

Review

## Utilization of pangolins in Africa: Fuelling factors, diversity of uses and sustainability

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Pangolins have attracted considerable attention in recent times due to their high rank in international trade. Whole carcass or body parts of extant pangolin species were used for many purposes which include: food, as a complementary protein source; in traditional medicinal preparations, and as ornaments. Factors responsible for the continued exploitation of pangolins were: low cost and very short time needed to acquire skills required for hunting; little or no further processing before the animals are disposed; high profit margins; general ignorance about conservation status and non-enforcement of the laws governing their trade. Traditional African medicinal practices believed that pangolins have a lot of medicinal, magical or mystical properties, sometimes requiring juvenile and pregnant female animals often rationalising exploitation as more important than conservation. Substituting other animals for pangolins is not always feasible because the possible substitutes were of greater conservation concerns. Local and intercontinental trade in pangolins also created a major challenge to the survival of remaining populations. Available evidence suggested the conservation status of six pangolin species (all four African and two Asian species) is growing worse. There is a need to determine the sizes of isolated populations across their ranges in the region.

**Key words:** Pangolins, wildlife utilisation, biodiversity conservation, pangolins trade, reducing pangolin demand, sustainability.

### INTRODUCTION

Pangolins are mammals that have attracted considerable attention in recent times not for their unique morphological features but for their high rank in international trade (Challender, 2011; Challender and Hywood, 2012; Soewu et al., 2012). The scales that cover the dorsum and tail and which gives them the appearance of a reptile is one reason they are heavily

exploited. The scales are used for purposes ranging from ornamental (Soewu, 2013a) to medicinal or traditional medicinal (Brautigam et al., 1994; Sodeinde and Adedipe, 1994; Sodeinde and Soewu, 1999; Soewu and Adekanola, 2011; Anonymous, 2014a) in Asian and African countries where pangolins are found. Hunted for generations for its tasty meat, the scaly-skinned pangolin

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**Figure 1.** Geographical range of the white-bellied pangolin (*P. tricuspis*). Source: Anonymous (2014b). Range: Angola, Benin, Central African Republic, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Kenya, Liberia, Nigeria, Rwanda, Sierra Leone, Sudan, Tanzania, Togo, Uganda, and Zambia- its presence is uncertain in Burundi.



**Figure 3.** Geographical Range of Temminck's Ground Pangolin (*S. temminckii*). Source: Anonymous (2014b). Range: Eastern and southern Africa, including Angola, Botswana, Central African Republic, Chad, Ethiopia, Kenya, Malawi, Mozambique, Namibia, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. Its presence is uncertain in Congo and Rwanda.



**Figure 2.** Geographical range of the black-bellied pangolin (*P. tetradactyla*). Source: Anonymous (2014b). Range: West and Central Africa, including Cameroon, Congo, Côte d'Ivoire, Democratic Republic of Congo (DRC), Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sierra Leone. Its presence is uncertain in Angola, Benin, Burundi, Central African Republic, Rwanda, Togo, and Uganda. The core of its range lies in Congo, DRC and Gabon.

is under threat in Gabon as demand for the small mammal surges in Asia, where it is used in traditional medicine (Anonymous, 2014a).

Apart from the scales, whole carcass or other body

parts of extant pangolin species are used for additional purposes based on their identified values and established uses. In Africa, these uses include: food as a complementary protein source (Ajayi, 1971; Martin, 1983; Ntiamao-Baidu, 1987; Wallis, 2004; Wright and Priston, 2010); traditional medicinal preparations, and as ornaments (Soewu, 2013b). Pangolin carcass is known as a delicacy of choice while the animal is believed to possess a reservoir of medicinal, sometimes mystical properties (Soewu and Adekanola, 2011). These values ascribed to pangolins, in addition to their aesthetic properties, provide the feasibility for their exploitation (Soewu and Ayodele, 2009). Their populations are increasingly under threat throughout their range due to domestic and international demand for live pangolins, their skin, scales and meat (Mohapatra and Panda, 2013).

Four species inhabit sub-Saharan Africa: Temminck's Ground Pangolin *Smutsia temminckii*, White-bellied Pangolin *Phataginus tricuspis*, the Black-bellied Pangolin *Phataginus tetradactyla* and the Giant Ground Pangolin *Smutsia gigantea* (Kingdon, 2005; Gaudin et al., 2009; Chandeller et al., 2012). *Smutsia temminckii* is found in central and southern Africa, *P. tricuspis* in West and Central Africa, *P. tetradactyla* in West Africa, and *S. gigantea* in West Africa. Their range and distribution are shown in Figures 1 to 4. Within these ranges, each species is known to occupy different habitats.

Regarding their conservation status, all African pangolins were previously regarded as near threatened on IUCN Red Data Book except *P. tetradactyla* and *S.*



**Figure 4.** Geographical Range of the Giant Ground pangolin (*S. gigantea*). Source: Anonymous (2014b). Range: Cameroon, Central African Republic, Congo, DR Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Senegal, Sierra Leone, Uganda and United Republic of Tanzania.

*temminckii*, which were categorized as least concern (IUCN, 2010). Presently, they are all regarded as vulnerable in the IUCN Red Data List (IUCN, 2014). All four African species are listed in Class B of the 1968 African Convention on Nature and Natural Resources (Soewu and Ayodele, 2009; OAU, 1968). Species in Class A are totally protected throughout the entire territory of the contracting states; the hunting, killing, capture or collection of specimens is permitted only on the authorization in each case of the highest competent authority and only if required in the national interest or for scientific purposes. Species in Class B are totally protected but may be hunted, killed, captured or collected under special authorization granted by the competent authority in the contracting country state. Also, all living Asian and African species of pangolin are listed in Appendix II of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). Appendix II contains species that are not necessarily now threatened with extinction but may become so unless trade is closely controlled. It also includes "look-alike species", which is, species whose specimens in trade look like those of species listed for conservation reasons. International trade in specimens of Appendix II species may be authorized by the granting of an export permit or re-export certificate. No import permit is necessary for these species under CITES (although a permit is needed in some countries that have taken stricter measures than CITES requires). Permits or certificates are only granted if the relevant authorities are satisfied that certain conditions

conditions are met, particularly important is that trade will not be detrimental to the survival of the species in the wild (Chandeller and Hywood, 2012; CITES, 2013).

### Natural history

Pangolins occupy a variety of habitats ranging from tropical, sub-tropical and flooded forests, to thick brush, savannah grasslands and cleared cultivated areas. Their distribution is understood to be linked to the presence of key prey species, though the solitary, predominantly nocturnal and highly secretive nature of pangolins makes it difficult for scientists to study them. Much about their behaviour and habits remains unknown (Anonymous, 2014b).

All pangolin species persist on a diet comprised predominantly of ants and termites. Emerging in the evening to forage, pangolins use their strong claws to dig into ant nests, termite mounds and rotting logs while using their flexible tails for support and balance. Pangolins locate insect nests using a well-developed sense of smell and capture their prey with long and extremely sticky tongues. They are protected from attacking insects by specially adapted muscles that seal their nostrils and ears shut. Arboreal species such as the White-bellied pangolin sleep and nest in the hollows of trees and can grasp and hang from branches using only their prehensile tails. Ground-dwelling pangolins tunnel underground to create burrows for nesting and shelter. Pangolins have an insatiable appetite and perform the important ecological role of regulating social insect populations. It has been estimated that an adult can consume more than 70 million insects annually.

Pangolins deter predators by hissing and puffing, and can protect themselves by rolling into a ball-their tough scales make them impenetrable to most predators. They identify their territories by scattering their faeces and scent marking with urine and secretions from a special gland. Scientists suspect that these odours advertise dominance and sexual status and may also help individuals recognize each other (Anonymous, 2014b; Soewu and Ayodele, 2009).

The longevity of pangolins in the wild is unknown though individuals have lived to almost 20 years in captivity. Males are generally larger than females, the latter reaching sexual maturity towards the end of their first year and giving birth to a single offspring. Pangolin mothers nurture their young in nesting burrows or trees. Scales are soft and pale at birth and begin to harden by the second day. A juvenile pangolin will cling to its mother's tail on foraging trips away from the nest and remain with her for a period of approximately three to four months. Ants and termites can be eaten from around one month old (Anonymous, 2014b).

Of the eight extant pangolin species, four occur in Asia: *Manis pentadactyla* (the Chinese Pangolin), *Manis*

*javanica* (the Sunda or Malayan Pangolin), *Manis culionensis* (the Philippine Pangolin), and *Manis crassicaudata* the Indian or Thick-tailed Pangolin. The four African species include *S. temminckii* (the Cape or Temminck's Ground Pangolin), *S. gigantea* (the Giant Ground or Giant Pangolin), *P. tricuspis* (the Tree or African White-bellied Pangolin), and *P. tetradactyla* (the Long-tailed or Black-bellied Pangolin). The Asian species are distinguished from the African species by the presence of hair between their scales (Anonymous, 2014b).

The utilization of pangolins for various purposes (briefly identified) continues to drive the annihilation of the species found in the African continent (Soewu, 2013a). To be able to realistically formulate management strategies to foster their long term survival, we need to know how pangolins are utilized in the continent, their role in the livelihood and culture of African people, the extent of use, and whether continued use at current levels is healthy or sustainable on the long run. In this paper, we present information on the factors that drive the uses of pangolins such as perception and conservation awareness, the diversity and prevalence of uses, trade-medicinal value and economic value. We also assessed the impact on the long term sustainability of such uses given the natural history of the species and their habits and habitats.

## FACTORS THAT PROMOTE CONSUMPTIVE USE OF PANGOLINS

Some of these factors can be regarded as fuelling factors which includes:

- i) Perception of pangolin values and conservation awareness;
- ii) Economic value and local trade.

### Perception of pangolin value and conservation awareness

Perception is one major factor fuelling the unregulated exploitation of pangolin in most parts of Africa. All renewable natural resources, including terrestrial and aquatic ones are regarded in most rural, sub-urban and even urban communities in Africa as gifts from nature whose utilization should not be regulated or should be under the most minimal control (Soewu et al., 2012; Soewu, 2013a, b; Simmonds, 1999). Based on this thinking, pangolins and other wild fauna are cropped for uses that the inhabitants desire; be it for food, traditional medicine or cultural ceremonies (Fa, 2000; Wallis, 2004; Wright and Priston, 2010). The exploitation is an "all-comers" affair and is fuelled by high level of unemployment and the attendant widespread poverty (Soewu,

2013b). Also, the skills required for cropping wild animals from the bush can be readily acquired in the community within a short period of time at little or no cost; and in most cases, the animals cropped require little or no further processing before they are disposed. The low production cost and high sales price translates to high profit margins.

For a trade that involves near-zero production cost outside that of cropping the animal from the wild, there are enough incentives to hunt this animal. Production cost ranges between NGN100.00 and NGN200.00 depending on the type of snare or trap used and can sometimes be at zero-cost on occasions when the animal is just picked incidentally in the bush while acquisition of skills needed to set up the snares and traps required training for just a couple of days at no cost. Market value of pangolin carcass presently ranges between NGN4500.00 and NGN7000.00 (Soewu pers. comm).

Ignorance about conservation status of local fauna and laws governing their use, absence of conservation education in the curriculum for formal education at most tiers of the education system; and non-enforcement of existing laws and regulations are further exacerbating factors. In a previous study describing conservation awareness, Soewu and Ayodele (2009), found that more than 90% of the respondents had no awareness about conservation status of pangolins. On their willingness to support conservation of pangolins, over 90% of respondents expressed that they would not support such effort.

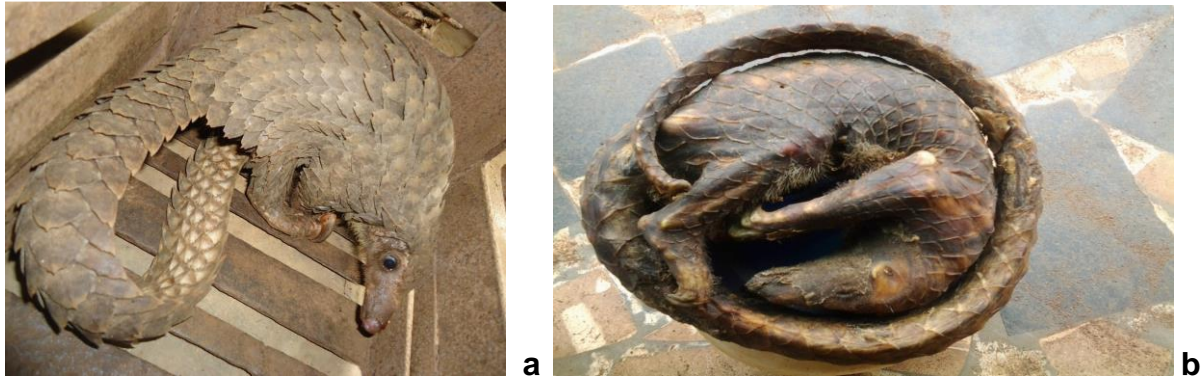
The high level of illiteracy coupled with a total absence of conservation education in the curriculum for formal education creates a knowledge gap that adversely hinders biodiversity conservation efforts. People are left with no awareness about the essence of conserving natural resources, the objectives, benefits and the consequence of overexploiting any renewable resource.

Non-enforcement of existing regulatory policies and laws tacitly encourages continued exploitation and utilization of natural resources. It is common to see animals under various categories of threat displayed openly for sale in markets (Figure 5). Despite the fact that pangolins are protected in some form throughout most of their range states, they are offered for trade in these states: Botswana, Chad, Ethiopia, Ghana, Guinea, Malawi, Mozambique, Namibia, Niger, Nigeria, South Africa, Tanzania, Uganda and Zimbabwe (Brautigam et al., 1994).

### Economic value and local trade

Legal and illegal trade in wildlife is pervasive and viable. Goodall (2000) observed that African species are getting closer to extinction as a result of the illegal trade in wildlife in Central and West Africa. On exploitation of wild fauna resources, Soewu (2006) observed that there is





**Figure 5.** *P. tricuspis* (a: live; in captivity; b: processed) (Copyright Durojaye Soewu).

little concern for decimating wildlife in an area because profit maximization is the objective of exploitation. Traditional subsistence use of wild fauna which was sustainable has been changing as commercial factors have affected the socio-economies of communities that are dependent on forest resources for sustenance. Many of these pressures come from urbanization and associated market economies that are creating demand for a variety of products in ever-increasing unsustainable quantities (Bowen-Jones, 1998). Soewu et al. (2012) showed that local trade in mammalian species in Southwest Nigeria is lucrative, extensive and prevalent involving a broad spectrum of species including pangolins. At prices ranging from NGN 1,500-2500 (per carcass of whole pangolin depending on size) the trade as recorded (Soewu and Ayodele, 2009; Soewu et al., 2012) was worth NGN 267,000-356,000. This figure is for a survey that covered just a fraction of Nigeria over a period of six months.

Wildlife resources often change hands several times before reaching the market, allowing many individuals to profit from this trade. Hunters sell carcasses to intermediaries who supply retailers in the town (Fa, 2000; Ott et al., 2002). However, most of the trade is direct to vendors or consumers and therefore hard to quantify (Steel, 1994; Pearce, 1996; Bowen-Jones, 1998; Soewu, 2006; Chandeller and Hywood, 2012).

## DIVERSITY OF USES

The very high market value ascribed to pangolin, whole or in parts is not accidental. It is a reflection of the benefits expected to be derived from its use (Sodeinde and Soewu, 1999; Soewu and Ayodele, 2009; Brautigam et al., 1994).

### Food

Pangolin meat is not only a delicacy of choice but

somewhat an exclusive preserve of the wealthy and influential in the society (Soewu, 2013a). A Nigerian adage states that “only the rich can request a meal with pangolin as an essential part of the ingredients”. This belief has actually turned pangolin into an article of ostentation, offered and purchased at a price well above its real value just because it is seen as a status symbol. This is in part responsible for the desperation of hunters and poachers to go all out in pursuit of pangolin. Sodeinde and Adedipe (1994) reported that the quality of pangolin meat in terms of taste rated higher than of other species such as cane rat, *Thryonomys swinderianus* and Maxwell’s duiker *Cephalophus maxwelli* that are also commonly hunted for food.

### Ornament

Utilization of pangolin as ornament dwells primarily on the scales (Figure 6). Another Nigerian adage demonstrates the cultural value attached to pangolins; it states that “the only motivation or justification for a man to adorn a flowing gown made with pangolin scales is a flagrant, needless and oppressive display of opulence” (Soewu, 2013b).

Pangolin skins are also processed into leather used for making footwear, bags and belts; and the scales and claws are used in decorations and in or as ornaments.

### Tradomedicine

The World Health Organisation (WHO) stated that traditional medicine refers to health practices, approaches, knowledge and beliefs incorporating animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being (WHO, 2000). Use of pangolins in traditional medicine is common in Africa: Nigeria (Soewu 2008; Soewu et al., 2012), Benin (Akpona et al., 2008), Cote D’Ivoire (Caspary, 1999), Tanzania (Walsh, 1996).



**Figure 6.** A coat of armor made of pangolin scales, an unusual object, was presented to George III in 1820. (Anonymous, 2014c)

The use for food and traditional medicine appears to exert more pressure on wild populations of animals than other uses (Bodasing, 1999, Ott et al., 2002; Soewu, 2006, 2013a). The demand created by traditional medicine has, however, been identified as one of the causes of the overexploitation of the wild population of numerous animal species (Soewu 2008). This indiscriminate use of wild animals, especially endangered species in all forms of traditional medicine is a cause of growing concern (Alves and Rosa, 2005; Soewu and Adekanola, 2011). Abdullahi (2011) reported an increase in the use of traditional medicine (TM) in Africa and the rest of the world.

TM, as observed, is being integrated into the mainstream of modern health care system in African countries including Ghana, Nigeria, Zambia, Mali and South Africa just as is the practice in China. Hunting and poaching animals for their medicinal values has brought many of the wild species closer to extinction and necessitated their listing in the red data book (Alves et al., 2011). Many African species, including pangolins now survive in fair numbers only in protected areas (Goodall, 2000). Pangolin rates very high on the list of species used for this purpose (Soewu and Adekanola, 2011; Soewu, 2013b).

The pressure on pangolin population from traditional African medicinal practices is premised on the belief that this animal has a reservoir of medicinal, magical or mystical properties. In southwestern Nigeria, pangolins are used to treat between 42 and 47 different ailments/conditions among the Ijebus and Aworis of the Yoruba tribe (Soewu and Ayodele, 2009; Soewu and Adekanola, 2011). The conditions treated range from therapeutic to psychological and even spiritual.

Soewu and Ayodele (2009) revealed some gender and age preferences for the use of pangolin in traditional African medicine. According to the report, some preparations specifically require juvenile and pregnant female animals. A pangolin seized in Zimbabwe in May 2012 had had most of its scales removed, which deviates from the local practice of *muti*, where the animal is kept alive and its scales removed as and when needed for medicinal purposes (Chandler and Hywood, 2012)

Persons requiring pangolin-infused preparations for treatment of their peculiar conditions will always rate the exploitation as more important than conservation. Substituting other animals for pangolin in these preparations has been suggested as a means of alleviating the pressure on the species. Soewu and Adekanola (2011) reported that only 27.7% of pangolin-based preparations would accommodate use of substitute animals. However, some of the animals identified as possible substitutes for pangolin are themselves usually of greater conservation concern as indicated by their IUCN listings. For instance, gorilla, identified as a possible substitute in a particular case is actually listed on schedules I and 1 of CITES and Nigerian Decree No 11, respectively (Soewu and Adekanola, 2011).

### Sustainability

An enormous number of meat in these instance pangolins, is being taken from some of the most bio-diverse forests in the world and this indicates the scale of seriousness of an ecological problem that will escalate if commercial trade goes unchecked (Bowen-Jones and Pendry, 1999; Caldecott et al., 1994; Fa et al., 2000, Soewu 2008). A huge number of animals are taken by subsistence hunters. Ott et al. (2002) reported that several regions of the world are experiencing massive defaunation, unregulated and unsustainable depletion of fauna resources, as a result of the bush meat crisis. Wilkie et al. (1998) stated that it is not habitat loss but defaunation that poses the greatest immediate threat to animal conservation in forests of west and central Africa.

Sodeinde and Adedipe (1994) estimated that an average of 24 pangolins was being supplied each month to the markets in Ogun State, Nigeria, with a total of 142 recorded between November 1988 and April 1989. In a more recent study, Soewu and Ayodele (2009) reported

**Table 1.** Extinction-susceptibility rating of pangolins (*Manis* spp.) based on known attributes of extinction-prone species

Attributes	Extinction-prone species	Pangolins	Rating
Trophic level	Usually top of the food chain	Insect eater (Cansdale, 1947; Menzies, 1963)	2
Body size	Large to very large	Moderate, adults 43 cm head and body (Rahm, 1956)	2
Taxonomic uniqueness	Monotypic	Monotypic family and genus (Simpson, 1945; Emry, 1970)	4
Reproductive rate	Low, very low	One young per female, gestation period c. 6 months (Menzies, 1967; 1091); monogamous (Pages, 1972)	3
Breeding and longevity in captivity	Poor	No conception in captivity, do not survive long (usually <3 months) (Menzies, 1963)	5
Population distribution	Fragmented	Fragmented (Dorst and Dandelot, 1970; Happold, 1987; this study)	3
General habitat distribution	Fragmented surrounded by incompatible land use	Forests and savannah (Booth, 1960; Happold, 1987)	3
Habitat alteration	Continuous and high	Continuous; at high rate (Umeh, 1986)	5
Habitat requirements	Special or specific	Restricted in diet (Cansdale, 1947; Menzies, 1963), found on trees infested with preferred prey (Pages, 1970)	
Insularity	Pronounced/high	Local populations discontinuous (Happold, 1987; this study)	3
Hunting pressure	High	Persistent (Walker, 1975; this study)	4
Economic/medicinal value	High or priceless	Flesh eaten, scales and other parts used for charms, ornaments and medicinal compounds (Hayman, 1954; Walker, 1975; this study)	4
Extinction risk index			0.68

Source: Sodeinde and Adedipe (1994).

that a higher figure:178 whole pangolins were sold into traditional African medicine during a period of three months amongst a population of people that represent less than 3% of the Nigerian population. Soewu and Adekanola performed another study in 2011, where the utilization of 64 pangolins were documented between 40 traditional medicinal practitioners within a month, giving a monthly average of 1.6 pangolins utilized per practitioner.

It has been suggested that the importance of pangolins as traditional medicines throughout Africa is likely to increase threats to their population (Anadu et al., 1988; Brautigam et al., 1994). The number of traditional medicinal practitioners in Africa cannot be ascertained but it has been estimated to be at least one practitioner to 2000 people (Soewu, 2013a). If we add the figures above that of the bushmeat markets spread all over the nook and crannies of the continent of Africa, the result would be devastating.

All these studies indicate a continuous decline in the size and number of the pangolin captured from the bush and a growing difficulty in encountering the animal. Sodeinde and Adedipe (1994) used an extinction-susceptibility rating to predict the long-term fate that would befall pangolins if the exploitation continues unabated. Extinction risk index for pangolins species was estimated to be 0.68 (Table 1).

Bowen-Jones (1998) observed that even the animals that could be hunted sustainably are often being exploited at probably unsustainable levels, and that controls need to be introduced in order to make sure that

they are not added to the vulnerable category. However, Chardonnet et al. (2002) has established that excessive harvest of wildlife depletes the wildlife resource when the level of exploitation overtakes the recruitment rate. The level of exploitation for pangolins so far has clearly overtaken the recruitment rate. According to Challender et al. (2012) evidence suggests the conservation status of six pangolin species (all four African and two Asian species) is decreasing.

More importantly, pangolins sold and utilized in Africa today come directly from the wild as there are no records of successful captive breeding and ranching of this species yet (Soewu and Ayodele, 2009; Soewu and Adekanola, 2011). The situation in West and South Africa is suggesting that most pangolins found on the market have been taken from protected areas (Sodeinde and Adedipe, 1994; Brautigam et al., 1994). International trade in pangolins is undoubtedly having a detrimental effect on population levels (Chandeller, 2011)

### Intercontinental trade

Due to the clandestine nature of illicit trade in wildlife, it is often difficult to estimate trade levels, hence minimum volumes can only be approximated/gauged based on data from media reports of seizures and the findings of research (Broad et al., 2003; Chandeller and Hywood, 2012). The exact proportion of the hunting and trade in pangolins in Africa intended for intercontinental trade,

international trade within Africa or for domestic use is not clear. However, the nature and circumstances surrounding seizures that have been made recently suggest links to intercontinental trade rather than to local use. Since 2008, a small number of seizures comprising African pangolins and derivatives have taken place in Asia and in Europe where the end destinations were reported to be China, Thailand and Hong Kong. This is undoubtedly a small fraction of actual trade levels based on the low detection rates associated with wildlife trade. Although the quantities of pangolins and scales seized are not known in all cases, some of these consignments included pangolin scales ranging in weight from between 1 and 115 kg; one comprised 100 African White-bellied pangolin skins (with scales attached) that had originated in Guinea and was bound for Thailand (Chandler and Hywood, 2012). There is an evidence of a potentially growing intercontinental trade in African pangolins between Africa and Asia. Over the last two years, there have been a small number of pangolin-related seizures from Africa which have been destined for Asian markets. For example, in 2009, 100 kg of 'Manis spp.' scales were seized in transit from Côte d'Ivoire to Hong Kong (Chandler, 2011). Hong Kong Customs officials intercepted an illegal shipment of 2.6 tons of pangolin scales from Cameroon via Malaysia- the second haul from the African continent in less than a month. The 2,340 kg of scales were discovered on June 11, inside 115 bags on a shipment declared as timber. This follows the May 28 seizure of one ton of pangolin scales, initially reported by the Hong Kong Customs and Excise Department on May 28 as arriving from South Africa (however, later information suggests the illicit cargo arrived from Kenya or Uganda, via Malaysia). The seizure at the Kwai Chung Custom House examination compound, the largest seizure of pangolin at Hong Kong's port in five years, is estimated to be worth R5-million. This trade is having catastrophic effects on the populations of all of the remaining eight pangolin species world-wide, with the Asian pangolin populations showing dramatic declines in recent years. Illegal trade is rife in central and west Africa and was known to occur at low levels in southern Africa prior to this incident. This most recent seizure indicates that illegal trade is widespread in southern Africa as well, and is far from being sustainable (Anonymous, 2014d). In July 2012, 115 kg of pangolin scales were seized in Uganda; the trader claimed that he had many suppliers and that he always exported the pangolin scales to China. He said that he received deliveries from various locations within the country and from the Democratic Republic of Congo. According to a spokesperson from the Ugandan Wildlife Authority, wealthy Chinese were encouraging the illegal trade. This supports the concern that intercontinental trade, if not the case already, is set to be a major threat to Africa's pangolins, especially if this practice is occurring elsewhere in Africa, facilitated by a growing Chinese presence

on the continent as a result of increasing trade and economic links. The larger volumes suggest this trade is commercial in nature but operating in parallel with smaller volumes (Chandler and Hywood, 2012).

### Conservation awareness

As reported earlier, there is a general lack of awareness of conservation laws and protection status of wild animals in Africa. In Soewu and Ayodele (2009), well above 90% of the respondents had no awareness about conservation status of, or any threat to the survival of pangolins. On their willingness to support conservation of pangolins, less than 10% expressed varying degrees of interest in any conservation programme for pangolins while others expressed total apathy towards such projects.

### Recommendations

The first step towards saving our darling species is to determine the sizes of isolated populations of pangolins across their ranges in the region and on the continent of Africa. Such a study requires concerted, coordinated and harmonized surveys throughout Africa. This is no doubt a daunting task, but it is attainable. Population studies should also incorporate evaluation of immediate and remote threats to the supporting ecosystem.

There is a need to quantify the number of pangolins sold and utilized within a specific time frame in the region and on the continent of Africa for all the identified uses. The sales figure should include domestic, cross-border and intercontinental trade. This will give an insight into the exploitation pressure on resources in the wild. According to Chandler and Hywood (2012), research needs to be undertaken on inter-continental trade, given the potential magnitude of the threat and the suspected precipitous decline in Asian pangolin populations driven by demand in the region, in particular China and the growing economic ties between Africa and China. Such a study should be supplemented with research into the status and ecology of African pangolins in order that an informed assessment can be undertaken into the impact of trade on pangolin populations. A critical examination of these uses as an index of pressure on resources in the wild is a prerequisite for any conservation programme to be meaningful and effective (Chardonnet et al., 2002; Soewu, 2006).

Lastly, the twin approach of increasing yield and reducing demand for pangolins should be adopted.

### Yield boosting measures

The following in situ and ex situ approaches to increasing yield are suggested.



### *In situ*

**Pangolin sanctuaries:** Establishment of sanctuaries around identified populations of pangolins will be a good starting point. It gives room for regulation and monitoring of exploitation. This will also raise the awareness about the conservation needs of the species among the populace in surrounding communities.

**Involvement of host communities with incentives:** Communities adjacent to conservation projects will more readily lend their support to such schemes if they are included as stakeholders and co-beneficiaries. Members of communities inhabited by pangolin population(s) should be engaged as much as possible in the projects. Offers of scholarship support to indigenes of such communities to pursue courses in conservation/ecology related courses will enable the engagement of such indigenes. This will prepare an army of conservationists among the indigene within a short time, thereby making the spread of the conservation message a lot easier.

### *Ex situ*

There is a need to boost the yield of this animal by establishing pangolin husbandries across all regions of the world, most especially in Asia and Africa which had been regular suppliers over the years. Semi-captive breeding of pangolins for education, research and re-introduction purposes will greatly enhance the survival and continued existence of these species.

### Reducing demand

Massive enlightenment campaigns on pangolin conservation should be mounted across all regions of the world. A drop in demand would impact on other dynamics of the trade and make it less rewarding to hunt pangolin. For this to be more effective, the manufacturing sector of the economy should be involved such that consumer products can begin to carry conservation-promoting inscriptions. It is also expedient we carry the pangolin gospel farther by participating in other fora and gatherings beyond the strictly conservation circles, for instance the World Social Forum. A point to emphasize to the world is that unsustainable depletion of wildlife resources not only embodies a challenge for conservation, but more importantly represents a serious threat to the health status and food security of human population (Soewu, 2006; Soewu 2008; Marshall, 1998).

### Strengthening the legal machineries

With the recent re-evaluation and adjustments in the

conservation status of pangolins by the IUCN Red Data List, and the on-going efforts by CITES to review the trade status of these species, there is a very urgent need to review the status of pangolin species across the continent as regards the African Convention on Nature and Natural Resources. It is also essential that all countries within the region review the status of these species accordingly and strengthen their legislation towards protecting pangolins and all other species identified as being under varying degrees of threats in their territories. Such legislations should be duly implemented to ensure its effectiveness.

The establishment of a joint-regional organ to monitor cross-border movement and trade in pangolins and all other vulnerable species would also go a very long way in enhancing the continued survival and availability of these species.

### Conflict of interests

The author(s) have not declared any conflict of interests.

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