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Reptile Trading in Cameroon: Setting Baselines for Monitoring and Interventions

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***Abstract.*—Trade in wildlife, including reptiles, represents an important component of the livelihoods of many indigenous people globally. Characterizing the extent of this trade and its relationship to livelihoods is necessary to understand its sustainability. We report on the trade of reptiles for food, traditional medicine, and crafts in Yaoundé, the capital of Cameroon, for which data has been lacking compared to elsewhere in the country. We interviewed 28 people, including 13 from craft stalls, five traditional healers, seven from restaurants, and three wildmeat traders on the origin, acquisition and use of reptiles. We documented 16 species, including nine CITES listed species, of which 69% were used for meat, 38% in traditional medicine, and 69% for leather products. The most harvested species for meat included the Gaboon Viper (*Bitis gabonica*), Nile Monitor (*Varanus niloticus*), Dwarf Crocodile (*Osteolaemus tetraspis*), Rock Python (*Python sebae*), and forest tortoises (*Kinixys* sp.). Species sold for traditional medicines included the Rock Python and two chameleon species. There was at least one incidence of a critically endangered African Slender Snouted Crocodile (*Mecistops cataphractus*) being traded for its meat and skin. Crocodiles, pythons, vipers, cobras, and monitor lizards were predominately utilized for clothing products. The demand for reptiles in these multiple uses requires further documentation, with only anecdotal reports from traders of reductions in availability of certain species traded; notably vipers and crocodylians. We discuss possible measures to improve monitoring of this trade network to determine its sustainability and requirements for sustainable management.**

Key Words.—harvest; food; traditional doctor; leather products; sustainability; conservation

Introduction

The collection of reptiles from the wild for subsistence or commercial purposes has long been invoked as a major factor in species decline (Jenkins and Broad 1994; Klemens and Thorbjarnarson 1999; Gibbons et al. 2000; Böhm et al. 2013: Marshall et al. 2020). This can involve large numbers harvested legally and illegally for food, leather, traditional medicine, and the pet trade (Simelane and Kerley 1998; Fa et al. 2006; Bauer 2009; Marshall et al. 2020), potentially contributing to livelihoods along the trade network (Kunin and Lawton 1996; Brown and Marks 2008). This phenomenon seems to be a call for concern in most parts of Africa where local people continue to use wildlife (Balakrishnan and Ndhlovu 1992; Osemeobo 1992; Fa et al. 2003; Robinson et al. 2018). In addition to their use as food, whole or parts of animal carcasses are used in traditional cultural practices (Adeola 1992; van Dijk et al. 2000; Akpona et al. 2008; Segniagbeto et al. 2013).

Over-collection of reptiles for various purposes has led to heightened risk of extinction, such as restricted-range species for the pet trade (i.e., various east Asian lizards; Stuart et al. 2006), with crocodilians, turtles, and tortoises particularly threatened by hunting (Cox et al. 2022), and with certain snakes and lizards also affected (Zhou and Jiang 2004; Dufour et al. 2022). Reptile exploitation is exacerbated by habitat destruction (Goode et al. 2004; Maxwell et al. 2016), such as increased hunting pressure with forest accessibility following logging and mining development (Fa et al. 2006; Gonwouo et al. 2021). On mainland Africa, fewer than half of described reptiles have published conservation assessments by the International Union for Conservation of Nature (IUCN; Tolley et al. 2016), with 54 species listed as Critically Endangered or Endangered due to global trade (Marshall et al. 2020), highlighting the need for monitoring threatened species. This is in addition to the significant use of reptile skin for leather for apparel and furniture (Jenkins and Broad 1994).

Few studies in Africa have attempted to identify and record trade of reptiles for medicinal use (Adeola 1992: Edderai and Dame 2006). More familiar uses for trade in reptiles include using skins for leather and crafts (Jenkins and Broad 1994). Species commonly reported for consumption in Central Africa (notably Nigeria and Cameroon) have included Forest Hinge-back Tortoises (*Kinixys erosa*), Home's Hinge-back Tortoises (*K. homeana*), Soft-shelled Turtles (*Trionyx triunguis*), Nile and Dwarf crocodiles (*Crocodylus niloticus/suchus*, *Osteoleamus tetraspis*), Nile Monitor Lizards (*Varanus niloticus*), Rock Pythons (*Python sebae*), Gaboon Vipers (*Bitis gabonica*), and Crested Chameleons (*Trioceros cristatus*; Fa et al. 2006). Other uses are not readily documented.

Cameroon has a robust diversity of reptiles (Chirio and LeBreton 2007), but reptile interactions with people has so far been understood predominately in terms of wild meat trade (Fa et al. 2006). Other forms of use have been less understood, though localized accounts of use for traditional medicine and crafts have been reported (Bobo et al. 2014). Crocodiles, pythons, monitor lizards are listed in the Convention in Trade of Endangered Species (CITES) appendices and the Cameroonian protected species list, yet despite this, these groups appear regularly in commerce. Wild meat markets have been comprehensively appraised in the Southwest and Littoral regions (Fa et al. 2006), but one key city has been missed off surveys: Yaoundé, the capital of Cameroon in the central region of the country. As the trade of wild meat and other wildlife products is channeled to urban centers of consumption, the contribution of this market is likely to be important for understanding and managing to the broader national consumption of reptile products.

There is growing concern that numbers of reptiles are being harvested in Cameroon to supply various markets is becoming unsustainable due to increasing demand. The trends in the demand and use of reptile products have not been consistently quantified, including price fluctuations in relation to supply and demand. This lack of evidence can thus lead to spurious inferences on the sustainability of trade and its management (Challender et al. 2022; Natusch et al. 2021).

We appraised reptile species currently exploited (wild meat, traditional medicine, crafts) in Yaoundé to determine current intensity and value of trade and identify potential threats to, as well as opportunities for, sustainable harvest. This includes setting up baselines for monitoring reptile trade networks in markets in this and other cities across the country and Africa. It could also be the start of improving monitoring on reptile trade networks, providing recommendations for sustainable exploitation and for expanding the research, as well as for interventions, such as confiscations. We were motivated in part by the emerging evidence that the over-collection of reptiles from the wild has resulted in the decline of local populations (Fa et al. 2006; Petrozzi et al. 2016; pers. obs.), in association with the perceived economic and health values behind their exploitation.

Materials and Methods

Study sites.—We conducted our study in Yaoundé, Cameroon (Fig.1), an urban agglomeration in the central African sub region. This city falls within the Guinea-Congolian lowland evergreen forest and characterized by a rapid urbanization. Vegetation in the suburban area of this town is a mosaic of food crops farms, cocoa farms, and secondary forest with varying levels of alteration that is progressively replacing the native evergreen forest (Nkwemoh et al. 2017, 2018). Forest clearance is a constant phenomenon in the area with wood exploitation for various uses and for sale in the city (Tchékoté and Ngouanet 2015). This has coincided with the emergence of a network of wildmeat trading posts (Edderai and Dame 2006).

Data collection.—Between October 2020 and December 2021, we gathered data on the species, origin, use, and price of reptiles in markets in Yaoundé. The focus was on reptiles (tortoises, turtles, crocodilians, snakes, lizards), but the surveyors paid attention also to the presence of amphibians if they were traded. We identified markets for study during random, opportunistic visits spaced throughout the survey period in restaurants, artisanal centers (craft markets), traditional doctors, and a wildlife (wild meat) market in the neighborhoods of Yaoundé. This included a large commercial trade of crafts made from reptile skin that are sold in the artisanal center in Yaoundé and that is well known by the general public, including tourists who visit the city.

We completed nine visits during market days (Saturdays), with visits to trading points one after the other to carry out interviews on the importance and cultural significance of reptiles being sold. This culminated in 26 reptile trading points (seven restaurants, one wild meat marketplace, 13 craft stalls, five traditional medicine markets/stalls) targeted for

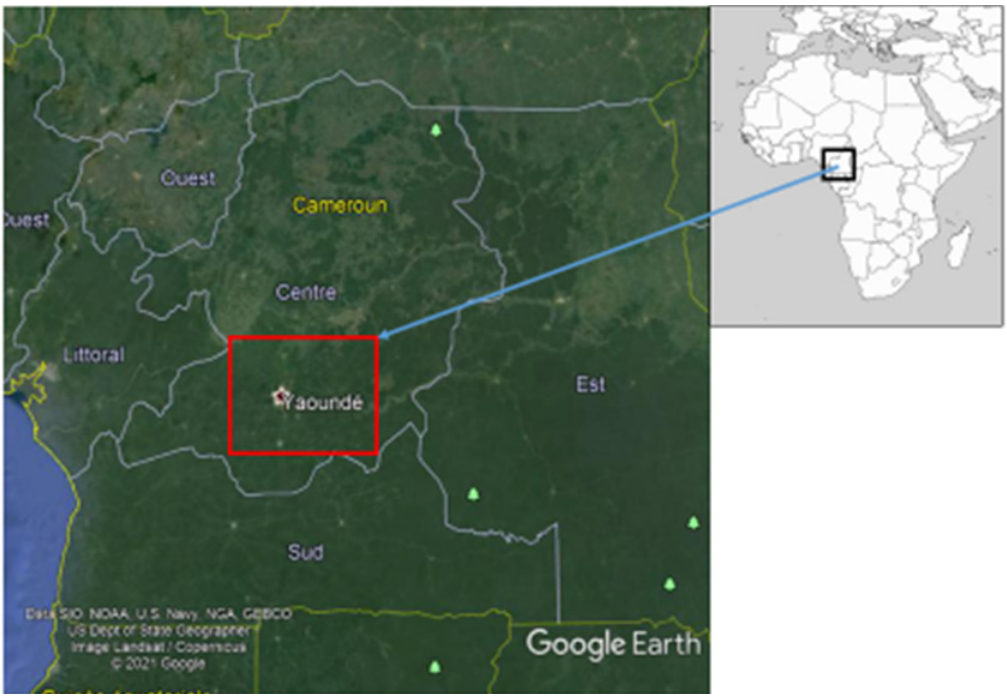

Figure 1. Map of Africa showing the position of Yaoundé in Cameroon.

the study. From these, we interviewed 28 people: 13 from craft stalls, five traditional healers, seven from restaurants, and three wild meat street vendors.

We conducted interviews during normal trading hours for market places and restaurants, with customers openly purchasing animal products, consuming reptile meat or using reptile-derived products for traditional healing rituals. On each visit, one or two members of our team collected data by means of counts of animals traded, informal interviews, and discussions with traders and traditional healers, usually held in French or with assistance from an interpreter. We randomly selected participants based on the order in which they were met as the surveyor would proceed through the various markets. We only included traders who were willing to participate by verbal consent in the survey.

At the initiation of each interview, we briefly explained the aim of the survey to the potential interviewee and proceeded if verbal consent was given. Ten people in the wildmeat market declined to participate with interviews, possibly due to concerns about incrimination due to the illegal nature of the trade in protected species. We interviewed each of the consenting individuals once, but if we encountered them again later and they were willing to provide insightful information that elaborated on the previous interview, we added that information to the findings. During these discussions, we asked respondents a series of questions, including: (1) What price for each species on the stall?; (2) What are these reptiles sold for?; (3) Do these animals have a use to you/your community/ethnic group?; (4) Which species do you use and for what purpose?; and (5) Do you experience difficulties with trading?

We asked questions so as not to lead the interviewee, but discouraged binary (yes/no) type by requesting elaboration to gain more detail. We recorded responses during or immediately after the discussion. Our surveyors remained at the market long enough to see what was being traded and to complete all interviews.

We used data collected from the interviews to analyze the value of each item and species traded. We identified specimens being traded to the species level based on the competent experience of the team based on > 20 y working with reptiles in Cameroon and following Chirio and LeBreton (2007) and Trape et al. (2012). We used Generalize Linear Model analysis to compare price fetched across and between species at each market type (R function: glm in R Core Team 2016). The model had the price per item for a given species as the independent variable and the market type as the dependent variable and was constrained following an assumption of a quasipoisson distribution of data. We applied the same model where all items traded for all species combined, which was applied as an independent variable for the

Table 1. Statistical analysis of prices of commonly traded species if they differed significantly among markets. The abbreviation df = degrees of freedom.

Species	*t*-value	df	*P*-value
Gaboon Viper (*Bitis gabonica*)	1.18	8	0.220
Dwarf Crocodile (*Osteolaemus tetraspis*)	0.97	29	0.480
Hingeback Tortoises (*Kinixys* sp.)	1.24	18	0.230
Monitor Lizard (*Varanus* sp.)	1.42	25	0.160
Rock Python (*Python sebae*)	3.17	30	< 0.001
All species	3.29	154	< 0.001

market type as an independent variable to compare overall revenue potential for each market.

Results

From the 26 reptile trading points visited throughout the study over the period of one year in Yaoundé, we observed 162 individual reptiles of 16 species from 11 genera and nine families across markets. All of these animals were used in restaurants, traditional medicine, craft shops, or the wildlife market (Appendix Table). Of all the species recorded, 69% (11 species) were present in wildlife markets and used as food in restaurants, 38% (six species) were used in traditional medicine, and 69% (11 species) were used for leather products. Four species are listed in the CITES Appendix I, while six species are listed in Appendix II. At least eight species traded are of global conservation concern, with two listed as Critically Endangered (Slender Snouted Crocodile, *Mecistops cataphractus*, and Home's Hingeback Tortoise) three classified as Vulnerable (Dwarf Crocodile, Nile Soft-Shelled Turtle, Gaboon Viper, and Rhinoceras Viper, *Bitis nasicornis*), and two Near Threatened (Ball Python, *P. regius*, and Rock Python). All three crocodile species are listed under Cameroonian law as Class A under full protection status, while monitor lizards, cobras, vipers, and the Rock Python fall under a lower-level Class B protection (similar level to CITES; Ministère des Forêts et de la Faune 2020). All dealers reported that larger reptiles, such as crocodiles, vipers, and monitor lizards, have become rare as the supply has dropped from the previous year, resulting in a rise in price in the wildlife markets. Smaller species such as tortoises and turtles appeared more frequently and were mainly bought by individuals for family meals, for home pets, to use their shells for traditional medicines (such as home protection against mystical attack), and for decoration. We note that no amphibian species were recorded in any of these markets.

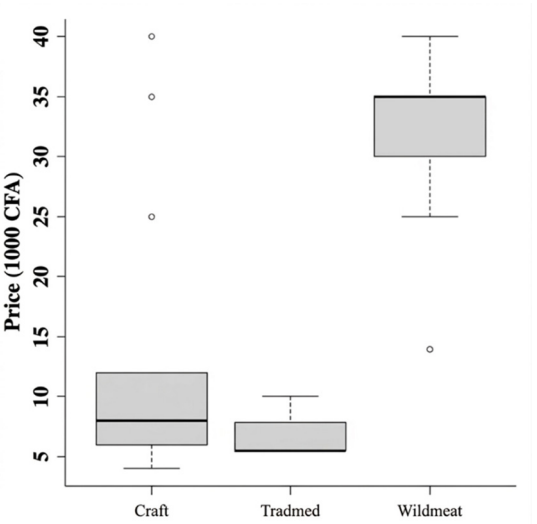

Figure 2. Prices of Rock Python (*Python sebae*) items across various market types in Yaoundé, Cameroon. Each item will vary, from bags and shoes in craft markets, oils and animal heads in traditional markets, to whole animals in meat markets. Currency is presented in Cameroon Central African Franc (CFA), equivalent to *c.* 599CFA per $USD. (Tradmed = traditional medicine).

The mean value per item traded (whether it was meat, craft, or traditional medicine) was highest in wildlife markets: 22,000 ± 11,945 CFA (equivalent to $36.73 ± 19.94 [standard deviation] USD with $1 USD equal to about 599 CFA at the time of writing), followed by the artisan markets 15,487 ± 14,247 CFA ($25.85 ± 23.78 USD), then traditional medicine 8,000 ± 5,141 CFA ($13.35 ± 8.58 USD). These differences among use types were significant (t = 3.29, $P < 0.001$). For species-specific comparisons for those traded at all markets, only Rock Pythons showed a significant price difference (t = 3.17 $P <$ 0.001, Table 1), reaching higher prices in wild meat markets (Fig. 2). Dwarf Crocodiles, tortoises, and monitor lizards showed no significant difference in price between markets (Table 1).

Reptiles regularly supplied to wild meat markets included Gaboon Vipers, Dwarf Crocodiles, Rock Pythons, and monitor lizards (Supplemental Information Figs. S1 and S2). Gaboon Vipers and Dwarf Crocodiles were consistently sold each month surveyed. Most specimens for sale at the wildlife markets were dead, though some were alive (notably tortoises and Dwarf Crocodiles). At one market, there was an adjacent room with freezers used to store various animals for wild meat. Interviews with traders revealed these animals were collected from the more remote areas of suburban Yaoundé and sold in the wildlife markets and restaurants, where

there is steady demand. The interviewees said that these reptiles are hunted using snare traps, machete, or by guns used especially for larger species, such as crocodiles and pythons. The wild meat traders/ restauranteurs say that citizens of Yaoundé consider the meat of the Gaboon viper (Fig. 2) to be a delicacy, which is in high demand on weekends (3,500 to 5,000 CFA per meal, $5.84–8.34 USD, respectively), with a fresh viper selling at a very high value of 22,000 ± 11,945 CFA ($36.68 ± $19.91 USD). A commonly observed dish on menus was what is called pepper soup eaten with plantains, yams, and cassava; this dish uses meat from crocodiles, vipers, or monitor lizards. When fresh, reptiles are sold whole, but in some cases, they are dismembered and smoked by the hunters before being supplied to markets and restaurants (as we observed and also were told by interviewees). All interviewees confirmed that all traded reptiles are taken directly from the wild with no mention of farms. All wildlife traders reported that there has been an increase in supplies originating from areas more distant from the capital.

Reptiles found being traded for traditional medicine were most represented by Rock Python (18 individuals, 11%), hingeback tortoises (11 individuals of Forest Hinge-back Tortoise, nine individuals of Home's Hing-back Tortoise; 12% for the genus), chameleons (10 individuals of Crested Chameleon, five individuals of Owen's Chameleon *T. oweni;* 9% for the genus), and African Forest Turtle (*Pelusios gabonensis*; seven individuals, 4%). To a lesser extent, Gaboon Viper (six individuals), Nile Soft-shell Turtle (four individuals), and Royal Python (one individual) were also traded.

In our interviews of traders, we found that they advocated certain reptiles for use in rituals, with detailed knowledge of the names, cultural attributes, and uses of some reptiles. For example, African Rock Python products at these markets were reported to be widely used for medicinal purposes. Bones and oil extracted from the fatty tissues of the snake were said to be used to massage the limbs of children who have rickets, slow growth, and impaired walking capacity. The oil, traded as Mboma oil, is stored in bottles, with 1 L costing up to 10,000 CFA ($16.67 USD). While there are variations in the prices of reptile parts used for therapeutic purposes (1,000–20,000 CFA, equivalent to $1.67–33.34 USD; Fig. 2), the mean value is 8,000 ± 5,141 CFA ($13.34 ± $8.57 USD). Traditional medicine merchants also discussed selling remedies using the Crested Chameleon (Supplemental Information Fig. S3). Chameleons were reported to be used alive directly after collection from the wild or killed and dried to be later crushed into powder and mixed with other herbs at the discretion of the traditional doctor. The African Forest Turtle was said to be used by three traditional doctors for the prevention of attack by mystical witchcraft through some traditional rituals. This would consist of using empty shells of the turtle (as well as *Kinixys* sp.) to place in houses as totems for protection against witchcraft, and for decoration (Supplemental Information Fig. S4).

The artisanal center traded products are made from the skins of *Crocodylus niloticus/suchus,* Dwarf Crocodiles, Rock Pythons, Royal Pythons, the Western Savanna monitor lizard (*V. exanthematicus*), and cobras (*Naja* sp.). These included products such as shoes, wallets, handbags, and belts (Supplemental Information Fig. S5). Not all species were consistently available from the leather markets, while Rock Pythons and Savanna Monitor Lizards (*V. exanthematicus*) were available each month surveyed. All interviewees stated that these articles are highly demanded by the public in Yaoundé, including by members of the Cameroonian international diaspora who visit the town on an occasional basis for souvenirs. Prices varied from 2,500 CFA ($4.50 USD) for purses to 25,000 CFA ($44.97 USD) for handbags made from crocodile skin, with a mean value of 15,487 ± 14,247 CFA ($27.86 ± 25.62 USD). Our discussion with all dealers revealed that these products are mostly produced in northern Cameroon, where there are several tanneries skilled in processing these products. Processed articles are sent to major urban centers across Cameroon and in neighboring countries, such as Gabon and Equatorial Guinea, and Europe. Our interviews and further inquiries have not found any evidence for known reptile breeding farms in Cameroon, suggesting that all reptiles used for leather products are harvested from the wild.

Discussion

Market surveys in Yaoundé over one year revealed the consistent use of particular reptile species and taxonomic groups, many with overlapping uses in meat, skins, and traditional medicine. This preliminary study found that the species consistently traded included globally threatened and nationally protected Dwarf Crocodile, hingeback tortoises, and vipers, as well as *Crocodylus* species (*niloticus/ suchus*) that are nationally protected. More threatened species, such as the Slender-snouted Crocodile and

Nile Soft-shelled Turtle, were occasionally found for sale in markets. These species, listed as Threatened by the IUCN, all have hunting as a factor contributing to their threat level (IUCN 2025). We obtained basic information on sales prices from each market, with wild meat being sold at the highest prices per product. This, however, did not take into account the quantities sold and the non-perishable nature of many of the traditional medicines and crafts.

The nutritional, cultural, and economic value of reptiles in the capital city of Yaoundé appears to be significant based on these findings. Accounts from traders claimed that the trade greatly contributes to the livelihood of the people engaging in these activities. Alongside use for medicine and various leather products, reptiles represent a so far unquantified source of protein to the population of Yaoundé. Reptiles as a food source remain a potentially under-appreciated protein resource in many tropical regions in the world (Jenkins 1995; van Dijk et al. 2000), and for people in the city of Yaoundé appears to be no exception. From our discussions with market traders, we understood that reptile harvesting was practiced mainly by hunters residing in the suburban areas who bring their harvest into town for sale to wildlife markets and restaurants. Processing and selling of reptile meat is not limited to a specific period and was apparently carried out all year round, although species such as Gaboon Vipers, pythons, and Dwarf Crocodile appear to be available most months. These animals traded are those that have made it to Yaoundé, with many others likely consumed locally around hunting sites (Gonwouo et al. 2021; Tasse Taboue et al. 2024). We have witnessed monitor lizards, pythons, tortoises, and crocodiles hunted and offered for sale around Cameroon (especially around Nkongsamba-Loum; pers. obs.). Retailers explained that farming seasons are when vipers are sold at lower prices by hunters as these snakes are encountered frequently on farmland during cultivation. Hingeback tortoises sold for meat were found to be mainly bought by individuals for family meals and pets. Tortoises are in less demand in restaurants, although this appears to be due to a diminished supply in Cameroon due to historical over-collection (Lawson 2000; Chirio and LeBreton 2007).

We found the majority of reptiles traded for fresh meat included crocodiles, vipers, pythons, and monitor lizards. As the wild meat market primarily includes recently caught animals, the take of animals is going to be high for these species. One trader used freezers, although the capacity was limited and power outages are frequent in Yaoundé, suggesting that supply is still continuous.

While the Gaboon Viper and Dwarf Crocodile were being traded on all occasions, traders revealed that it had been more than 6 mo since they received large crocodiles (*Crocodylus* sp.) for sale, claiming this is a relatively long interval in supply compared to 10 y ago. It might be assumed that these species are sustainably sourced due to continuous use, although this study was carried out within 2 y, with declines unlikely to be detected in that time period. Consequently, longer-term data is needed on the availability of these species and on the origins, demography, and sizes of animals being traded. The use of freezers to store this wild meat could confound this; therefore, follow-up surveys should take care to differentiate freshly caught animals from those defrosted from the freezer. Our personal observations from localities such as Nlonako (Littoral Region) and Mamfe (Southwest Region) have shown that crocodiles (both *Osteolaemus* and *Crocodylus*), in particular, are rare, likely due to hunting. As a result, the various forms of trade may greatly contribute to the overexploitation of vulnerable and protected species. It has already been noted that exploitation of vipers and pythons for food in Cameroon has probably contributed to population declines (Chirio and LeBreton 2007), as has occurred elsewhere in the world (Gibbons et al. 2000; Nijman et al. 2012) and could be going undetected for many other consumed species in the suburban areas of Yaoundé. This could certainly be the case for Ball Pythons that were traded for crafts in Yaoundé, corresponding to known studies of this being one of the most commercially traded live wild animals under CITES from Africa over the past 5 y, although usually for the pet trade rather than skins (Auliya et al. 2020; D'Cruze et al. 2020). The use of chameleons for traditional medicine purposes also represents a case of exploitation other than for the international pet trade (Carpenter et al. 2004), with regional impacts from that trade.

The indigenous Ewondo people of Yaoundé use traditional medicines of reptile origin to treat perceived health imbalances and evil spirits, as well as for protection from witchcraft. Species such as Rock Pythons, hinge back tortoises, Gaboon Vipers, and chameleons play a significant role in these traditional remedies in the city. This zootherapy appears to be built from an indigenous knowledge system passed on through generations by living in close contact with wildlife and using traditional remedies. Animals have long been used by indigenous people

as medicinal resources for the treatment and relief of various illnesses, including healing practices and magic rituals (Adeola 1992; Segniagbeto et al. 2013), and continue to be an important part of traditional medicine in many parts of the world (Angeletti et al. 1992; Costa-Neto and Marques 2000).

We found the phenomenon of zootherapy taking place through the medicinal use of reptiles, with people in Yaoundé paying significant sums of money for these remedies. Given this demand, trade in therapeutic reptiles potentially constitutes an additional form of pressure on the wild population, especially for already heavily harvested species. Earlier studies found that the annual global trade in animal-based medicinal products accounts for billions of dollars per year (Kunin and Lawton 1996) and is likely to be similar or higher at the time of writing. Populations of many animal species used as sources of traditional medicine, however, have become dramatically impacted as a result of overexploitation (Bauer 2009; Jenkins 1995; van Dijk et al. 2000). These threats should be viewed within the cultural dimension, including the perception, use, allocation, transfer, and management of these natural resources.

The sustainability of the use of reptile skin for making leather products in Cameroon is unsustainable, including for large species such as crocodiles, pythons, vipers, cobras, and monitor lizards. Chirio and LeBreton (2007) mentioned the overcollection of Rock Pythons for food and the export of its skin, contributing to its population decline more than a decade ago. Our findings reveal that reptiles used in leather products are often collected from the wild. The craft markets are likely to have the same stock, but turnover needs to be monitored to understand offtake of these species. Fa et al. (2006) revealed that increasing hunting pressure especially in protected areas will have severe negative impact on biodiversity particularly the viability of endangered species. We, however, note that uncontrolled collection of reptiles globally has contributed to population declines (Jenkins and Broad 1994), and this is feasibly the case in Cameroon.

The known ranges of many reptile species are being fragmented and unsustainable collection has dramatic effects on reptile populations (Maxwell et al. 2016; Johnson et al. 2017). Overexploitation of crocodiles for trade and other purposes has historically resulted in dramatic population declines, including local extinctions worldwide (Klemens and Thorbjarnarson 1995; Stuart et al. 2006), and urgently needs to be regulated in Cameroon based on sound trade and livelihood data. It is therefore important to initiate actions to assess populations where collection is high to initiate management measures within their range sites. The extent of exploitation appears to be growing and depends upon the demand for leather products traded in main towns and exported to neighboring countries.

The reptiles we assessed are known to provide livelihoods to numerous people through diverse markets. Sustainability for species populations and the welfare of individual animals now needs to be determined. As most of these activities are illegal, assessing the impact of trade on commercialized species is challenging due to their clandestine nature. Community outreach on the cultural and economic value of species used in food and ethnozoology can be carried out to sustain these values for the next generation. Research on zootherapy should encompass possibilities of using animal by-products without harming the individual animal and its population for a sustainable exploitation practice (Costa-Neto 2005; Lee et al 2020). In the event that any species can turn out to be useful to humans from a medicinal perspective, its conservation remains a priority to safeguard its various values, which might include developing a chemical substitute for its medicinal benefit. Initiatives to develop captive breeding to farm species of economic or cultural value (species eaten in restaurants) could be explored to help reduce pressure on wild populations, such as snake farms in southeastern Asia (Aust et al. 2017).

It is important that people in the various localities where reptiles are collected be identified and the collectors should be educated on the importance of establishing sustainable collection quotas to prevent local extinctions. Regulation of exploitation could be set through issuing collection permits to local exploiters and monitoring initiated over cross-boundary trade. Given that all reptiles reported here were collected from the wild, further research on the sustainability of the harvest is necessary, including the perspectives (especially understanding of legality), practices and take of hunters, traders, and consumers (Nana et al. 2025). Species such as all three crocodile species documented in our study are classified as Class A species (full protection), but were still used by hunters, traders, and end users in our study. These species are potentially at risk of local extinction, so research should focus on their demographic properties and the level of demand in trade to determine their vulnerability to commercial collecting. Commercial hide hunting and with habitat

loss are widely recognized as the principal factors responsible for the worldwide decline of crocodilians (Thorbjarnarson 1999).

We likewise recommend initiating population assessment of all traded species to identify areas of high population concentration for developing conservation measures and to set up monitoring plans. Long-term survival of wild populations, legal, and commercial managed wildlife trade has been proposed by others (e.g., Dutton et al. 2013). Because several species documented during our study are yet to be investigated with respect to their biology and population dynamics, urgent research is needed to advise on enlightened and sound exploitation practices.

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An institutional ethical approval panel was not available for this study. Therefore, the researchers followed the ethical guidelines of the British Herpetological Society (2017) for work with animals and Brittain et al. (2020) for working with people. Key ethical issues included maintaining the confidentiality of interviewees and avoiding incentivizing the unsustainable trade of wildlife.

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Thomas Doherty-Bone is an Ecologist and conservation practitioner researching conservation biology and management, with a particular but non-exclusive interest in herpetology. Thomas is Director of Friendly Frog Org, a new conservation Non-Governmental Organization that carries forward conservation projects in ecology and conservation across Africa, the UK and elsewhere for over 20 y. Thomas holds a Ph.D. in Freshwater Ecology and Invasive Alien Species from the University of Leeds, England, UK. He currently works on Freshwater Pearl Mussel conservation in Wales, UK, is a Honorary Research Associate of the Natural History Museum, London, England, UK, and is Chair of the Wirral Amphibian & Reptile Group. (Photographed by Paul Parnell).

Appendix Table. List of reptile species recorded during the study and their conservation status according to CITES, the IUCN Red List, and the protection status in Cameroon. Key: Not Evaluated (NE); Data Deficient (DD); Least Concern (LC); Near Threatened (NT); Vulnerable (VU); Endangered (EN); and Critically Endangered (CR); CITES Appendices I; II; III. National Protection Cameroon (Ministry of Forestry & Wildlife): Class A: Species that are rare or threatened with extinction. These species are integrally protected and cannot be collected; Class B: Species of this group are under partial protection and can be hunted/captured only after obtaining an exploitation permit; Class C: All species not listed in Class A and Class B, which are partially protected, with their collection regulated. The heading Total animals observed include living and dead animals. An asterisk (*) are species not observed entirely, but whose parts (skin of head) were seen/identified/used to produce furniture being sold in the craft market.

Scientific Name	Common Name	Market type	Body Part Used	Purpose of use for traditional medicine	Products/Prescription	CITES protection	IUCN	Cameroon Protection	Total animals observed
CROCODYLIDAE (Crocodiles)									
Crocodylus niloticus	Nile Crocodile	Wild meat, Craft	Flesh, Skin		Shoes, handbags, purses	I	LC	CLASS A	*
Mecistops cataphractus	Slender-snouted Crocodile	Wild meat, Craft	Flesh, Skin		Shoes, handbags, purses	I	CR	CLASS A	*
Osteolaemus tetraspis	Dwarf Crocodile	Wild meat, Craft	Flesh, Skin		Shoes, handbags, purses, belt	I	VU	CLASS A	14
PELOMEDUSIDAE (Mud turtle)									
Pelusios gabonensis	Mud Turtle	Traditional medicine	Flesh, shell	Mystical protection	Ritual on the patient		NE	CLASS C	6
TESTUDINIDAE (Tortoises)									
Kinixys erosa	Serrated Hinged Tortoise	Wild meat, Traditional medicine	Flesh, shell	Mystical protection	Crushed and mixed with palm seed oil and eaten	II	DD	CLASS C	17
Kinixys homeana	Home's Hinged Tortoise	Wild meat, Traditional medicine	Flesh, shell	Mystical protection	Crushed and mixed with palm seed oil and eaten	I	CR	CLASS C	7
TRIONYCHIDAE (Soft-shelled Turtles)									
Trionyx triunguis	Nile Soft-shelled Turtle	Traditional medicine	Flesh, shell	Food, shell used as arm board for learning			VU		4
CHAMAELEONIDAE (Chameleons)									
Trioceros crestatus	Crested Chameleon	Traditional medicine	Entire animal	Mystical or witchcraft origin Anti poison	Crushed into powder, mixed with herbs, and eaten	II	LC	CLASS C	39
VARANIDAE (Monitor lizards)									
Varanus niloticus	Nile Monitor Lizard	Wild meat, craft	Flesh, skin		Shoes, handbags, purses	II	NT	CLASS B	17

Appendix Table, Continued

Scientific Name	Common Name	Market type	Body Part Used	Purpose of use for traditional medicine	Products/Prescription	CITES protection	IUCN	Cameroon Protection	Total animals observed
Varanus exanthematicus	Savanna Monitor Lizard	Wild meat, craft	Flesh, skin		Shoes, handbags, purses	II	NE	CLASS B	X*
PYTHONIDAE (Pythons)									
Python regius	Ball Python	Craft	Fat, Flesh, Skin,		Shoes, handbags, purses, belt	II	NT	CLASS C	2
Python sebae	Rock Python	Wild meat, craft, traditional medicine	Fat, flesh, skin, bones	Rickets, inflammation, muscular pains, body pain rheumatism	Shoes, hand bags purse, belts/applied externally on skin, massage, food	II	NT	CLASS B	12
ELAPIDAE (Elapid Snakes)									
Naja melanoleuca	Forest Cobra	Wild meat, craft	Flesh, skin		Shoes, handbags, purses, belt		LC	CLASS B	6
Naja nigricollis	Black-necked Spitting Cobra	craft	Flesh, skin		Shoes, handbags, purses, belt		LC	CLASS B	*
VIPERIDAE (Vipers)									
Bitis gabonica	Gaboon Viper	Wild meat, craft	Flesh, skin, Bone		Shoes, handbags, purses, belt		VU	CLASS B	29
Bitis nasicornis	Rhinoceros Viper	Wild meat, craft	Flesh, skin		Shoes, handbags, purses, belt		VU		9
								Total	162