

# Of meat and ritual: Consumptive and religious uses of pangolins in Mali

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## Funding information

U.S. Fish and Wildlife Service; U.S. Fulbright; Wenner-Gren Foundation

**Keywords:** bushmeat, *Donsow*, fetish, Manidae, West Africa, wild meat

## 1 | INTRODUCTION

In many parts of Africa, wildlife is locally consumed for meat (Ingram et al., 2021). Hunting and consuming wild animals for meat is common in rural areas across the continent, and their bodies are openly sold in markets, along roadsides, and in restaurants or 'chopbars' (Eniang et al., 2008; Gonodelé Bi et al., 2017; Ingram et al., 2018). In some places, animal body parts are also used in traditional remedies purported to treat a variety of afflictions or bring good fortune (Bakarr et al., 2001; De Surgy, 1993; Imperato, 1977; Kedzierska & Jouvelet, 2006; Marshall, 1998; Sale, 1981). Wildlife is a fundamental component of ritual practices for some communities, both for consumptive ceremonial uses and as part of remedies (e.g. powders to mix with water and drink or bath with, scrubs, ointments) and/or ritual objects such as power objects or fetishes<sup>1</sup>. Thus, it comes as no surprise that the body parts of wild animals are also sold in traditional 'medicine' or 'fetish' markets in several West African countries (Bassett, 2003; Hellweg, 2011; Nikolaus, 2011). Wildlife is still openly sold in traditional 'medicine' and/or fetish markets in Mali (Kedzierska & Jouvelet, 2006), Côte d'Ivoire (Bassett, 2003), Togo

(D'Cruze et al., 2020), Benin (Djagoun et al., 2013), Ghana (Gbogbo & Daniels, 2019) and Nigeria (Nikolaus, 2011).

Pangolins are one such group of species that are hunted both for meat and used in a variety of African traditional remedies or ritual practices, with examples available from Nigeria (Eniang et al., 2008; Ogoanah & Omijie, 2017), Benin (Djagoun et al., 2013; Sogbohossou & Kassa, 2016); Togo (D'Cruze et al., 2020), Ghana (Boakye et al., 2016), Côte d'Ivoire (Gonodelé Bi et al., 2017), Liberia (Greengrass, 2016; Jeffrey, 1977), Sierra Leone (Boakye et al., 2014) and the Republic of Guinea (Brugiere & Magassouba, 2009). Three species of pangolin occur in West Africa (IUCN, 2021), which include the two small arboreal species, the white-bellied and black-bellied pangolins (*Phataginus tricuspis* and *Phataginus tetradactyla*, respectively), and the fossorial giant pangolin (*Smutsia gigantea*). All three species are largely associated with the Guinean and Guineo-Congolian bioclimatic regions, although they can also be found in the gallery forests and wooded savannah in the Soudanian bioclimatic region (Ingram et al., 2019; Nixon et al., 2019; Pietersen et al., 2019). All species are listed as threatened on the IUCN Red List of Threatened Species (IUCN, 2021), and the commercial and international trade of wild-caught pangolins has been banned (CITES, 2017). While a few studies have now investigated the local uses of pangolins in several West African countries, knowledge on the distribution and local uses of pangolins remains limited in the western-most countries (e.g. Guinea, Guinea-Bissau, Senegal, Sierra Leone), at the periphery of currently reported pangolin distributions.

<sup>1</sup>In many African languages, including Mande languages, the same term denotes various remedies and power-objects or fetishes, thus, the frontiers between the two are porous and fluid. In short, the difference lies not in their ingredients but in the modalities of their manipulations: usually the remedies are directly applied to the body whereas fetishes are addressed verbally and receive bloody sacrifices.

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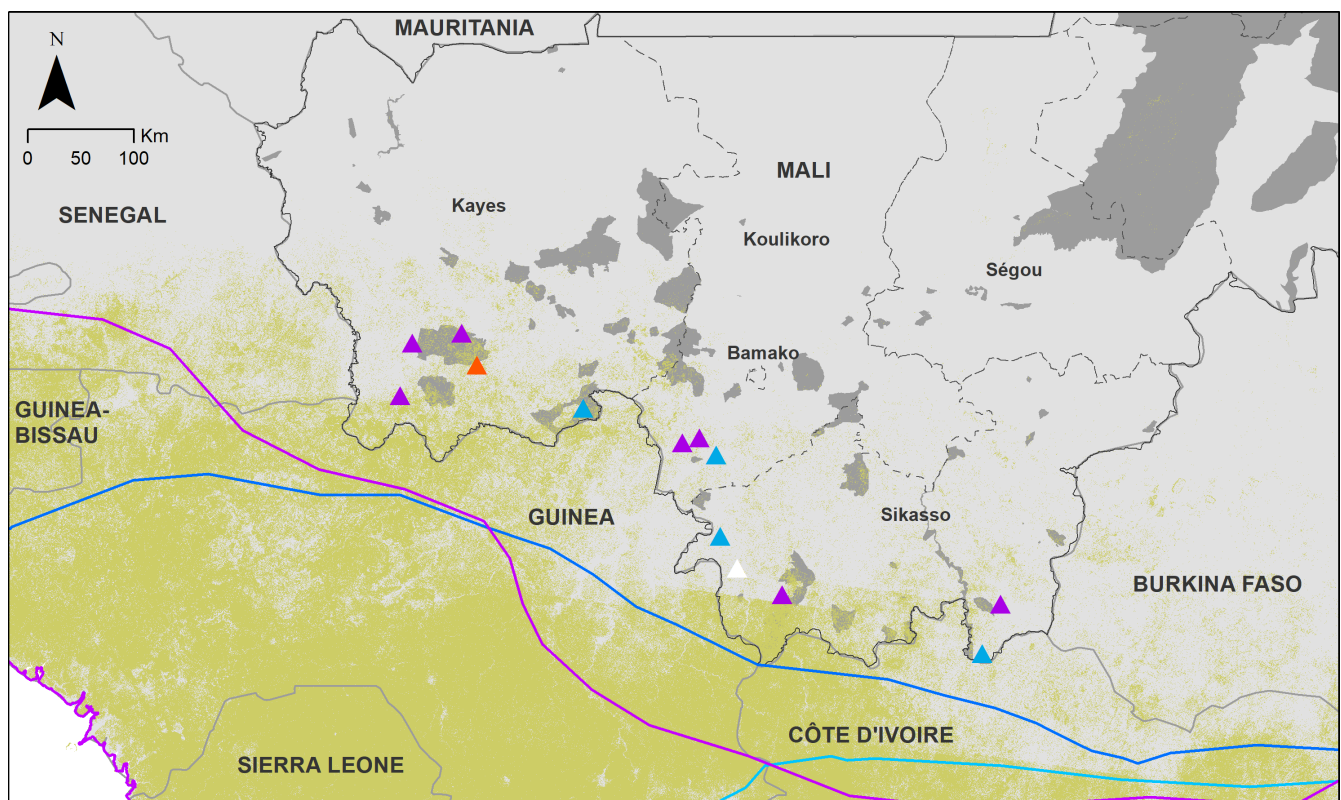
Current pangolin species ranges are delineated on the IUCN Red List by whether the species is known (or thought very likely) to occur in a given area with suitable habitat. Mali borders several pangolin range countries and is currently not listed as a pangolin range state on the IUCN Red List. Here, we review and appraise the evidence for the presence and local uses of pangolins in Mali.

## 2 | THE PRESENCE OF PANGOLINS IN MALI

Mali is a large African country covering an area of 1.241 million km<sup>2</sup>, inhabited by the Mande people who in classical ethnographies are divided based on the language spoken into several sub-groups such as the Bamana (largest group), Malinke or Maninka, Sarakole or Soninke, living aside others such as Fulani, Dogon and Senufo also called Minyanka. While the majority of people consider themselves as Muslims nowadays there is a steady and even increasing presence of traditional or a-Islamic religious specialists (Bazin, 2008; Bourdarias, 2009; Colleyn, 2004; Kedzierska & Jouvet, 2006; Kedzierska Manzon, 2013, 2022; McNaughton, 1988; Soares,

2005, 2016). This vast country spans several bioclimatic zones, with the north-eastern half of Mali largely comprising the Saharien and Sahelian zones. The south-western half of Mali comprises Soudanian vegetation with a strip of Soudano-Guinean vegetation along the southern borders with Senegal, Guinea, Côte d'Ivoire and Burkina Faso. Soudano-Guinean areas typically have extensive plant cover associated with shrublands, woody savannahs and both open and fragmented forests, and in 2010, this region of Mali had 15–20% forest cover (Hansen et al., 2013; Figure 1). In south and south-western Mali, species from Soudanian and Guinean zones can be present. For example, in southern Mali, Granjon and Duplantier (2011) note that in the gallery forest patches, which share botanical similarities to humid Guinean forests, rodent species composition is similar in Mali to that of the Guinean humid forests, particularly in the extreme southeast of the Sikasso region, and in the west Bafing area which is environmentally similar to the Djallon plateau in Guinea. In south-western Mali, near to Bafing Faunal Reserve, the northern limits of Guinean vegetation are also home to the only populations of western chimpanzee (*Pan troglodytes verus*) in Mali (Duvall, 2000).

Despite none of the pangolin species being listed as occurring in Mali in any of the IUCN Red List assessments, Warshall (1989)



**FIGURE 1** Map of southern Mali showing regions (dashed lines) and bordering countries. Also shown are protected areas (dark grey polygons; UNEP-WCMC and IUCN, 2021), forest cover >15% (olive green; Hansen/UMD/Google/USGS/NASA; Hansen et al., 2013), and current northern range extents for giant pangolin (purple line), white-bellied pangolin (dark blue line) and black-bellied pangolin (light blue line; IUCN, 2021). Triangles show the rough locations of possible giant (purple), arboreal (blue) or unknown species of pangolin (white) presence mentioned in the review. The orange triangle represents the location of the disputed presence of arboreal (both black- and white-bellied) pangolins. Note that i) four of the purple triangles are based on the map presented in Niagaté and Clark (2004), and ii) the blue triangle in Koulikoro region is based on the location of the *Tiywara* headdresses that include pangolins in Zahan (1980)

reports that pangolins (scientific name not provided) are on the list of mammals that are protected by Malian law (Annexe II). The Malian 1995 Wildlife Protection Law then lists *Manis spp.* as completely protected on Annexe I (Loi No. 95–031), which is reiterated in a report from the Malian Ministry of Environment and Sanitation (MEA, 2007). Pangolins (as *Manis sp.*) are also mentioned in Décret No 95-184/P-RM of 1995 and Décret No 01-136/P-RM of 2001 which set the rates of fees and charges levied in connection with the exploitation of wildlife, which for pangolins refers to fees for hunting a wholly protected species. Given that the Malian Wildlife Law does not identify the species of pangolin, in the following sections, we review the available evidence separated by the species reported.

## 2.1 | Giant pangolins

Niagaté and Clark (2004) report that giant pangolins are found in southern Mali (in the south of the Sikasso, Koulikoro and Kayes regions). It is noted that giant pangolins are very rarely encountered and are threatened by habitat degradation and illegal hunting (Niagaté & Clark, 2004) and that they are considered to be 'near extinction' in Mali (reported as *Manis gigantea*, USAID, 2008). Suspected giant pangolin tracks, and a suspected pangolin carcass based on description and discussion with local hunters, were reported in 1996 from an area near the Balinn River in south-western Mali (southern Kayes region), west of the present Wongo National Park (founded in 2002; Duvall & Niagaté, 1997). In 2013, people from 15 villages around Bafing and other nearby protected areas were interviewed about the species present in the local area (southern Kayes region), and people in 14 villages said they knew of giant pangolins, and people in 7 villages reported the species to still be present with the last sighting or sign being in 2013 (Schleicher et al., 2014). In the study area, giant pangolins were considered 'very rare', and local names were given, such as *Konso Ha*, *Konso Konso*, and *Konso Fa*. Aardvark were distinguished separately in the study (*Kinhon*, *Timba*, *Tumba*, *Kifo* and *Kihon*) and were also reported as known (14/15 villages) and present (13/15) but rare in the area. Communications reported in Zahan (1980) with Richard van Gelder of the American Museum of Natural History at the time state that giant pangolin were also found in Mali, but the location was not mentioned.

Evidence from research conducted since 2003 among Mande hunters—known as *donsow* given they are members of a specific initiation society, *donsoton*—living in the Kangaba Cercle area of Koulikoro region in southern Mali (bordering Guinea) highlight knowledge of pangolins (pers. comm. to A. Kedzierska Manzon, September 2020 and before during fieldwork). One of the master hunters (today aged 60 and who started hunting activities at the age of 10 with his father who was also a master hunter) compared the pangolin to an antbear (*timba*; aardvark; *Orycteropus afer*), in terms of activity pattern, diet and solitary lifestyle, and considered pangolin meat to be a delicacy especially given its elusiveness. The behavioural and morphological details provided by the hunters—size, weight, activity—allow us to identify with no doubts that the species is the giant (and not arboreal) pangolin. This information is

corroborated by the accounts of biologist Bruno Sicard, who affirms that giant pangolin was an easy pray for hunters and were therefore overhunted in the past (pers. comm. to A. Kedzierska Manzon, April 2021, account based on the fieldwork conducted in Mali by B. Sicard for the last 40 years). As with the aardvark, the hunters, as well as Bruno Sicard, perceive that the pangolin seems to have completely disappeared from their region of southern Mali in the recent past.

Giant pangolins have been reported to occur in similar habitats and at similar latitudes in countries bordering Mali. In Senegal, giant pangolins are known to occur in the Niokolo-Koba National Park which is comprised of gallery forests and savannah habitat near the border with south-western Mali (Dupuy, 1971; Nixon et al., 2019). Giant pangolins have been reported from the Basse-Casamance National Park in Senegal (IUCN/UNEP, 1987, cited in Sayer et al., 1992; Gueye, 1991) which has the predominant habitat types of Guinean forests and savannah woodlands. In Guinea, bordering Mali to the south, the predicted range of giant pangolins span most of the country and has been confirmed in the National Park of Upper Niger (Ziegler et al., 2002), and hunted by villages in the buffer zone (Brugiere & Magassouba, 2009; Duonamou et al., 2021), which has a similar latitude to the far south of Mali. At a similar latitude, giant pangolins were thought to occur in the complex of Pendjari and W National Parks that span northern Benin, south-eastern Burkina Faso and the extreme south of Niger (Nixon et al., 2019; Poche, 1973; Sayer & Green, 1984). It should therefore come as no surprise that there were (or still are) giant pangolins present in Mali.

## 2.2 | Arboreal pangolins

Both species of arboreal pangolin are reported to be present in the vicinity of Bafing National Park, near to the northern border of Guinea (AGEFORE, 2004; Caspary et al., 1998). Caspary et al. (1998) report that *P. tricuspis* is known as *Kossokassa* in Bamanan, while *P. tetradactyla* is known as *Kossokassa-ning* and that both species occur in the park. The meat was reported as less popular than other bushmeat species, and not commercialised. Schleicher et al. (2014) dispute the presence of the arboreal pangolin species (*Phataginus sp.*) in this region claimed by Caspary et al. (1998) and AGEFORE (2004), highlighting that Niagaté and Clark (2004) only report giant pangolin (which they also refer to as *Kosso-kassa* in Bamanan) and that the ecological and biogeographic conditions are more likely suited to giant pangolin, but note that further research is needed. To the east of Bafing, in the Cercle of Kita, the southern area bordering Guinea was heavily forested (1960–70s), and informants in this region at the time stated that pangolins (*N'gossonkassan*) there climbed trees (P. Imperato pers. comm. to D.J. Ingram May 2021).

Zahan (1980) in his study of Bamana initiation societies (see section below) in the Wasulu area of south-western Mali (mostly overlapping the Sikasso region, and parts of the Koulikoro region) states that the Bamana informants referred to 'the other type of *timba*' (aardvark) that was capable of climbing trees (referred to as *n'goso*). While Zahan had never seen a pangolin, letters from Pascal James Imperato

stated that he had seen a pangolin in Mali (species unknown). The sighting occurred in the Cercle of Yanfolila near the Sankarani River in the Sikasso Region, and at the time, it was confirmed as a pangolin by Mons. Marcher, the Director of the Bamako Zoological Gardens (P. Imperato pers. comm. to D.J. Ingram May 2021). Zahan also reports that in a letter to his colleague, Solange de Ganay, Imperato stated that he had spoken with Richard Van Gelder who was the Curator of Mammalogy at the American Museum of Natural History who reportedly said that both *Manis tricuspis* and *Manis gigantea* were present in Mali (letter dated January 29, 1976). In the Sikasso region of southern Mali, Edwards (2012) reported that one agriculturalist and hunter he interviewed for his ethnographic research living in a small village near the border with Côte d'Ivoire had caught a juvenile tree pangolin in 2007, but it is not clear which species this refers to. It is possible that this refers to either *Phataginus* species of pangolin, as both species are reported to occur in northern Côte d'Ivoire and Ghana (IUCN, 2021; Figure 1). White-bellied pangolins in particular are known to occur at similar latitudes in northern Benin (Zanvo et al., 2020), dry dense forest islands in middle Togo (Segniagbeto et al., 2020) and in the forest-savannah areas in middle and northern Côte d'Ivoire (Rahm, 1956) and Guinea (Ziegler et al., 2002).

### 2.3 | Language discrepancies

Across sources, we found that the same words (and their variants) have been used for giant and arboreal pangolins; therefore, we cannot use language alone to distinguish between pangolin species. It is possible that *Nkósonkasan* (and variants cited throughout) refers to giant pangolin and is also the generic term for 'pangolin', given its use in sources alluding to both arboreal (Caspary et al., 1998; Zahan, 1980) and giant pangolin (Kedzierska Manzon, 2014a; Niagaté & Clarke, 2004). Bamana/Mande language dictionaries cite both *gw étère/gétèré/gétere* and *nkósonkasan* as synonymous and referring to giant pangolin, describing the species as 'very rare' (Baillieu et al., 2020; Dumestre, 2011). Dumestre (2011) provides the following example for the use of *Nkósonkasan*: '*Nkósonkasan bé báladinge dámine, k'í bálí kà bó, f'í bé sà yèn*' which means 'The pangolin blocks the entrance to the porcupine burrows, and prevents you from going out, until you finally die', possibly suggesting the giant pangolin. Imperato (1981) states that pangolin (*Manis gigantea* or *Manis tricuspis*) is known in Bamanankan as *n'gozonkassan*. Caspary et al. (1998) refer to *Kossokassa-ning* for black-bellied pangolin; we speculate that the ending of this word (*-ning*) may refer to a diminutive form (*nin* in Bamanankan, for young/small/little), but this is not clear, and we found no other sources citing this word structure.

## 3 | PANGOLINS AS BUSHMEAT IN MALI

Information on the hunting, consumption and use of wildlife in Mali is limited to few sources. In the early 1970s, 65% of rural protein consumption in Mali reportedly came from wild animals, and in the Wasulu area

of southern Mali, 90% of men hunted and 94% consumed bushmeat (FAO cited in Warshall, 1989). The Ministry of Rural Development and the Environment (MDRE, 1995) reported that in some areas (Fladougou, Wasulu), hunting was practiced by up to 75% of adult men, the meat and income of which helped them get through the agricultural lean season. The same report cites a 1990 survey estimating that the income derived from selling bushmeat in Bamako was 210 million CFA, but the time frame for this estimate was not clear. Nowadays, bushmeat is still consumed in the Sikasso region, where Cooper and West (2017) found that bushmeat was consumed on average 1.75 times per month, but did not record the species that are consumed.

According to the authors' recent data (Kedzierska Manzon, 2014a, b, unpublished data based on research conducted between 2002 and 2007), bushmeat is consumed by hunters' families in south-western Mali at least once a month and even more often during the dry season where it is still a non-negligible source of protein. Numerous species are consumed and include: *wálo* (*Pternistis bicalcaratus*), *potopoto* (*Columba guinea*), *sege* (*Accipiter badius*), *nontoma* (*Galago senegalensis*), *le* (*Phacochoerus africanus*), *kami* (*Numida meleagris*), *bala* (*Hystrix cristata*), *kɔɲene/kɔɲine* (*Thryonomys swinderianus*) and more rarely *mangarani* (*Sylvicapra grimmia*), *minan* (*Tragelaphus scriptus*) as well as less recently *son* (*Kobus kob*), *dage* (*Hippotragus equinus*) and *kuntani* (*Cephalophus rufilatus*) (see complimentary list in Kedzierska Manzon, 2014a). These last species are regular in the hunter's oral tradition (Bird, 1974; Derive & Dumestre, 1999; Kedzierska Manzon, 2014a, b). The diversity of mammal species which are hunted and consumed, including pangolin, is confirmed by other sources (C. Duvall pers. comm. 2021, B. Sicard pers. comm. 2005 and 2021). In the region surrounding Bafing Faunal Reserve, Caspary et al. (1998) also states that pangolins were locally consumed for meat. In recent communications with hunters living in the Kangaba Cercle area of Koulikoro region in southern Mali (bordering Guinea), a master hunter reported knowing or knowing of hunters (from the generation of their fathers) who have hunted pangolin, and one reported seeing a pangolin as a child when accompanying his father on a trip into the bush (pers. comm. to A. Kedzierska Manzon, September 2020). This resonates with the work of Malian scholar, Yousouf Tata Cissé, who reported that *donsow* hunters knew of the pangolin and considered the animal dangerous given the potent levels of *nyama* (life force) the animal contains (Cissé, 1964, 1994). As with the *nyama* of other potent or dangerous animals (e.g. porcupine, wildcats, buffalo), the pangolin *nyama* is considered to be released when it is killed and needs to be controlled (e.g. with a preparation; see next section); otherwise, the hunter, his family or those who eat the meat will face adverse consequences. Pangolins (to which Cissé referred to as *ko sô kâ sa*) were reported to be rarely seen by the hunters and were distinguished from *aardvark* (*tiba*) (Cissé, 1964).

## 4 | PANGOLINS IN FETISH OR POWER OBJECTS AND RITUAL REMEDIES

In the late 1980s, it was reported that 60% of citizens in the capital city, Bamako, had been treated with products made from wild



**FIGURE 2** Black-bellied pangolin (*P. tetradactyla*) skins with scales for sale in the Marabagaw Yoro (fetish market), in Bamako, Mali. Three individuals supplied to the market by a traditional hunter from Kayes region on 11 March 2008 (a) and one individual on the market on 23 May 2008 (b). Photo credit: I. B. Edwards

animals at least once in their life (Warshall, 1989). West Africans and European and American tourists bought such products to acquire special 'powers' or as a sign of wealth and contributed to driving the trade in animal parts in Bamako. Several examples of how body parts are used to treat a variety of ailments or for ritual purposes are provided (e.g. hyena skin and python meat) and include selling stuffed pangolin paws to prevent rain (neither genus or species are reported). This was corroborated in 2007 by a traditional hunter based east of Bafing Faunal Reserve, who also stated that pangolin 'power' is the ability to control the weather (pers. comm. I. Edwards).

In the Malian capital city, there is a traditional market called the Marabagaw Yoro, or secret-keeper place, also referred to as the Marché des Fétiches, or Fetish Market. Within the Marabagaw Yoro, a wide variety of fauna (nearly 500 species of vertebrate fauna) are sold as ingredients for use in traditional remedies and ritual practices (Edwards, 2012). Edwards (2003) list that the heads, feet and skin of *Manis spp.* were available on the Marabagaw Yoro market,

as identified by both the study author and Malian informant in the study. Black-bellied pangolin (*P. tetradactyla*) skins with scales still attached were also available in the Marabagaw Yoro in 2008 (Figure 2; Edwards, 2012) and indicate that pangolins are used in traditional medicine and religious practises (*bamanaya*) in Mali, regardless of whether pangolin species occur in Mali or not. Scales are not the only aspect valued, as internal organs, skulls and paws are also used. Records from ethnographic observations within the Marabagaw Yoro outlined in Edwards (2012) revealed that species such as *P. tetradactyla* are used in different types of traditional remedies ranging from treatment of physical injuries and illness to all manner of social issues. For example, pangolin scales may be used in preparing treatments for various skin conditions like eczema and skin infections, while sex organs are used in preparing mixtures to help with sexual problems such as impotence and infertility (pers. obs. I. Edwards 2007–8). Similarly animal parts, including the skulls and paws of pangolins (pers. obs. I. Edwards 2007–8), are used in the preparation of *basiw* or *boliw*: power objects or fetishes (for general study of *basiw/boliw*, see Colleyn, 2004; Bazin, 2008; Kedzierska Manzon, 2013; Kedzierska Manzon, 2016; Kedzierska-Manzon, 2018; Kedzierska-Manzon, 2022). For example, it seems that a member of the Malian National Assembly had a political power object made in which a pangolin paw was the key ingredient (among other flora and fauna), and was used to influence others to help secure the position of the National Assembly representative (pers. obs. I. Edwards 2007–8). The paws of pangolins were also used in power objects that were designed to control the economic environment to increase potential opportunities (pers. obs. I. Edwards 2007–8). In addition, pangolin parts might be used in preparing mixtures intended to punish, or hurt others, usually as a form of retribution. For instance, male pangolin sex organs were used in preparing a mixture to punish a husband for his infidelity; the purpose of the preparation was to cause the husband physical pain for his actions, specifically in his genitals (pers. obs., I. Edwards 2007–8). This is corroborated by anecdotal evidence from two separate time-periods and sources. Firstly, in 2006, when it is suggested that pangolin scales and other parts were reportedly widely available from traditional remedy sellers across southern Mali, and local hunters stated that they could be found readily if you knew where to look (pers. obs. C. Duvall). The use of pangolin parts in the fabrication of *basiw/boliw* (power objects or fetishes) is also confirmed by the evidence at our disposal. In southern Mali, *donsow* hunters report that pangolin paws were, and still are, used in the fabrication of certain objects, namely the *sidi* (or *siri*, or *siri ku*, which means 'to tie') which serves to diminish—by tying or closing—the good luck of other persons (pers. comm. to A. Kedzierska Manzon, September 2020). The hunters report that skin is also used in the local pharmacopeia, including in the purported treatment of illness, bad luck, or in a prophylactic way to prevent accidents and misfortune. Aardvark and porcupine could reportedly be used in similar ways, and we suggest that this may be because all of these species are 'anomalous' in that they are nocturnal, solitary, insectivorous, and have a unique appearance. There may also be a link to the earth, home digging and therefore farming (see next section).

To meet the demands of urban communities, an elaborate system of supply known as the Animal Parts Trade (APT) extends to rural environments to harvest and transport key species to urban centres such as Bamako (Edwards, 2012). Specifically, there are rural hunters as well as middlemen who harvest, transport and sell animals and/or body parts to vendors of the Marabagaw Yoro (Edwards, 2012). During his ethnographic fieldwork, Edwards (2012) accompanied a focal farmer, who was also a wildlife supplier from the Sikasso region of Mali, back to their village upon invitation to better understand the role of opportunist suppliers of the animal part trade. The farmer lived in a small village near the Mali-Côte d'Ivoire border, and in 2007, sold a live arboreal pangolin (*Phataginus* sp.) that he had stunned with a slingshot along with 23 veiled chameleons (also live) that he had collected on his agricultural land.

## 5 | PANGOLINS IN RITUAL ARTS

This section is somewhat an extension of the previous one, given that the content relates to ritual practises known as *bamanaya* or *mandenkaya* in Mali, but we focus here on artistic representations rather than actual use of animal body parts.

In the past, the Mande were well known for their male initiation societies (e.g. Dieterlen & Cissé, 1972). One of these societies, called *Tyiwara*, aims to teach young men agricultural techniques and traditions and societal values (e.g. the importance of hard work) through ceremonies, dances and rituals (Colleyn, 2003; Zahan, 1980). In the ceremonies, homage is paid to the *Tyiwara*, a wild beast (Colleyn, 2003) or according to more ancient interpretations, a half-man half-animal ancestor, who is considered to have taught humans how to farm (Imperato, 1970). As part of the ceremonies, *tyiwara/chiwara/ci wara* masks/headdresses are worn, which typically comprise visual representations alluding to animals (antelope spp., aardvark, guinea fowl, hornbills) that are chosen based on characteristics viewed as important for farming (e.g. aardvark to portray the idea of strength). Headdress shapes and forms are regionally distinct, taking into account the crops that grow in each of the regions. Three broad regional variations were determined in Zahan (1980) as follows: vertical headdresses in the south-eastern Segou region, horizontal headdresses in Beledougou (northwest Bamako region) and abstract headdresses from the Wasulu and Bougouni regions.

Zahan (1980) reports the inclusion of a pangolin (considered to be *Manis tricuspis*), as well as an aardvark, in many headdresses from the Bougouni area (overlapping present-day Koulikoro and Sikasso regions) bordering Guinea, Côte d'Ivoire and Burkina Faso. The headdress alludes to an aardvark at the base, a curved pangolin standing on its back, and horns of the roan antelope on top. In some cases, the scales are depicted by lines or triangular marks along the back. The pangolin is meant to represent the properties of the strongly rooted plants from the region (in this case sorghum), both in terms of its strong rooting in the ground and the 'aerial' nature of the

wind-resistant sorghum fronds (Dupuis, 1982; Zahan, 1980). Zahan describes that the 'dual ecology' of the white-bellied pangolin, being both terrestrial and arboreal, as why this species was chosen. More recently, Fodé Moussa Sidibé (2020) asserts that the pangolin was included into *ci-wara* headdresses as an ancient symbol of bravery and abnegation.

## 6 | CONCLUSION

We present the first review of the use and more than likely presence of pangolins in Mali. We confirm through photographic evidence that black-bellied pangolin skins were at least available in the fetish market in the capital city, Bamako, in 2008. We also present reports of possible ritual significance of pangolins amongst the Mande, and use of pangolins for meat and in the production of traditional remedies and power objects, as well as more generally in ritual and religious practices. It is not clear to what extent these uses persist, and if so, how commonly, given social, economic and cultural change in Mali. Yet, as 'traditional' remedies have been used for a long time (likely originating in the pre-Islamic period), all signs suggest traditional remedies will continue to be used, particularly given the fairly recent resurgence in traditional practitioners in Mali (Kedzierska Manzon, 2022) as in other countries of the region such as Ghana (de Witte, 2004) and Burkina Faso (Kibora & Langewische, 2019). Evidence outlined in this review spanning the past 60 years highlighting the varied uses, values and practices associated with pangolins underscore that. Moreover, such practices associated with other species illustrate that what we call 'traditional medicine' and what is in fact part of traditional and neo-traditional ritual practices, is highly adaptive, as species values and practices are shared/borrowed between groups.

Based on the variety of sources and time-periods that show complementary evidence, it is likely that the giant pangolin occurs or at least occurred very recently in south-western Mali (southern Kayes and Koulikoro regions) and possibly in other parts of the Soudano-Guinean bioclimatic region in the south of Mali (Sikasso region). It is also likely that at least one species of arboreal pangolin occurs in southern Mali (Sikasso region) and possibly in the south of Kayes region. This represents an extension of the known range of at least two pangolin species into Mali, compared to that shown on the IUCN Red List. Several species of mammal are already considered to be extirpated or declining in Mali due to overexploitation and habitat loss particularly from deforestation for firewood and agricultural expansion (USAID, 2008). Furthermore, creeping desertification southwards, and concomitant droughts, are major threats to wildlife in Mali, which may also be exacerbated by climate change. Therefore, we strongly recommend that efforts are made to assess the presence and distribution of pangolins in southern and western Mali, considering the broader context of their presence and trends in neighbouring countries. If present, particular efforts are needed to identify pangolin strongholds, and the threats that pangolins may face in Mali.

## ACKNOWLEDGEMENTS

We would like to thank Jorg Schleicher, Pascal Imperato, Chris Duvall, Valentin Vydrin, David Conrad, John Darr, Bruno Sicard, Salia Malé, Matthew William Cooper, Mary Jo Arnoldi, Stephen Wooten and Allen Roberts for invaluable communications throughout this research. We are also grateful to Diakaridia Keïta and other master hunters who provided AKM with valuable information. DJI is partially supported by the U.S. Fish and Wildlife Service. IBE would like to thank Kara Dembelé and the rural and traditional communities of Mali for sharing their insights. IBE's fieldwork was funded by U.S. Fulbright and the Wenner-Gren Foundation.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

## DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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**How to cite this article:** Ingram, D. J., Edwards, I. B., & Kedzierska Manzon, A. (2022). Of meat and ritual: Consumptive and religious uses of pangolins in Mali. *African Journal of Ecology*, 60, 184–192. <https://doi.org/10.1111/aje.12945>