and 2) a more dangerous man-eating one (Hutchinson 1992). It is notable that the places where the relationships between humans and crocodiles have been more formal and prolonged, notably in the ‘sacred pools’ of West and West-Central Africa, occur in the range of *C. suchus*.

In some regions, humans, like other mammals, entered crocodile-inhabited waterways at their peril. In such place, what the Worthingtons called the “omnipotence” of the crocodiles in their watery domain was recognised, and the passage of humans and their livestock was restricted and fraught. Loveridge (1940: 44) noted that while crocodiles at Nyamkolo and Kasanga near the southern end of Lake

Tanganyika were indifferent to humans, at Mwaya on Lake Malawi they were “voracious” and dangerous.

In addition to food-supply and diet-related explanations for the behaviour of crocodile populations alleged to be partial to man-eating, human agency in encouraging attacks in some places was also noted. Burckhardt (1835: 483) claimed that Nubian men near Aswan stabbed adulterous wives and threw them into the Nile “to be food for the crocodiles”. The trader George Westbeech (1963), who travelled in Barotseland in the 1880s, claimed that Barotse kings fed refugees and enemies to crocodiles. Gibbons (1898) recounts that in the 1870s a paramount chief named Sepopo had thrown children (Stevenson-Hamilton (1917) claims that it was criminals and slaves) to crocodiles at Sesheke on the Zambezi River, rendering the place unsafe for decades thereafter. Idi Amin was alleged to have fed his enemies to crocodiles around Mukusu Island in Lake Victoria (Flanagan 2002).

Certain places have long been notorious for ‘man-eating’ crocodiles, for example, stretches of the lower Zambezi, or the Chobe in Namibia (Livingstone 1858; Stevenson-Hamilton 1917; Aust et al 2009; Wallace et al 2011). Paul Theroux (2002) reported 43 fatal attacks over six months on Sukulu [Sigulu] Island, northern Lake Victoria. There is speculation that predators in such places have developed cultures of preying on humans as a result of conjunctions of human and animal behaviour and environmental conditions. Animal behaviour studies suggest that animals have culture in the sense of learned behaviour passed on from parents to offspring (Berger 2008). Examples where this has been attributed to predators preying on humans include crocodiles at Sesheke (Stevenson-Hamilton 1917), tigers in the Sundarbans (Kruuk 2002), and lions at Tsavo (Peterhans and Gnoske 2001).

Crocodile societies and human societies

The bonds between crocodiles and humans were variously conceptualised as between human and animal communities, communities and individual crocodiles, or between individual humans and individual crocodiles. Some African societies conceived of human communities and crocodile communities in relation to one another, each with their own codes of behaviour, but sharing an understanding of what was and what was not acceptable behaviour, each towards the other. Relations might be understood as between separate but morally equivalent communities (Morris 2000). In an ethnozoological study of hyenas in Harar, Ethiopia, Baynes-Rock (2013) found that hyenas were understood to live in societies similar to humans, where misbehaviour towards humans would be internally disciplined. So long as humans behaved reasonably towards hyenas, and maintained the boundaries between human and hyena society, and vice versa, serious conflicts could be avoided (Baynes-Rock 2013). Malagasy people near Lake Itasy apparently had a similar conception of their relationship with crocodiles on the lake. Killing a crocodile would result in an attack on a human, and vice versa (Sibree 1880; Frazer 1922). Fears of retribution, which imply a community of

crocodilians with their own sense of kinship and solidarity, and justice, occur elsewhere, for instance Korogwe District, Tanzania (Scott and Scott, 1994).

The concept of kinship is controversial in anthropology but has been important in anthropological accounts of African societies. In one conception, people from the same lineage are descended from the same ancestor (usually male). At the next level of social organization, people from the same clan are descended from a common ancestor but so long ago the exact genealogy has been forgotten (several lineages). At the next level up, the tribe describes clans sharing an ethnonym (e.g., Swazi, Zulu), common language and identity (Eriksen 2004).

Certain clans (particularly from Bantu cultures) have claimed to have special relationships with crocodiles, adopting the crocodile as their totem animal. Examples include some Bechuana clans (Livingstone 1858); Mpongwe people in Gabon (du Chaillu 1861); Dagomba, Konkomba and Kassena peoples from northern Ghana (Cardinall 1927), and some Dinka (Frazer 1922) and Nuer clans (Evans Pritchard 1956). While staying in Ujiji on the eastern shore of Lake Tanganyika, Henry Stanley (1891) was told about the Wajiji people, who were so friendly with crocodiles that they could make them do their will.

The origin stories of such clans vary: in some cases crocodiles saved the clan's ancestors from attack or other adversities (e.g., the Kuranko of Sierra Leone, and the Katab of central Nigeria); in others (e.g., the Kwottos of the Toto area of Nigeria) important individual ancestors had special relations with crocodiles or could turn into crocodiles and assume their powers (Meek 1928; Wilson-Haffenden 1928; Jackson 1974). Several Nuer lineages had crocodile totems, and in one case, the lineage's ancestor was twin-born with a crocodile (Evan-Pritchard 1956). Members of crocodile clans were supposed to enjoy immunity from attack (e.g., Stanley 1891; Hartland 1901; Evans-Pritchard 1956). However, violating taboos such as killing or eating crocodiles could bring about misfortunes ranging from deformed children to the destruction of the clan (Meek 1928; Evans-Pritchard 1956; Diawuo and Issifu 2015).

In the 1930s, Loveridge noted that his staff would not swim in crocodile-inhabited waters at Nyamkolo on Lake Tanganyika, despite locals swimming alongside the reptiles. One of these men explained to Loveridge (1940: 44) that while in some homes cats and dogs co-exist peacefully, if a strange dog or cat appears, the results maybe different: "these people and these crocodiles know each other of old".

At the community level, crocodiles were also important as intermediaries with the ancestors. This is particularly associated with origin myths in which the first man, or ancestor, emerged from deep pools, as in Shona and Venda religious tradition (Huffman 1996 cites several sources from the 1920s to the 1940s, regarding what he terms the Zimbabwe culture area). Crocodiles as amphibious animals linked the world below with the world above. In the late 1800s and the early 1900s, Theal (cited in Besterman 1930) reported that a number of Bantu peoples in southeastern Africa regarded

crocodiles as spiritually significant animals, and ancestors could visit them in the form of a crocodile.⁴ Thus crocodiles should be protected, unless they behaved unusually (meaning dangerously), in which case, they could be driven away or even killed if necessary.

According to Besterman (1930) some southern African peoples, including the Awemba (Bemba) and Barotse (Lotse) of Zambia and the Matabele of southern Zimbabwe, believed they could be reborn into certain animals, including crocodiles. Malcolm (1922) reports an Eghap story to this effect from Cameroon, and a large crocodile that preyed on women on the Luena River in Western Province, Zambia, was supposedly the spirit of a bad man who had drowned (Sheane 1906).

Clans in the northern region (the Antankarana), central (the Betsileo) and south-central (the Bara) regions of Madagascar reportedly believed that their chiefs were reincarnated as crocodiles (Sibree 1880; Besterman 1930), while the Sakalava are supposed to have believed that the souls of bad persons were reincarnated in animals like snakes and crocodiles. Recent research confirms that some of these associations survive in northern and western Madagascar today: locals in Sava Region explained to researchers in 2013 that crocodiles were not hunted because the spirit of an ancestor may reside in these sacred animals (CITES 2013).

For some groups crocodiles symbolised social and political authority and power. This has long been the case in parts of West Africa where crocodiles adorn many of the famous 'Benin bronzes' of the sixteenth and seventeenth centuries (Blier 1995). Crocodiles are associated with the founder of the Kingdom of Baule (Ivory Coast), Queen Abra Poku (Guggisberg 1972), and when Félix Houphouët-Boigny created a new capital for Ivory Coast at Yamoussoukro, he created a crocodile-filled moat around the presidential palace (Naipaul 1985).

Crocodile imagery pervades the symbolism of the court language of the Venda and Shona peoples. Huffman (1996: 29) explains that the Venda proverb—"The crocodile does not leave its pool"—refers to the chief's ritual seclusion. According to Shona spiritual tradition, the first man and rain-maker emerged from the bottom of a sacred pool, and Shona chiefs were all linked to this first man. Crocodiles were likened to chiefs "in that they are dangerous, ferocious, and fear no enemies, they live for many years..." Chiefs were said to swallow gastroliths (stones swallowed by crocodiles, probably to aid digestion) to symbolically 'become' crocodiles, or to spend a night with a crocodile in a hut as part of their initiation into chieftdom (Huffman 1996). The Bemba are similarly reported to have associated crocodiles with royalty (Stigand and Lyell 1909).

Crocodiles have long been associated with spiritual power. In West Africa, crocodiles have been identified with the deities who rule springs and rivers, and as aquatic beings, are thought to be revealers of truth (Wylie 2013). One of the most striking contemporary manifestations of the association of crocodiles with water divinities is the hybrid figure known as Mami Wata, 'Mother Water.' An unmistakable mermaid figure, her image first appears on a late fifteenth century ivory salt cellar fashioned for the Portuguese by a Sapi carver on Sherboro

Island. The assumption is the European offered a mermaid image as a subject, which was ‘Africanised’ with the addition of two flanking crocodiles (Drewal 2008). Popular in the delta regions of Nigeria from the late 1800s, the cult of Mami Wata spread as far south as the Congo. She has been evoked as a protective spirit against oil companies in the Ogoni sector of the Niger delta (Wylie 2013). In other regions, she is regarded as a temptress evoking greed and sex and served by evil crocodiles, though others interpret her as a symbol of feminine agency and power in a male-dominated society (Drewal 2008; Wylie 2013).

Representations of crocodiles as spiritual forces or intermediaries to them, are typically ambivalent. As powerful ambush predators capable of great stealth and stunning speed of attack, crocodiles both symbolise the capriciousness of fate, and provide a means to divine the future and (for chiefs) the moment of death (Junod 1912 Vol. 2; van Binsbergen 1996). These conceptualisations address uncertainty and anxiety over life-and-death: as agents of the spirit world, crocodiles provide an explanation for the apparent randomness of death in the natural world, assuaging the horror this might otherwise hold. It is notable that for most of the peoples surveyed in this literature, ‘natural’ or ‘real’ crocodiles are not the primary agents of human death. Death by crocodile attack is more often attributed to either justice being meted out to immoral humans, or evil humans bewitching or becoming crocodiles to murder or maim their enemies or those of their clients.⁵

Relations exist between individual humans and individual crocodiles. These were often relations involving witches or wizards or those employing their powers, and crocodile familiars or were-crocodiles (discussed below). They could also be less fraught: Stanley (1891: 553) was told that at Ujiji on Lake Tanganyika there lived a crocodile that was “as learned as the seal of Barnum’s Museum in New York,” which obeyed its friend’s (one individual man) commands implicitly.⁶ Relations might also exist between communities and individual crocodiles: Lutembe was a “celebrated sacred crocodile” which frequented a bay on the shores of Lake Victoria between Jinja and Kampala (Pitman 1930; Huxley 1931: 248). Uganda game warden Charles Pitman (1930) claimed that the crocodile was used in trials by ordeal and in the 1920s a suspected thief was presented to Lutembe, who tore the man’s arm off and he died. The villagers felt justified as stolen articles were discovered among his possessions. Despite these provocative offerings, however, Lutembe never attacked other humans, and was regarded as a protective presence who kept other potentially dangerous crocodiles away. This provides a good example of the “attribution of subjective agency and unique personalities” to animals observed by Morris (2000: 38–40).

Crocodile attacks: Remedies and explanations

Africans coped with the uncertainties of living alongside crocodiles as potentially dangerous predators in a variety of ways. These can usefully be divided into what Morris (2000) refers to as ‘social praxis,’ and ‘culture.’ In the former category belong ‘everyday’ interactions and precautions made without

overt spiritual or other symbolic overlay. The Wapokomo people living along the banks of the Tana River in Kenya typify this matter of fact attitude: said to be “singularly fearless as regards crocodiles,” they explained that “we eat each other” (Werner 1913: 463). As Morris (2000: 43) cautions, however, “the relationship between social praxis and cultural representations is ... a dialectical one”.

Crocodiles attacked Africans’ domestic livestock and in response, in many regions from the Egyptian Nile to the Congo, East Africa to Mozambique, and Madagascar, defensive structures like thorn fences and stockades were erected to enclose portions of rivers, streams or lakes (Grant 1864 and 1872; Livingstone and Livingstone 1866; Monteiro 1876; Sibree 1880; Gibbons 1898; Lyell 1913; Loveridge 1928). Herbert Lang (1919: 433–434) led the American Museum Congo Expedition (1909–1915), observing “semi-circular palisades” in rivers near villages where crocodiles occurred, and the trapping of crocodiles by hunters and fishermen in such places.

Sayce (1906: 198–199) reported that, “Nile-sailors never get into the water without shouting, and men who work the shadufs [pumps] on the banks, where they were liable to be carried off by the crocodiles, still keep up a shrill shout or song while they raise the water.” At Gondokoro on the Nile, Grant (1872: 314) saw “the natives constantly swim across the great river in company ... yelp[ing] like dogs ... to frighten away the crocodile.” Grant thought this very brave, but foolhardy. Making a lot of noise through shouting and splashing was also the approach of Hamran Arabs in the Sudan (Myers 1876) and Africans in Togo (Gehrts 1915). The author’s crocodile attack data suggest this is a very poor tactic (Pooley 2014).

Narrating his expedition along the Zambezi River (1852–1856), Livingstone (1858) remarked on the very different relations that people living at different places along this river had with crocodiles. At Sesheke, crocodiles were numerous and attacks on humans and livestock were common. However, as far as he could discover, no symbolic meaning was attached to such attacks. Livingstone was puzzled by the equanimity people here showed towards the risk of crocodile attacks. In contrast, for people from the “Bamangwato and Bakwain tribes⁷, if a man is either bitten or even had had water splashed over him by the reptile’s tail, he is expelled his tribe [sic]” (Livingstone 1858: 277). Attacks might be accepted as a natural hazard, or result in accusations of witchcraft and social exclusion, either of those deemed to have incited the attack, or of the victims if they survived (Monteiro 1876; Bentley 1891; Glave 1892; Kingsley 1897).

Cultural interpretations of crocodile attacks

Africans have tended not to blame *all* crocodiles for attacks, in striking contrast to many Europeans, who very often in the recorded accounts, sought vengeance on the entire species (e.g., Sykes 1903; Lyell 1923). It seems that some African societies have had a concept of a shared ethical community with crocodiles; a shared legality of behaviour and punishment. Man-killing crocodiles could be treated as criminal exceptions

and punished accordingly. According to Frazer (1922: 519), people living near Lake Itasy in Madagascar made a “yearly proclamation to the crocodiles, announcing that they will revenge the death of some of their friends by killing as many crocodiles in return, and warning all well-disposed crocodiles to keep out of the way, as they have no quarrel with them...”

Johnston (1910) recounts the story of a man-eater, which troubled the district of Bopoto, upper Congo, until it was shot by a retired African soldier. Once ashore, the body was beaten with sticks and admonished for killing various persons. Livingstone (Livingstone and Livingstone 1866: 311) describes how Batoka villagers killed a crocodile which had attacked a woman drawing water, and mounted its head on a pole “as they were wont to do the heads of human criminals and of strangers.” Tangye (1910) described a similar instance near Renk on the White Nile in what is now southern Sudan.

The anthropologist John Knight (2000: 17-18) argues that predatory animal behaviour is disturbing because it is both an external threat, and also triggers fears about ‘the beast within’ which humans must control and transcend. Were-animals (shape-shifters) are inwardly and outwardly transformed human beings, and the threat they pose is a moral one. Predators preying on humans raise the possibility of the violation of species boundaries. There is some support for this argument with regard to attitudes to eating crocodiles. Venning (1953) relates that while many Subia people (of what is now Zambia) ate crocodile meat, they would never eat one which had eaten a human: such crocodiles were burnt when killed. He witnessed this in Sesheke District in 1913, when an employee’s daughter was taken by a ten-foot crocodile, which was hunted down and speared. Behra (1990) reported that in Madagascar crocodiles were not eaten because eating a crocodile that had eaten a human would amount to cannibalism. Pitman reports (1941), but gives no specific example or reference, that in West Africa humans who eat crocodile meat are believed to become cannibals.

An example of how social praxis and cultural perceptions were intertwined is provided by the Nuer, who were supposed to avoid eating animals that could consume human flesh—except for crocodiles. Hutchinson (1992) was told there were two types of crocodile, ‘white’ or ‘cattle-eating’ and ‘black’ or ‘people-eating’ crocodiles. However they were hard to tell apart (colour was symbolic), so stomach contents of large crocodiles were examined for evidence of human remains before the meat could be eaten.

Evans-Pritchard (1956) relates that some Nuer clans regarded crocodiles as Spirit, but also (separately) as physical crocodiles. More broadly, Africans often made an important distinction between ‘normal’ crocodiles and ‘were’ or spirit crocodiles. With the former, accidents could occur: the latter attacked with intent. Protective measures against the former were physical: against the latter, magical.

From a conservation perspective, the idea of spirit crocodiles, or ethical community with crocodiles, can prevent the killing of ‘innocent’ crocodiles for the ‘crimes’ of others. On the other hand, attributing crocodile attacks to spiritual causes can defeat attempts to instil physical mitigation measures and take simple

precautions to avoid being attacked. Holman Bentley (1900 Vol. 1) recounts that near Manyanga on the Upper Congo, fishermen ignored large crocodiles to attend to their traps, insisting that real crocodiles didn’t eat people; only a witch transformed into a crocodile would do so.

Witchcraft has long been a theme of anthropological studies in Africa. Frazer (1922) writes that the Fan people of Gabon believed that sorcerers upon initiation united their lives with particular wild animals by rite of blood-brotherhood. These animals (including crocodiles), chosen for their ferocity and stealth, became the sorcerers’ familiars and did their bidding including harming their enemies (Frazer 1922). In Nigeria/Cameroon, particular villages in the Cross River Valley had similar relations with particular animal familiars, including crocodiles (Frazer 1922). Similar ideas were attributed to the Bavili people in what is now the Republic of Congo (Dennett 1905), and the Tonga of southern Mozambique (Junod 1912). On the Pangani River in Karogwe District, Tanzania crocodiles are allegedly fed and tamed and in return perform services for their owners including carrying them over rivers, assassinating their enemies, and abducting women (Scott and Scott 1994). These relationships were usually understood to link individual animals and humans, and did not extend to crocodiles generically. Although attributing causality of crocodile attacks to magical influences, they show natural history knowledge of crocodiles’ behaviour.

There is a long record of accusations of witchcraft involving ‘crocodile magic’ among Tonga speakers in southern Zambia, noted from the early 1900s (Gouldsbury and Sheane 1911) and regularly between the 1940s and the 1970s (Colson 2000). This manifested in dramatic fashion amidst the HIV/AIDS epidemic of the 1990s among the Goba people in Chiawa village (Yamba 1997). A self-proclaimed witch finder named Chaka accused a local traditional healer of controlling a crocodile which he used to hurt people, and tried to force him to summon the crocodile from the river. The accused was forced to confess his relationship with the crocodile to escape certain death through drinking Chaka’s poison tea, which supposedly only killed the guilty. This reveals dialectical relations between social practices of healing, and cultural beliefs about bewitchment; of physical and spiritual malaises in which crocodiles as physical animals and servants of witches are entangled, with potentially fatal consequences for humans and crocodiles.

Another important category of explanations for crocodile attacks has been the idea that crocodiles only attack people who had sinned, as Livingstone (1858) reported of the BaNgwato and Bakwena of Botswana. On the Zouga River east of Lake Ngami in Botswana, Livingstone met a BaNgwato who had been exiled after being bitten by a crocodile (the man bore the scars). Elton (1872) reported that the Amatonga he encountered in southern Mozambique held similar ideas. Pitman (1930) and Huxley (1931) recorded that the crocodile Lutembe was involved by Buganda locals on Lake Victoria in trials by ordeal. Judicial ordeal by crocodile was reported as widespread in Madagascar in the 1800s, including along the

Matinàna River (Sibree 1880; CITES 2013). Researchers working in Sava Region, Madagascar in 2013 were unable to obtain “logical reasons for the explanations of [crocodile] attacks from locals” because “the persons killed or injured are considered to have done something bad” (CITES 2013).

Crocodile attacks were also interpreted as the manifestation of the anger of the ancestors, at being neglected by the living, or offended by their actions (e.g., Junod 1912 Vol. 2). Europeans have long been baffled by this cultural perspective about attacks, which to their minds endangers Africans (e.g., Duff 1903; Sykes 1903; Stevenson-Hamilton 1917; Pitman 1930; Lamarque et al. 2009).

The variety of causal explanations for crocodile attacks can also be inferred from the measures taken to avoid attacks. These included magical charms, defensive structures, and strategies regarding how to behave when entering the water or crossing watercourses. Speke (1864) recorded that on Kasengé Island in Lake Tanganyika locals staked out a bathing area using the bough of a particular tree which was supposed to repel crocodiles.⁸ Comyn (1911) reported that on the upper Pribor River in southern Sudan, a red (unidentified) flower was thrown into water to blind crocodiles. Writing of Sudan, Baker (1890: 256) professed himself astonished at “the risks incurred by Arabs whose faith in some special charm ... is sufficient to induce them to brave all dangers, and to defy the fate which so frequently befalls them.” There are many similar accounts of the use of charms and ‘medicine’ to prevent attacks (see Appendix 2).

Utilisation

The diversity in cultural attitudes to crocodiles is also apparent from the wide variety of purposes for which crocodile body parts were (and are) used by Africans. Various African groups hunted and trapped crocodiles, most commonly for food, and they also used body parts for artefacts, for leather work, for medicines or magic, as aphrodisiacs and for their musk (see Appendix 2). ‘Arabs’ and Africans hunted crocodiles professionally. Samuel Baker (1868) gives a graphic account of a crocodile hunt with harpoons undertaken by ‘Jalyn’ (Ja’alin) howartis (hippo hunters) in the Atbara River in Abyssinia (Sudan) in the 1860s. He later observed that Arabs hunted crocodiles professionally in the Sudan as they could sell their meat and musk (1890).

Crocodiles were hunted with harpoons by Mpongwe people on Lake Anengue in Gabon (du Chaillu 1861), by fishermen and hippopotamus hunters at Dongola on the Nile in northern Sudan (Rüppell 1835), and along the Shebelle (Shabeelle) River near Bari (Bariire) in Somalia (Smith 1897) and elsewhere, but also caught in traps or with baited hooks (Livingstone and Livingstone 1866; Campbell 1955; Pooley 1982). In the late 1940s, a party of immigrant Hausa from West Africa worked as professional crocodile hunters at Wau in the Bahr-el-Ghazal, southern Sudan (Owen 1948). They showed intimate knowledge of crocodile behaviour, going out at night and clapping their hands and uttering ‘a curious, bubbling bleat’

and other sounds which attracted the crocodiles. The hunters blinded the crocodiles with torches and harpooned them.

On the river Congo near Ngombé, the explorer Henry Morton Stanley (1885) was approached by Africans in canoes selling crocodiles. He reported that Africans hatched out crocodile eggs and raised the young to sell them for meat. This is certainly the first recorded case of commercial crocodile farming in Africa. Along the Ubangi River (a tributary of the Congo), the African Dwarf Crocodile (*Osteolaemus* species) was “kept in enclosed pools and bred for consumption” (Johnston 1910: 614). It is very widely used for bushmeat across Central Africa today (Eaton et al. 2009), though apparently the crocodiles are sourced from the wild. The idea of sustained utilization (farming) has yet to be proposed as a conservation measure for these small, protected animals.

Neighbouring African peoples might either eat crocodiles with relish, or hold strong religious objections to eating them (du Chaillu 1861; Baker 1890; Maugham 1906; Stigand and Lyell 1909; Campbell 1955). Adams (1870), Baker (1868), Speke (1868) and Grant (1864 and 1872) observed that in North Eastern Africa, people they described as ‘Arabs’ (possibly Omanis), ‘Turks’ (Ottomans) and ‘Mussulmen’ (Muslims of all races) ate crocodiles. Speke and Grant record that Africans travelling with them in this region professed disgust and identified eating crocodiles as something peculiar to Muslims (the names used are imprecise, and within Sunni Islam, different interpretations of dietary restrictions co-existed.)

Some groups ate crocodile meat but avoided eating the flesh of crocodiles that had eaten a human (Pitman 1941; Venning 1953; Behra 1990). Again, this was not a universal custom: Bentley (1900) reports that some Africans near Lukolela on the Congo ate the flesh of a crocodile that his men had just shot for eating one of his mission’s office workers. After a South African game ranger shot a crocodile which contained the remains of a human, a Tonga game guard ate a sliver of the crocodile’s flesh in order to acquire immunity from attack (Pooley 1982).

Lagercrantz (1950) mapped areas (mostly East Africa from Kenya to Lake Malawi) where the eating of eggs (of domestic fowl) was forbidden. This overlaps with areas where travelers encountered professed disgust at the idea of eating crocodile eggs, so it seems that such prohibitions extended to crocodiles (and were not unique to them). Lagercrantz argues that the primary reason for avoiding eggs was an association with eggs and fertility, where egg-eating was believed to cause infertility (Lagercrantz 1950). Of the nineteenth century explorers in search of the source of the River Nile only Livingstone (Livingstone and Livingstone 1866) recorded an instance where eggs were collected and eaten, along the Rovuma River. Speke (1868) and Grant (1872) reported that ‘Turks’ ate crocodiles flesh and eggs, but their Zanzibari bearers refused to. Sibree (1880) noted crocodile eggs sold in markets on Madagascar.

Magical properties

Although wildlife is considered a common property resource in most African societies, the killing of animal species used

in powerful traditional magical medicines has been subject to strict controls. Across southern Africa, leaders (chiefs) in partnership with traditional healers control access to them. Cunningham and Zondi (1991) provide examples, including restrictions on the use of lion fat, spotted predator skins and the liver and brains of crocodiles to prevent their abuse in *ukuthakatha* sorcery. They cite Van Tonder (1966) who relates that in haMbukushu society, in Okavangoland (northwest Botswana), crocodile brain is the most potent poison and severe punishment awaits those who fail to summon the Chief to supervise the disposal of the brain matter.

Similar ideas about the poisonous nature of crocodile body parts (also the fat, liver and gall bladder) and the necessity to control the disposal of crocodile parts were reported for people in the lake regions of East Africa (Burton 1859), Nigeria (Burton 1863), locals at Muxima in Angola (Monteiro 1876), the Matabele in southern Zimbabwe (Selous 1907), and Tonga people in northern KwaZulu-Natal Province, South Africa (Pooley 1982; Cunningham and Zondi 1991). Adeola (1992) records widespread use of crocodile body parts in Christian, Muslim and Olokun religious ceremonies in Nigeria, as well as pharmacological uses.

The pharmacologist N.Z. Nyazema (1984: 103) complained that many Zimbabweans believed that crocodile bile was used as a poison, mixed into beer or porridge. Nyazema tested the toxicity of crocodile bile on mice and a chacma baboon, with the result that “no signs of toxicity or mortality were observed”. Tony Pooley (1982) records a hunger strike when sugarcane workers at Mfolozi Sugar Mill in KwaZulu-Natal, South Africa, feared their food had been poisoned with crocodile liver. He considered that it was the preparation rather than the substance that caused illness. In January 2015, 69 Mozambicans from the villages of Chitima and Songo died following a beer drink in Tete Province: the deaths were attributed to poisoning with crocodile bile (Anon 2015).

Crocodiles' body parts could be used for malevolent purposes, but were also used for their powerful protective properties (see Appendix 2, also for treatments of bodily ailments). The disturbing *bochio* (meaning ‘empowered cadaver’) figures found throughout lower Benin and Togo, where *vodun* is a feature of cultural life, often incorporate potent materials, including crocodile skulls. Crocodiles were valued for protection against malevolent forces, but the bile of crocodiles was forbidden to Fa diviners as although Fa-*bochio* were meant to be protective objects, the inclusion of such pollutants could turn them into malevolent objects (Blier 1995: 208). In South Africa, where crocodile bile and liver were believed to be very poisonous, crocodile fat was widely used as an antidote to poison administered in this way (Cunningham and Zondi 1991). Crocodile scales were used as aphrodisiacs in Nigeria (Adeola 1992), and allegedly women and girls of the Yao of southern Malawi, and others, kept gastroliths in their mouths to aid fertility (on gastroliths, see Lagerkrantz 1952).

The idea of farming crocodiles to supply traditional *materia medica* (and therefore provide reasons to tolerate crocodiles) has been discussed (CSG 2010), but apparently nowhere pursued,

perhaps because of concerns over the evil as well as the good purposes for which such powerful substances might be used.

DISCUSSION

In some regions, local attitudes to crocodiles are predominantly hostile, usually because of impacts on human lives and livestock (Lamarque 2009; Wallace et al. 2011), and perceived competition for fish and damage to nets, for instance in Binga District, Zimbabwe (McGregor 2005) and in northeastern Namibia (Aust et al. 2009). In such regions, education about crocodile behaviour, protective structures, and lethal control must be considered. In many instances, however, efforts to mitigate such conflicts will be improved by an attempt to understand the ecological, social and cultural dimensions of the history of local human and crocodile behaviour and interrelations. The challenge for existing conceptualisations of human wildlife encounters is to find ways of studying humans and predators together, to explore their co-produced sociabilities. New work on human-animal geographies which explores how animals adapt their life course rhythms to human ecologies (Lorimer 2015), and multispecies ethnographies which draw on techniques from ethnography and ethology (Kirksey and Helmreich 2010), offer ways forward here.

The idea of an ethnoherpetology of crocodiles proposes that there are lessons ethnologists and natural scientists could draw from one another's disciplines. The anthropologist Matei Candea (2010) was stimulated to move beyond his discipline's mistrust of the detachment cultivated by natural scientists studying animal societies, after he worked with researchers in the field with their meerkat subjects. He found their disciplined detachment acknowledged but tried to minimise human influence on the behaviour of their subjects, and the ways in which the meerkats engaged human emotional as well as intellectual responses. For this to work, the animals had to become used to the researchers, and learn to trust and tolerate them. This relationship of polite indifference involved ‘being with’ rather than ‘being together’. The point was that trying to be objective observers didn't entail human domination or rendering the animal as ‘other’ or disempowered ‘object’.

The particular animals being studied were presented to a wider public via the television series *Meerkat Manor*, which resulted in quite different imagined relationships, where viewers identified emotionally with particular individuals. These little inhabitants of the Kalahari were rendered cosmopolitan through this process, influencing publics on different continents to engage emotionally with wildlife and support conservation. Such cosmopolitan species (Lorimer 2015) motivate support for conservation in ways conservationists or locals find problematic, for example, through a desire to ‘save’ individuals through medical or other interventions.

Both anthropologists and ethologists need to move beyond methodological and ideological distrust and disapproval of these kinds of relations with wild animals, accept their existence, and engage with their diversity. It seems more useful to investigate the complexity inherent in the concept

of habituation, for instance, than to castigate either scientists for ignoring their influence on animal behaviour, or members of the public for indulging egocentric impulses to interact with animals, and thereby possibly endanger them or render them less 'wild.'

It certainly is potentially dangerous to habituate predators to humans through feeding them. Some 'sacred pools' have become tourist destinations, and allowing visitors to handle the crocodiles may be asking for trouble. In 2012, the long-term keeper of the crocodiles at Yamoussoukro was eaten by one of his charges (James 2012). Nevertheless, it may be more fruitful to learn more about what is going on in such interactions, than to dismiss them out of hand as unwise, unethical or unnatural.

Instead we could ask: by what processes have humans and crocodiles on Lake Baringo, or at sacred crocodile pools at Paga in northern Ghana, Bazoule in Burkina Faso, Amani in Mali or Bakau in the Gambia (Wylie 2013), arrived at relationships of mutual toleration? In addition, what kinds of relations develop between scientific researchers and the crocodiles they study? Pooley (1982) found wild crocodiles became habituated to his presence more quickly when they could see him, than when he remained concealed in a hide. Individual captive crocodiles retained markedly different tolerances for proximity to humans. A multispecies lens opens up possibilities for studying the processes through which such relationships are negotiated.

Multispecies ethnographies encourage us to think about crocodiles as individuals with particular histories, with character, and as animals with local cultures of behaviour developed in the absence or presence of particular human societies, and their beliefs and practices. Rather than seeing them as generic killing machines, we could: 1) recognise crocodiles as individuals with particular histories and relations with humans, like Lutembe; 2) consider the implications of the innocence and inquisitiveness towards humans shown by the crocodiles of Central Island, Lake Turkana; 3) acknowledge the peaceable relations between crocodiles and humans on Lake Baringo and at the sacred pools; and 4) ponder what has shaped the behaviour of the aggressive crocodiles of Sesheke.

Crocodiles have often been represented by Europeans as reptilian 'intruders' in the realm of mammals (Pooley 2016a). Rather, we should rethink the contact zones where humans and crocodiles interact, and consider how we shape each others' behaviour. In my lifetime I have seen crocodiles and humans share good fishing at Lake St Lucia Estuary, South Africa, where Combrink (2015) showed, through radio telemetry, that crocodiles are much more present and active than humans realise. In 2015, Combrink and I sat in a boat on the southern shore trying to noose crocodiles for science, while they bobbed away without giving up their spot where freshwater flows into the brackish Estuary and fish abound. Opposite, young men showed off their machismo by seeing who could get closest to the wild crocodiles they were feeding with chicken bought at the local supermarket. We shared their excitement about interacting with crocodiles, but disapproved of their reasons. Were we supposed to feel more sympathetic to our human

brothers and the danger they faced, or to the habituated reptiles and the fate which awaited any which killed a man? At least seven humans have been killed here since the 1950s (my unpublished data), in one instance in direct competition for a fish. Considering the hundreds of thousands of holidaymakers visiting annually, and widespread indifference to signs warning of the presence of crocodiles, this seems very low.

At St Lucia, sufficient fish or fishing for recreation rather than survival means there have been few serious conflicts. In some other African waterways, however, competition for fish and destruction of nets by crocodiles has resulted in more serious conflicts. Multispecies ethnographies would have us consider not just human-crocodile encounters, but also human and crocodilian interactions with prey species like fish, as well wild and domestic animals and related practices like hunting and transhumance. These interactions are further enmeshed in biophysical factors which shape their seasonality (e.g., seasonal fluctuations in water levels and temperature).

Crocodiles' social behaviour results in concentrations of animals in particular areas at certain times of year, where complex gender politics are played out, and their physiology makes them more active at certain times in response to environmental conditions (Pooley 1982). Human cultural practices around utilisation of waterways for recreation, and social conventions like holidays and the school day, similarly determine peak times when humans utilise waterways where crocodiles occur. We still do not know enough about how these social and biophysical factors interact in space and time, to co-produce particular human-crocodile encounters and relations in particular places. To begin to do so we need to move beyond mathematical models of population dynamics based on population genetics, which strip away all social relations, and recover an older tradition of natural history which has become deeply unfashionable in the natural sciences (Tsing 2013).

We also need a historical perspective, because physical environments and animal and human societies have mutually constitutive histories. Human-crocodile relations have changed at St Lucia: in the 1950s crocodiles were forced into the Estuary by the transformation of wetlands upstream for agriculture, and several attacks on humans occurred in the modified wetlands and the lake. These were mobilised in a fight over land use to try to get the Lake de-proclaimed as a protected area, with public calls for the extermination of crocodiles. The provincial conservation authority was forced to hire a hunter to shoot crocodiles, to mollify public opinion, but set out to improve scientific and public understanding of crocodiles (Pooley 2013). Tony Pooley opened a crocodile research centre with extensive interpretation facilities about crocodiles at St Lucia in 1976. By this time crocodiles were protected, and 'problem' animals caught rather than killed. Crocodiles are today a valued feature of this United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Park and were a factor in calls for its proclamation. Relations remain complex, however: some tourists enjoy seeing them while others resent their presence as a curb on their recreation; scientists are fascinated by their behaviour and ecological role

in the lake system; for some young men they are a means to validate their conception of masculinity; and for some Africans, they retain potency as a source of powerful medicines.

For conservationists, negative human-crocodile relations have been a focus. This paper argues that it is helpful to explore the full range of explanations given for attacks on humans, from the ecological to the metaphysical. The question of agency, of who instigated an attack, is not a trivial one. Different parties may attribute this to the individual animal, to generic species behaviour, to the prevailing ecological circumstances, to human carelessness or ignorance, to vengeful ancestors, or to spirit or 'were-crocodiles'. For some Nuer clans, for example, some attacks may be attributed to physical crocodiles and appropriate physical actions taken in response; but others may be attributed to spirit crocodiles. There is no simple, invariable rule to apply for understanding encounters between particular peoples and crocodiles in specific places.

Conservationists need to decide how to work with local perceptions of crocodiles. In some cases these can be positive for conservation purposes. A striking observation that emerges from this review of historical sources is that in very many regions, Africans have tended not to seek vengeance for attacks on *all* crocodiles. Some Africans have understood crocodile attacks as punishments for immoral acts. Elsewhere 'man-killing' crocodiles were regarded as were-crocodiles, either sorcerers in crocodile form, or bewitched crocodiles. Attacks were conceived of as the outcome of relationships between individual animals and humans, often to act out human-human conflicts. On the other hand, man-killing crocodiles may be treated as criminal exceptions and punished accordingly. It seems that some Africans have a concept of a shared ethical community with crocodiles; a shared legality of behaviour and punishment (see Morris 2000: 37). Of course, traditions are not set in stone, and may evolve or disappear. Where crocodiles were previously not eaten by locals in northern KwaZulu-Natal and Swaziland, the meat has recently become popular in the region (Viljoen 2014; Zulu 2015), with potentially serious consequences for wild crocodiles living outside protected areas.

The attribution of agency in the case of crocodile attacks influences who is held responsible for attacks. Is it the conservation authorities who protect (and fail to curb the behaviour of) predators? Is it the immoral behaviour of the individual attacked, or of someone who put a curse on that person? Is it an 'act of god,' or an unfortunate accident? The concepts and language used to describe and explain human-crocodile conflicts may express profound epistemological differences. Attempts at conflict resolution which ignore, exclude or oversimplify local perceptions of and attitudes towards wildlife and related behaviour—and which are not reflexive about the goals and perceptions of outside experts and agencies—are unlikely to succeed (Madden and McQuinn 2014).

The case studies discussed here reinforce Morris's (2000: 34) advice "not to set up a radical dualism between the Western conceptions of animals...and the conceptions of other cultures, which are likewise interpreted in a rather monolithic fashion

as involving trust, giving, reciprocity, sacramentality, or a 'benign attitude towards animals'." On the contrary, Morris (1998: 34) urges us to recognise that "human social attitudes and relationships to animals are never monolithic," and that all human societies have "diverse, multifaceted, and often contradictory attitudes toward the natural world, especially towards animals."

CONCLUSION

In localities with persistent negative encounters between humans and crocodiles, and where mitigation measures are not being implemented, it seems advisable to investigate the kinds of relationships between humans and crocodiles outlined in this paper. These relations may be conceptualized in a great diversity of ways: as between human and crocodile societies, between humans and individual crocodiles or individual humans and individual crocodiles, with varying degrees of interaction with the spirit world. Interventions should take into account personal beliefs and attitudes to crocodiles, and how these may vary in different social or professional contexts. It is important to consider social norms about how to interact with crocodiles, and to investigate which individuals and community authorities are regarded as responsible for regulating human-crocodile interactions. These actions of humans and crocodiles should be considered in environmental and historical context.

We need more studies of the kind undertaken by Kpéra et al. (2014) in northern Benin. In a study of human-crocodile relations in three communities living next to agro-pastoral dams, they found that differences in institutional arrangements and attitudes towards sharing a dam with crocodiles had notably different outcomes in human-crocodile relations. Of the three villages studied, Fombawi—where people adapted their behaviour in line with traditional beliefs and practical rules for coexisting with crocodiles—experienced the lowest level of crocodile attacks on domestic animals and damage to nets and the dyke, per crocodile present in their dam.

Kpéra et al. (2014: 331) postulate that "the behaviour of wildlife, at least to a certain extent, is constructed in interaction, both, between people and crocodiles, and among people." This enlarged conception of more-than-human agency is an important theme in multispecies studies, and seems like a fruitful point of departure for future studies aimed at improving human-crocodile coexistence across the enormous diversity of social and ecological contexts in which this might be fostered across Africa.⁹ It encourages conservationists to engage in place-based studies of human-crocodile relations, which recognize their ecological and social dimensions, and grapple with the dialectical interplay of social structures, cultural representations and agency—which Brian Morris brings to light in his work.

NOTES

1. More details, including graphics of the data, are included in Pooley (2016a), focused on European encounters with crocodiles.

2. For a detailed study of European encounters with Nile crocodiles, see Pooley (2016a) and Musambachime (1987); and on literature and film, Pooley 2013.
3. Probably the Kabompo, a tributary of the Zambezi in Western Zambia.
4. Theal refers to tribes from the Zambezi to as far south as the Fish River in South Africa, but names only the Bakwena, a South Sotho clan from southern Botswana named after their totem animal the crocodile. The Kingdom of Lesotho, a crocodile-free mountain kingdom, has a crocodile on its coat of arms.
5. Morris (2000: 66) writes of Malawians: “a witch can be defined as a generic human being who is not a real person—defined as a social and moral being—but who...motivated by greed, malice, anti-social tendencies, and using medicines, wreaks harm or even kills, his or her kin or neighbours.”
6. We now know that crocodiles are highly trainable (Morrissiey et al. 2014).
7. The BaNgwato are a Tswana Chieftancy in eastern Botswana, and the Bakwena clan Livingstone refers to lived in southeast Botswana.
8. It is unclear where this was; possibly Kavala Island or the peninsula north of Kibanga.
9. Crocodile attack data is poor for Africa, but the online database CrocBITE and some recent studies suggest that good regions for such research include the Kavango and Caprivi regions of Namibia, Botswana’s Okavango Delta, the lower Zambezi and shores of Kariba Dam in Zambia, Tete Province in Mozambique, and southeastern Madagascar.

REFERENCES

- Adeola, M.O. 1992. Importance of wild animals and their parts in the culture, religious festivals, and traditional medicine, of Nigeria. *Environmental Conservation* 19(2): 125-134.
- Álvares, F., J. Domingues, P. Sierra, P. Primavera. 2011. Cultural dimension of wolves in the Iberian Peninsula: implications of ethnozoology in conservation biology. *Innovation: The European Journal of Social Science Research* 24: 313-331.
- Anon. 2015. Mozambique links contaminated beer deaths to crocodile bile. Associated Press in Maputo, 12 January 2015, available at: <http://www.theguardian.com/world/2015/jan/12/contaminated-beer-at-funeral-kills-56-in-mozambique>. Accessed on November 29, 2016.
- Aust, P., B. Boyle, R. Fergusson, T. Coulson. 2009. The impact of Nile crocodiles on rural livelihoods in northeastern Namibia. *South African Journal of Wildlife Research* 39: 57-69.
- Baynes-Rock, M. 2013. Local tolerance of hyena attacks in East Hararge Region, Ethiopia. *Anthrozoös* 26(3): 421-433.
- Behra, O. 1990. Reports of crocodiles attacks on people in Madagascar 1990 to 1996. *Crocodile Specialist Group Newsletter* 15(3): 4-5.
- Berger J. 2008. *The better to eat you with: fear in the animal world*. Chicago, IL: University of Chicago Press.
- Blier, S.P. 1995. *African Vodun: art, psychology and power*. Chicago, IL: University of Chicago Press.
- Candea, M. 2010. “I fell in love with Carlos the meerkat”: Engagement and detachment in human–animal relations. *American Ethnologist* 37: 241–258.
- Cavalcanti, Sandra M., Silvio Marchini, Alexandra Zimmermann, Eric M. Gese, and David W. Macdonald. 2010. Jaguars, livestock, and people in Brazil: realities and perceptions behind the conflict. In: *The biology and conservation of wild felids* (eds. Macdonald, D. and A. Loveridge). Pp. 383–402. Oxford: Oxford University Press.
- CITES. 2013. *Madagascar Crocodile Project Final Report*. Report prepared by General Directorate for Forests, Ministry of Environment and Forests of Madagascar (CITES Management Authority). Geneva: Switzerland.
- Colson, E. 2000. The father as witch. *Africa: Journal of the International Africa Institute* 70(3): 333-358.
- Combrink, A.S. 2014. Spatial and reproductive ecology and population status of the Nile crocodile (*Crocodylus niloticus*) in the Lake St Lucia estuarine system, South Africa. Ph.D. thesis. University of KwaZulu-Natal. South Africa.
- CrocBITE. 2016. The worldwide crocodilian attack database. Available at: <http://www.crocodile-attack.info/>. Accessed on November 29, 2016.
- CSG. 2010. Crocodiles: proceedings of the 2nd congress the Crocodile Specialist Group on the promotion and conservation of crocodilians in West Africa. Nazinga, Burkina Faso, from 2-6 March 2010. Gland: IUCN.
- CSG. 2016. Human-Crocodile Conflict. Available at: <http://www.iucncsg.org/pages/Human%252dCrocodile-Conflict.html>. Accessed on November 29, 2016.
- Cunningham, A.B. and A.S. Zondi. 1991. Use of animal parts for the commercial trade in traditional medicine. Working Paper No.76. Pietermaritzburg: Institute of Natural Resources.
- Diawuo, F., A.K. Issifu. 2015. Exploring the African traditional belief systems in natural resource conservation and management in Ghana. *The Journal of Pan African Studies* 8(9): 115-131.
- Dickman, A.J., L. Hazzah. 2016. Money, myths and man-eaters: complexities of human-wildlife conflict. In: *Problematic wildlife: A Cross-Disciplinary Approach*. (ed. Agelici, F.M.). Pp. 339-356. Berlin: Springer.
- Douglas, M. 1966 [2003]. *Purity and danger: an analysis of concepts of pollution and taboo*. London: Routledge.
- Drewal, H.J. 2008. Mami Wata: arts for water spirits in Africa and its diasporas. *African Arts* (summer): 60-83.
- Eaton, M.J., A. Martin, J. Thorbjarnarson, G. Amato. 2009. Species-level diversification of African dwarf crocodiles (Genus *Osteolaemus*): a geographic and phylogenetic perspective. *Molecular Phylogenetics and Evolution* 50(2009): 496–506.
- Eriksen, T.H. 2009. *What is Anthropology?* London: Pluto Press.
- Flanagan, J. 2002. Idi Amin’s island of slaughter for sale. *The Telegraph*. June 2, 2002.
- Goin, C.J. and O.B. Goin. 1962. *Introduction to herpetology*, 2nd edition. San Francisco, CA: W.H. Freeman.
- Grigg, G., D. Kirshner. 2015. *Biology and evolution of Crocodylians*. Ithaca, New York, NY: Cornell University Press.
- Guggisberg, C.A.W. 1972. *Crocodiles: their natural history, folklore and conservation*. Newton Abbot: David & Charles.
- Hekkala, E., M.H. Shirley, G. Amato, J.D. Austin, S. Charter, J. Thorbjarnarson, K.A. Vliet, et al.. 2011. An ancient icon reveals new mysteries: mummy DNA resurrects a cryptic species within the Nile crocodile. *Molecular Ecology* 20(20): 4199-215.
- Huffman, T. 1996. *Snakes & crocodiles: power and symbolism in ancient Zimbabwe*. Johannesburg: Witwatersrand University Press.
- Hutchinson, S. 1992. “Dangerous to eat”: rethinking pollution states among the Nuer of Sudan. *Africa: Journal of the International Africa Institute* 62(4): 490-504.
- Jackson, M. 1974. The structure and significance of Kuranko clanship. *Africa: Journal of the International Africa Institute* 44(4): 397-415.
- James, J. 2012. The crocodile feeder of Ivory Coast. BBC, September 13, 2012. <http://www.bbc.com/news/magazine-19576296>. Accessed on July 18, 2015.
- Kirksey, S.E., S. Helmreich. 2010. The emergence of multispecies ethnography. *Cultural Anthropology* 25: 545-576.
- Knight, John. 2000. Introduction. In: *Natural enemies: people-wildlife conflicts*

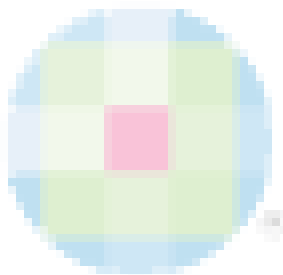
- in anthropological perspective. (ed. John Knight) London: Routledge.
- Kpéra, G.N., N. Aarts, R.C. Tossou, G.A. Mensah, A. Saïdou, D.K. Kossou, B. Sinsin et al. 2014. "A pond with crocodiles never dries up": a frame analysis of human–crocodile relationships in agro-pastoral dams in Northern Benin. *International Journal of Agricultural Sustainability* 12(3): 316-333.
- Kruuk, H. 2002. *Hunter and hunted: relationships between carnivores and people*. Cambridge: Cambridge University Press.
- Lamarque, F., J. Anderson, R.A. Fergusson, M. Lagrange, Y. Osei-Owusu, L. Bakker. 2009. *Human-wildlife conflict in Africa: causes, consequences and management strategies*. Rome: FAO.
- Lorimer, J., 2015. *Wildlife in the Anthropocene: conservation after nature*. Minneapolis, MN: University of Minnesota Press.
- Macdonald, D.W., A.J. Loveridge, A. Rabinowitz. 2010. Felid futures: crossing disciplines, borders, and generations. In: *The biology and conservation of wild felids*. (eds. Macdonald, D.W. and A.J. Loveridge,) Pp. 600-649. Oxford: Oxford University Press.
- Mackenzie, J.M. 1988. *The empire of nature*. Manchester: Manchester University Press.
- Madden, F., B. McQuinn. 2015. Understanding social conflict and complexity in marine conservation. In: *Human-wildlife conflict*. (eds. Draheim, M.M., F. Madden, J.-B. McCarthy, and E.C.M. Parsons). Pp. 3-16. Oxford: Oxford University Press.
- Marvin, G. 2012. *Wolf*. London: Reaktion Books.
- McGregor, J. 2005. Crocodile crimes: people versus wildlife and the politics of postcolonial conservation. *Geoforum* 36: 353-369.
- McLynn, F. 1992. *Hearts of darkness*. London: Hutchinson.
- Morris, B. 1998. *The power of animals*. Oxford: Berg.
- Morris, B. 2000. *Animals and ancestors: an ethnography*. Oxford: Berg.
- Morris, B. 2006. *Insects and human life*. Oxford: Berg.
- Morrissiey, F., Krebs, J., Reeves, A. 2014. Behavioral conditioning to assist in crocodilian conservation. In: *Proceedings of the 23rd Working Meeting of the Crocodile Specialist Group – IUCN – The World Conservation Union*/ Pp. 144-148 Gland, Switzerland and Cambridge, UK: The World Conservation Union.
- Musambachime, M.C. 1987. The fate of the Nile crocodile in African waterways. *African Affairs* 86: 197-207.
- Naipaul, V.S. 1985. *Finding the centre*. London: Penguin Books.
- Nyazema, N.Z. 1984. Crocodile bile, a poison: myth or reality? *The Central African Journal of Medicine* 30(6): 102-103.
- Peterhans, J.C.K., T.P. Gnoske. 2001. The science of 'man-eating' among lions *Panthera leo* with a reconstruction of the natural history of the 'man-eaters' of Tsavo. *Journal of East African Natural History*. 90: 1-40.
- Pooley, A.C. 1982. *Discoveries of a crocodile man*. Johannesburg: Collins & Sons.
- Pooley, A.C. 1989. Food and feeding habits. In: *Crocodiles and Alligators* (eds. Ross, C.A. and S. Garnett). Pp. 76-91. Sydney: Weldon Owen.
- Pooley, S. 2013. No tears for the crocodiles: representations of Nile crocodiles and the extermination furore in Zululand, South Africa, from 1956 to 1958. In: *Wild things: nature and the social imagination*. (eds. Beinart, W., K. Middleton and S. Pooley) Cambridge: White Horse Press.
- Pooley, S. 2014. Human crocodile conflict in South Africa and Swaziland, 1949–2014. In: *Proceedings of the 23rd Working Meeting of the IUCN–SSC Crocodile Specialist Group, Lake Charles, USA, 25–30 May 2014*. Pp. 236-245. Gland: IUCN.
- Pooley, S. 2016a. The entangled relations of humans and Nile crocodiles in Africa, c.1840-1992. *Environment and History* 33(2): 421-454.
- Pooley, S. 2016b. *Croc digest: a bibliography of human-crocodile conflict research and reports*. London: Simon Pooley.
- Redpath, S.M., R.J. Gutiérrez, K.A. Wood, R. Sidaway and J. Young. 2015. An introduction to conservation conflicts. In: *Conflicts in conservation: navigating towards solutions*. (eds. Redpath, S.M., R.J. Gutiérrez, K.A. Wood and J.C. Young). Pp.3-18. Cambridge: CUP.
- Scott, R., H. Scott. 1994. Crocodile bites and traditional beliefs in Korogwe District, Tanzania. *British Medical Journal* 309: 1691-1692.
- Soewu, D.A. 2008. Wild animals in ethnozoological practices among the Yorubas of southwestern Nigeria and the implications for biodiversity conservation. *African Journal of Agricultural Research* 3(6): 421-427.
- Stewart, W.P., D.R. Williams and L.E. Kruger (eds.). 2013. *Place-based conservation: perspectives from the social sciences*. Berlin: Springer.
- Stoneman, J. 1969. Crocodile industry in Uganda. Republic of Uganda Ministry of Animal Industry, Game and Fisheries. *Occasional Papers* 2: 15-21.
- Theroux, P. 2003. *Dark Star Safari: Overland from Cairo to Cape Town*. London: Penguin Books.
- Van Binsbergen, W. 1996. Regional and historical connections of four-tablet divination in Southern Africa. *Journal of Religion in Africa* 26(1): 2-29.
- Viljoen, A. 2014. Soweto next for Dan's croc braai. *The Witness* March 13.
- Wallace, K.M., A. Leslie and T. Coulson. 2011. Living with predators: a focus on the issues of human–crocodile conflict within the lower Zambezi valley. *Wildlife Research* 38: 747–755.
- Williams, D.R., P.S. William and L.E. Kruger. 2013. The Emergence of Place-Based Conservation. In: W.P. Stewart et al. (eds.). *Place-Based Conservation: Perspectives from the Social Sciences*, Dordrecht: Springer.
- Woodroffe, R. and S.M. Redpath. 2015. When the hunter becomes the hunted. *Science* 348(6241): 1312-1314.
- Woodroffe, R., S. Thirgood and A.R. Rabinowitz (eds.). 2005. *People and wildlife: conflict or coexistence?* Cambridge: Cambridge University Press.
- Wylie, D. 2013. *Crocodile*. London: Reaktion Press.
- Yamba, C.B. 1997. Cosmologies in turmoil: witchfinding and AIDS in Chiawa, Zambia. *Africa: Journal of the International African Institute* 67(2): 200-223.
- Zulu, J. 2015. Tail most eaten. *Times of Swaziland* February 5.

APPENDICES

Appendix 1: Primary Sources

- Adams, A.L. 1870. *Notes of a naturalist in the Nile Valley and Malta*. Edinburgh: Edmonston and Douglas.
- Anon. 1949. Crocodile control campaign. *East Africa* April 21 1949. Natural History Museum Library (London) Pitman collection Z.MSS PIT / C61 1936-73.
- Baker, S.W. 1868. *Exploration of the Nile tributaries of Abyssinia*. Dartford: O.D. Case & Co.
- Baker, S.W. 1890. *Wild Beasts and their ways*. London: Macmillan & Co.
- Bentley, W.H. 1891. *Life on the Congo*. Oakland, CA: Pacific Press Publishing Company.
- Bentley, W.H. 1900. *Pioneering on the Congo*, Vol. I. New York, NY: Fleming H. Revell Co.
- Besterman, Theodore. 1930. 'The belief in rebirth among the natives of Africa (including Madagascar),' *Folklore* (March): 44-45.
- Burckhardt, John L. 1835. *Travels in Nubia* (1819), excerpts in *The North American Review* 40 (April): 477-510.
- Burton, R. 1863. *Abeokuta and the Camaroon Mountains: an exploration* Vol. I. London: Tinsley Brothers.
- Burton, R.F. 1859. The lake regions of Central Equatorial Africa. *Journal of the Royal Geographical Society of London* 29: 1-454.
- Campbell, J. Soane. 1955. Crocodile stories from Barotseland. *Northern Rhodesian Journal* 5: 56-58.
- Cardinal, A.W. 1927. *In ashanti and beyond*. Philadelphia, PA: J. B Lippincott Co.
- Comyn, D.C.E. 1911. *Sport and service in the Sudan*. London: John Lane.
- Cott, H.B. 1954. The Status of the Nile Crocodile in Uganda. *The Uganda Journal* 18: 6-7.
- Cranworth, Lord. 1912. *A colony in the making: or sport and profit in British East Africa*. London: Macmillan and Co.
- Dennett, R.E. 1905. Bavili notes. *Folklore* 16(4): 371-406.
- Ditmars, R.L. 1922 [1910]. *The reptiles of the world*. New York, NY: The Macmillan Co.
- Dorman, Rev. S.S. 1934. 'The crocodile in south African religion and folklore. *South African Journal of Science* 31: 495-499.
- du Chaillu, P. 1861. *Explorations and adventures in Equatorial Africa*. London: John Murray.
- Duff, H.L. 1903. *Nyasaland under the foreign office*. London: George Bell and Sons.
- Elton, F. 1872. Journal of an exploration of the Limpopo River. *Journal of the Royal Geographical Society of London* 42: 1-49.
- Evans-Pritchard, E.E. 1956. *Nuer religion*. Oxford: Clarendon Press.
- Frazer, J.G. 1922. *The golden bough*. New York, NY: The Macmillan Company.
- Gehrts, M. 1915. *In the wilds of Togoland*. Philadelphia, PA: J.B. Lippincott Company.
- Gibbons, A. St H. 1898. *Exploration and hunting in Central Africa*. London: Methuen & Co.
- Glave, E.J. 1892. *In savage Africa*. New York, NY: R.H. Russell & Son.
- Gouldsbury, C. and H. Sheane, 1911. *The great plateau of Northern Rhodesia*. London: Edward Arnold.
- Grant, J.A. 1864. *A walk across Africa*. London: William Blackwood and Sons.
- Grant, J.A. 1872. Summary of observations on the geography, climate, and natural history of the lake region of Equatorial Africa, made by the Speke and Grant Expedition, 1860-63. *Journal of the Royal Geographical Society of London* 42: 243-342.
- Hartland, E.S. 1901. Retiring presidential address. *Folklore* 12 (1): 15-40.
- Hunter, J.A. 1957. *Hunter's tracks*. London: Hamish Hamilton.
- Huxley, J. 1931. Travel and politics in East Africa. *Journal of the Royal African Society* 30(120): 245-261.
- Johnston, H.H. 1910. *George Grenfell and the Congo*. New York, NY: D. Appleton & Co.
- Junod, H.A. 1912. The life of a South African tribe. 2nd Volume. Neuchatel: Imprimerie Attinger Freres.
- Kearton, C. and J. Barnes. 1915. *Through Central Africa from East to West*. London: Cassell and Company.
- Kingsley, M. 1976 [1897]. *Travels in West Africa*. London: The Folio Society.
- Lagerkrantz, S. 1950. *Contribution to the ethnography of Africa*. Lund: Studia Ethnographica Upsaliensia, 1.
- Lagerkrantz, S. 1952. Krokodilsteine. *Tribus: Jahrbuch des Linden-Museums* 2(3): 400-403.
- Livingstone, D. 1858. *Missionary travels and researches in South Africa*. New York, NY: Harper & Brothers.
- Livingstone, D. and C. Livingstone. 1866 [1965]. *Narrative of an expedition to the Zambezi and its Tributaries; and of the discovery of the lakes Shirwa and Nyassa, 1858-1864*. London: John Murray.
- Loveridge, A. 1928. The Nilotic crocodile. *Copeia* 168: 74-76.
- Loveridge, A. 1940. The crocodiles of Tanganyika Territory. *Tanganyika Notes and Records*. 41-46.
- Lyell, D.D. 1913. *Wild life in Central Africa*. London: Horace Cox Ltd.
- Lyell, D.D. 1923. *Memories of an African hunter*. Boston, MA: Small Maynard and Co.
- Malcolm, L.W.G. 1922. Notes on the Religious Beliefs of the Eghap, Central Cameroon. *Folklore* 33(4): 354-379.
- Marvin, G. 2012. *Wolf*. London: Reaktion Books.
- McGregor, J. 2005. Crocodile crimes: people versus wildlife and the politics of postcolonial conservation. *Geoforum* 36: 353-369.
- Monteiro, J.J. 1876. *Angola and the River Congo*. New York, NY: Macmillan and Co.
- Myers, A.B.R. 1876. *My life with the Hamran Arabs*. London: Smith, Elder & Co.
- Owen, T.R.H. 1948. Harpooning crocodiles. *The Field*. 16 October 1948.
- Pooley, A.C. 1982. *Discoveries of a crocodile man*. Johannesburg: Collins & Sons.
- Pooley, A.C. 1989. Food and feeding habits. In: *Crocodiles and Alligators* (eds. Ross, C.A. and S. Garnett). Pp. 76-91. Sydney: Weldon Owen.
- Potous, P.L. 1956. *No tears for the crocodile*. London: Hutchinson & Co.
- Rüppel, E. 1835. *Reisen in Nubien, Kordofan und den peträischen Arabien*, 1829, excerpts in *The North American Review* 40(87): 477-510.
- Sayce, A.H. 1906. Cairene folklore III. *Folklore* 17: 198-199.
- Schmidt, K.P. 1919. Contributions to the herpetology of the Belgian Congo based on the collection of the American Museum Congo expedition, 1909-1915. *Bulletin of the American Museum of Natural History* 34: 386-624.
- Selous, F.C. 1907 [1881]. *A hunter's wanderings in Africa*. London: Macmillan & Co.
- Sheane, J.H.W. 1906. Some aspects of the Awemba Religion and superstitious observances. *Journal of the Anthropological Institute* 36: 150-158.
- Smith, D. 1897. *Through unknown African countries*. London: Edward Arnold.
- Speke, J.H. 1864. *What led to the discovery of the source of the Nile*. London: William Blackwood and Sons.
- Speke, J.H. 1868. *Journal of the discovery of the sources of the Nile*. New York, NY: Harper and Brothers.

- Stanley, H.M. 1885. *The Congo and the founding of its free state*. 2nd volume. New York, NY: Harper & Brothers.
- Stanley, H.M. 1891. *How I found Livingstone*. New York, NY: Charles Scribner's Sons.
- Stevenson-Hamilton, J. 1917. *Animal life in Africa*. Volume 3: birds, reptiles, fishes. London: William Heineman.
- Stigand, C.H. and D.D. Lyell. 1909. *Central African game and its spoor*. 2nd edition. London: Horace Cox.
- Sykes, C.A. 1903. *Service and sport on the tropical Nile*. London: John Murray.
- Tangye, H.L. 1910. *In the Torrid Sudan*. Boston, MA: The Gorham Press.
- Tsing, A. 2013. More-than-human sociality: a call for critical description. In: *Anthropology and Nature* (ed. K. Hastrup). Pp. 27-42. London: Routledge.
- Venning, J.H. 1953. A crocodile incident. *Northern Rhodesia Journal* 2: 67-72.
- Westbeeck, G. 1963. *Trade and travel in early Barotseland*. (ed. Tabler, E.C.) Berkeley, CA: University of California Press.
- Wilson-Haffenden, J.R. 1928. Ethnological notes on the Kwottos of Toto (Panda) district, Keffi division, Benue province, northern Nigeria: Part V: religion and magic. *Africa: Journal of the Royal African Society* 27(108): 380-393.
- Worthington, S. and E.B. Worthington. 1933. *Inland waters of Africa*. London: Macmillan and Co.
- Wright, A.R. 1907. Secret societies and fetishism in Sierra Leone. *Folklore*, 18: 423-427.



Appendix 2: Some uses of Nile crocodile body parts

Body part	Use/s	Region	Source
Teeth	Decorative (necklace)	Madi, S. Sudan; Somaliland	Grant 1864: 342; Smith 1897: 443
Teeth	Medicinal	Nkata Bay, Lake Nyasa (Malawi)	Duff 1903: 135
Teeth	Magical powers (confer tenacity)	Mangbetu people, Niangara, DRC	Schmidt 1919: 434
Skin	Leather ('Arab shields'); leather to repair saddles; for bucklers	Abyssinia; Khartoum; River Nile, first cataract	Baker 1868: 188; 1874: 29; Edwards 1878 vol. 1: 257
Gallstones, gall bladder and bile ducts	Medicine (kept by 'witchdoctors'); poison	Wemba people, Zambia; Zimbabwe, Tete Province Mozambique, lower Benin and Togo, SW Ghana	Gouldsbury & Sheane 1911: 201; Nyazema 1984: 102-103; Anon 2015; Blier 1995: 208, 419; Ntiamoa-Baidu 1992.
Claws	Talismans for protection against attack by crocodiles	Mangbetu people, Niangara, DRC	Schmidt 1919: 434
Brain	Ingredient in preparation used in initiation ceremonies; poison	For initiation: baPedi, northern S Africa. Poison: haMbukushu, Okavangoland; Thonga, KwaZulu-Natal, South Africa	Dornan 1934: 497; Cunningham and Zondi 1991: 6-8
Liver	poison	Angola; Matabeleland; Okavangoland; KwaZulu-Natal, South Africa	Monteiro 1876: 37; Selous 1907: 462-463; Pooley 1982: 79; Cunningham and Zondi 1991: 6-8
Lungs	Ingredient in mixture to treat consumption	Thonga people	Junod 1912 vol. 2: 423
Fat	Poison; antidote to poison; protection against lightning; basis for many ointments and potions	Poison: Dodoma region, central Tanzania. (2) Antidote: KwaZulu-Natal, S. Africa; Nigeria	Burton 1859: 69, 356; (2) Pooley 1982: 79; Cunningham and Zondi 1991: 24; Adeola 1992: 132
Unidentified body parts; whole head	Aphrodisiacs; aphrodisiac/potency	Egypt and Northern Africa, Sudanese Nile; Nigeria	Burton 1859: 69; Pitman 1931: 184; Adeola 1992
Scales	Aphrodisiac; antidote to snake poison; fertility (women)	Nigeria	Adeola 1992: 134; Soewu 2008
Musk (glands)	Musk/perfume	Berbers and Arabs, Dongola, on the Nile; Abyssinia	Rüppel 1829: 502; Baker 1867: 117; Lugard 1893 vol. 2: 223
Stomach stones	Magical powers (for sorcery); Swallowed by chiefs (confers premonitions of death); fertility	Ituri region, DRC; Thonga, South Africa; Yao, Malawi	Schmidt 1919: 434; Junod 1912 vol. 1: 365; Lagerkrantz 1952