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Ethnozoological knowledge of reptile species involved in international trade: implications for sustainable conservation in Benin

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The objective of this work is to assess the evolution of international trade in reptile species in relation to their state of conservation at the national level. The study was carried out in southern Benin precisely in the municipalities with release sites. The sampling method used is the technique of stratified random sampling. The ethnozoological knowledge was therefore evaluated by a survey of healers, hunters, farmers. Various ethnozoological parameters were determined for each target reptile species. The target species are those regularly and legally exported over two decades. These species are locally known and there is a diversity of local names reinforced by a high ethnic coverage rate (T_{CE}). The informants have a very good homogeneity of knowledge (IE >= 0.5) and a diversity of uses of reptiles in the study area is noticed. A total of thirty-two (32) uses were obtained, of which meat consumption (95%) is the most important. This confirms the fact that the endogenous values relating to reptile species are increasingly abandoned in favor of food uses. Note also that of all the types of specimens cited, only the whole animal is used much more. This confirms the drastic regression of reptile populations.

Keywords: Reptile species, CITES-Benin, Endogenous knowledge, Conservation

INTRODUCTION

In several regions of the world, we note the use of wild species and their products to satisfy basic human needs (FAO, 2017). Wildlife trade has worsened in recent years with global population growth (Larsen et al., 2016) and the discovery of the importance of several wildlife species for medicinal and food uses (UNODC, 2013). Millions of animal and plant species are traded internationally, mostly leaving African countries, to supply markets in Asia, Europe and America (Affre et al., 2005; Segniagbeto, 2016; Yawo, 2019). Trafficking in wildlife is therefore a highly lucrative activity but one that must be reprimanded for the survival of biodiversity and sustainable development (Dalberg et WWF, 2017). Therefore, the world community has judged the establishment of an international legal instrument to control international trade in wildlife. Thus, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was adopted in 1973 in Washington. It regulates international trade in wild species to prevent their overexploitation and disappearance from the natural environment (Sigaud, 2020 a,b). This

convention had 183 signatory countries in 2016 and protects more than 35,000 species of animals and plants which are marketed in the form of living or dead specimens or in the form of raw or finished products (https://logistics.public.lu/fr /formalities-procedures/type-goods/animals/protected-species-cites.html). But, despite the regulatory provisions of this convention, significant illicit trade activities in CITES specimens are still noted. Statistics have shown that this widespread trafficking brings in billions of dollars each year and may even be ranked third behind drug trafficking and the sale of weapons (CCE, 2005; COM, 2016). Indeed, wildlife trafficking is based on socio-economic as well as cultural motivations (FAO, 2017).

In recent years in West Africa, and particularly in Benin, large quantities of animal specimens have been exploited illegally (Sinsin et al., 2008; Kakpo, 2013; Toni, 2013; Sossa, 2014). Studies have revealed an increasingly diversified operation of wildlife. Many animal resources are now overexploited and animal species are threatened with extinction (Neuenschwander et al., 2011). Some have already disappeared while others are on the endangered species list. This is the case, for example, of the vipers (Bitis gabonica and B. nasicornis) which are critically endangered on the IUCN Red List. Of all the animal species involved in international trade, reptile species are quantitatively and numerically the most important. Indeed, snakes (pythons, vipers, etc.), lizards (monitor lizards, chameleons, etc.) and turtles are the three groups of reptiles which are the subject of anarchic and fraudulent taking for export (Ineich, 2006; Sinsin et Kampmann, 2010). The survival of these reptiles depends on the dynamics of exports and the importance that mainly local populations place on them. For example, the hunting for food, the supplying many markets with dead snakes for medicinal and occult uses (Toudonou et al., 2015; Sinsin et al., 2008) could considerably reduce the species richness of the fauna (UICN et TRAFFIC, 2019). This poaching affects both unprotected and protected areas. However, populations consider natural areas and reptiles to be sacred (Kpéra et al., 2004; Toudonou et al., 2004; Mensah et al., 2006; Bio Ouré et al., 2015). These uncontrolled removals of reptiles in the wild could lead to a drastic decline in their population and disruption of the trophic chain. It is urgent to protect them while developing techniques for their restoration. It is in this vision that the CITES-Benin, through the General Directorate of Water, Forests and Hunting in Benin (DGEFC), regularly organizes the releases of reptiles in the wild. In addition, it largely only authorizes the export of specimens from breeding sites. It is also important to define conservation strategies involving local populations; because the sustainable management of tropical ecosystems requires participatory approach (Mate, 2014; Koto Mata, 2015). It is in this context that the present study entitled “Contribution to ethnozoological knowledge of reptile species mostly involved in international trade: implications for sustainable conservation in Benin (West Africa)” finds its importance. The study will therefore focus on regularly traded live reptile species, which are primarily intended for the legal pet trade, but which in some cases supply production industries such as breeding for meat and skins. We aim to assess the contribution of endogenous knowledge in the conservation of reptile species and also to identify the main wild sources of supply in Benin. The species regularly and legally exported over two decades mainly consist of: Python regius, Varanus exanthematicus, Varanus niloticus, Kinixys belliana, Python Seba, Calabaria reinhardtii and Kinixys erosa (Sossa, 2021).

MATERIAL AND METHODS

Presentation of the study area

With an area of 114,763 km2, Benin republic is located on the coastal strip of the Gulf of Guinea and is located between the parallels 6°10’ and 12°25’ of North latitudes and the meridians 0°45’ and 3°55’ East longitudes. It is bounded to the north by Niger, to the south by the Atlantic Ocean, to the east by Nigeria and to the west by Togo and Burkina Faso.

Southern Benin is the region of high concentration of reptiles in Benin (Sinsin et Kampmann, 2010). The study was therefore conducted in South Benin, between meridians 1°40’ and 2°45’ East longitude and parallels 6°15 ‘and 7°30’ North latitude (Figure 1).

The study area therefore corresponds to the Guinean or Guinean-Congolese zone which benefits from a subequatorial climate with a bimodal rainfall regime. The rains are distributed over two rainy seasons of unequal duration, a large one from March to July and a small one from September to October, interspersed by two dry seasons, a large one from November to February and a small one, centered on the month of August. Rainfall is decreasing from East to West: from 1300 mm in Porto-Novo to 900 mm in Grand-Popo. This zone is characterized by a high relative humidity (85 to 90%) and an average annual temperature oscillating between 23 and 32°C.

On the phytogeographic level, South Benin includes a mosaic of dense humid forests, savannas, meadows, mangroves and fallows (Adomou et al., 2011). The topography is variable ranging from flat lands with ferralitic soils to alluvial plains through valleys (lowlands) with hydromorphic soils and vertisols.

The population of South Benin has 5,369,774 inhabitants divided into 3 main ethnic groups namely: Fon and related, Adja and related and Yoruba and related (INSAE 2013). Taking into account the distribution of the population in the regions of the country, the Fon and related are mainly spread out in the southern departments with a high proportion in Zou (93%), Atlantique (80%), Oueme (79%) and the Littoral (57%).

In Benin, the agricultural sector occupies half of the population and contributed 25.2% to the national Gross Domestic Product (GDP) (INSAE, 2007). Although constraints linked to climatic variations are considerable, agriculture is the primary activity of the agricultural sector and contributed 33% of its GDP in 2013 (MAEP, 2013). The livestock sub-sector comes second among agricultural activities with a herd dominated by cattle, goats, sheep, poultry, etc. but also to a lesser extent by unconventional productions such as grasscutters, snails and ostriches (ONASA, 2008). The other sectors employing the Beninese population are: commerce (27%), crafts (17%) and others (7%).

Collection of data

The chosen municipalities are those where the takings as well as the releases of reptile species had been made. On the basis of this criterion, five (05) municipalities located in the south of Benin were selected. They are: Abomey, Abomey-Calavi, Agbangnizoun, Ouidah and Zogbodomey (Figure 1). The sampling method used is the technique of stratified random sampling. On the basis of the existing documentation, the defined strata are: farmers, hunters and healers. A total of 150 informants who know the selected species were surveyed, or 30 per municipality, at the rate of 10 per defined stratum.

The perceptions of rural communities by reptile species were therefore assessed through ethno-zoological surveys on the basis of a semi-structured questionnaire. The different sections of the questionnaire are: the identity of the interviewee, the vernacular names of the species, the different specimens sought by species, the places of taken or the main wild sources of supply, the various uses linked to the specimens, the socioeconomic motivations, the cultural motivations, the threat and conservation factors of the species. Photos of each target species will be kept to facilitate recognition.

The profile of the people interviewed or informants is summarized in Table 1. They are divided into seven ethnic groups mainly represented by the Fon (76%) and the Aïzô (12%). They are mostly men (82%), literate at primary level (45%) and non-literate (39%). Regarding the profession, we note farmers, hunters and healers (33% each one). As for religion, animists are dominant (55%), followed by Christians (43%).

Data processing and analysis

The matrices of the different modalities collected were the presence (1) absence (0) with the Excel

software.

Data from ethno-zoological surveys were analyzed using the relative frequency of responses, degree of homogeneity of knowledge, Factor Correspondence Analysis (CFA) and various ethno-zoological parameters (Table 2).

• The degree of homogeneity of the respondents' knowledge was assessed by the diversity index of Shannon and the equity index of Pielou.

• Analysis of Variance (ANOVA) was performed for the number of citations per use within each species.

• The chi-2 test was carried out for dependency number of uses on the ethnicity, age, sex, profession, level of education or religion of the respondent. A Factorial Correspondence Analysis (CFA) was carried out to establish the links between use categories and the categories of respondents.

The R software was used and the normality of the data was checked beforehand.

RESULTS

Local taxonomy of reptile species

Case of python species

The three species of studied pythons are: Python regius, Python sebae and Calabaria reinhardtii. They are designated respectively by three, five and six local names (Table 3). The popular appellations with the highest ethnic coverage rates are "Dangbé" (86%) for P. regius, "Hon" (100%) for P. sebae and "Dodan" (86%) for C. reinhardtii. The names with the highest response frequencies are "Gossou" (70%) for P. regius, "Hon" (64%) for P. sebae and "Dodan" (55%) for C. reinhardtii.

Case of monitor lizards

The two species of monitor lizards involved in the study are: Varanus exanthematicus and Varanus niloticus. They are designated respectively by ten and four local names (Table 4). The appellations with the highest ethnic coverage rates are "Fandjivê" (100%) for V. exanthematicus and "Tovê" (100%) for V. niloticus. They are the most popular with high response frequencies of 60% for V. exanthematicus to 73% for V. niloticus.

Case of turtle species

The two species of turtles concerned are: Kinixys erosa and K. belliana. They are designated respectively by seven and eight local names (Table 5). The names with the highest ethnic coverage rates are valid for each of the two species. The most popular are "Logozo" (71%) and "Okro" (43%).

Categories of uses and diversity of uses of targeted species

A total of thirty-two (32) uses were obtained. They have been grouped into four categories of use. The Food category has the highest response frequencies (95%) with a single use. It is followed by Employability (55%) with 5 uses, Spiritual practices (50%) with 13 uses, and Traditional medicine (30%) with 13 uses (Table 6). Considering all the species of reptiles, the most cited uses with response frequencies greater than 10% are: consumption of meat (95%), collection and sale of specimens (29%), trafficking in skins (12 %) and protection against bewitchment (12%). It should be noted that the number of citations per use varies significantly within each species.

The most sought-after specimens used are the whole animal (96%), skins (16%), head (12%), teeth (10%), fat (10%) and shells (5%). To this are added the bones, the vertebrae, the tongue, the limbs, the eyes. For all species, whole animals are the specimen types with very high value and high use (IVs ≥ 0.5). On the other hand, the other types of specimens have a low value (IVs < 0.5). We deduce that there is a strong pressure on adult individuals, especially parents.

Influence of the citation frequencies of the use categories on the socio-professional characteristics

The independence test of Chi-square shows that the citation frequencies of the use categories strongly depend on the variables linked to the profession ($p = 0.0000$) for each species. For the other categories, the citation frequency of the different use categories does not induce a significant dependence from one socio-professional characteristic to another at the 1% level (Table 7).

Overall, the Factorial Correspondence Analysis (CFA), applied to the variables linked to the profession and the categories of use, shows a total inertia of 100% for each of the species, i.e., more than 90% for the F1 axis and less than 10 % for axis F2 (Figure 2). We deduce that the first component alone explains the dependence of the citation frequencies on the profession characteristic. It emerges from this figure, that the healers mainly use the specimens in spiritual practices and traditional medicine. This may be due to the fact that healers have more knowledge about the uses related to these two categories. This observation can also be explained by the fact that species in particular Python spp. are used in rituals serving as protection for the population. Regarding the food category, we note that it is mainly farmers and hunters who use the species for food. The latter make more of it a job (collecting specimens) which provides them with monetary income.

Variation in the number of uses held by respondent

Case of python species

The number of uses reported per respondent varied globally from 1 to 8 in Python spp. against 1 to 4 in C. reinhardtii. The highest mean values (mean ± sd) are 4 ± 1 in Python spp. against 3 ± 1 in C. reinhardtii. They were recorded in the profession category, particularly among healers. Considering the other socio-professional categories, the high mean values (mean ± sd) of the uses number are 3 ± 1 in Python spp. against 2 ± 1 in C. reinhardtii. They were obtained in particular from respondents over or equal to 50 years; respondents Fon, Aïzô, Houéda and Xwla; literates of primary and secondary level; animists and respondents belonging to both sex (Table 8). From these results, we deduce that the specimens of Python spp. are much more used than those of C. reinhardtii.

Case of monitor lizards

The number of uses reported per interviewee varied overall from 1 to 6 in Varanus spp. The highest mean values (mean ± sd) are 3 ± 1 in the two species. They were recorded at the “profession and education level” categories, particularly among “healers and high school literates”. Considering the other socio-professional categories, the average values (mean ± sd) of the uses number are 2 ± 1 in the two species (Table 9). From these results, we deduce that the two species of monitor lizards are used in the same way.

Case of turtle species

The number of uses reported per respondent varied overall from 1 to 5 in K. erosa against 1 to 6 in K. belliana. The highest mean values (mean ± sd) are 3 ± 1 in both species. They were recorded in the profession category, particularly among healers. Considering the other socio-professional categories, the mean values (mean ± sd) of the uses number are 2 ± 1 in the two species (Table

10). From these results, we deduce that these two species of turtles are used in the same way, with a particular preference for K. belliana.

Diversity and homogeneity of uses knowledge within socio-professional groups

The diversity of knowledge relating to each of the seven species of reptiles is high among many respondents in all categories (ID ≥ 4 bits) with a very high degree of information homogeneity (IE ≥ 0.5). For each species, this diversity is high whatever the age category (ID ≥ 4 bits) and medium whatever the profession of the respondents (ID between 3 and 4 bits). All these values are accompanied by an equitable distribution of the uses number within the respondents according to age and profession (IE ≥ 0.5) (Table 11).

Considering ethnicity, the diversity of knowledge is higher among Fon respondents (ID ≥ 4 bits) whatever the species. On the other hand, it is low in the other ethnic groups (ID <3 bits). We deduce that the Fon respondents have more knowledge about reptile species. The degree of homogeneity of knowledge regarding uses has its strong values among the Fon and Aizo ethnic groups (IE ≥ 0.5) for each of the seven species (Table 11). We deduce an equitable distribution for the citation frequencies of uses among these two ethnic groups.

About the sex category, the diversity of knowledge is higher among male respondents (ID ≥ 4 bits) whatever the species. On the other hand, it is medium in the women (ID between 3 and 4 bits). We deduce that the male respondents have more knowledge about the targeted reptile species. However, the homogeneity degree of knowledge has its strong values in both sexes (IE ≥ 0.5) for each of the seven species. We deduce an equitable distribution for the citation frequencies of uses whatever the sex.

Considering the level of education, the diversity of knowledge is higher among illiterate and literate of primary-level respondents (ID ≥ 4 bits) whatever the species. On the other hand, it is medium among high school literates (ID between 3 and 4 bits) and very low among university-level literates (ID <3 bits). We deduce that the illiterate and literate primary-level respondents have more knowledge about these species of reptiles. For each of the seven species, the homogeneity degree of knowledge has its low values only among literate university respondents (IE <0.5) (Table 11). This shows an unequal distribution of knowledge only within this category.

Considering religion, the diversity of knowledge is higher among animists and Christians (ID ≥ 4 bits) whatever the species. We deduce that the animist respondents and the Christians have more knowledge about the species of reptiles studied. On the other hand, this diversity is very low among Muslims (ID <3 bits). A low value of the ID means that only a small group of respondents have most of the knowledge about each species. In addition, the degree homogeneity of knowledge regarding uses has its strong values among animists and Christians (IE ≥ 0.5) for each of the seven species (Table 11). We deduce an equitable distribution for the citation frequencies of uses within these two categories.

Factors impeding species survival and main sources of supply

Regarding threats, 72% of respondents assert that the species, especially pythons and monitor lizard, are threatened by the trafficking of skins to border countries. In addition, we note their consumption (50%). The other factors are: export, bush fires, slaughter or massacre of gravids, agriculture, hunting, sale of broodstock at the expense of release, urbanization, forest exploitation, overgrazing and trapping (Figure 3).

The modes of acquisition are purchase (79%), wild-taken (16%), purchase and wild-taken (5%). The acquisition of specimens takes place mainly in markets (92%). It is also done directly with hunters (32%), with breeders (26%) and in the wild (22%). Wild-taken involves the probable habitats where the species are found. Figure 4 indicates the relative citation frequencies of the habitats where the

species are collected. From the analysis of this figure, we note that the most important taking sites (FR ≥ 30%) are:

• Savannas or bushes (83%), fallows (68%), fields (55%), wooded savannas (47%) and wetlands (33%) for P. regius;

• Fallows (76%), rocks (53%), fallows (33%) and burrows (32%) for P. sebae;

• Burrows (61%), wetlands (33%) and dense forest (33%) for C. reinhardtii;

• Fallows (93%), fields (46%), wooded savannas (43%) and fallows (42%) for V. exanthematicus;

• Wetlands (87%), rivers (59%) and fallows (37%) for V. niloticus;

• Fallows (35%) and decomposing matter (33%) for K. belliana;

• Wetlands (34%) for K. erosa.

DISCUSSION

Analysis of ethno-zoological knowledge and importance of reptile species

Animal species are important in the life and development of human communities for their dietary, economic, medicinal and socio-cultural contribution. Reptiles continue to be heavily exploited in many parts of the world and especially in Africa and Benin. Local populations in southern Benin in general, and informants in particular, exert pressure on reptile species. It emerges from this study that these species are involved in 32 uses which were then grouped into four categories namely food (95%), employability (55%), spiritual practices (50%) and traditional medicine (30%). These results corroborate those of D'Cruze et al. (2020b), Toudonou (2015), Segniagbeto et al. (2013), Auliya et Schmitz (2010); Sinsin et Kampmann (2010); Alves et al. (2008); Toudonou et al. (2004 a,b) and Kpéra et al. (2004). These authors report that whole specimens and organs of reptiles (snakes, turtles, monitor lizards, etc.) enter in local subsistence use, food recipes, medicinal and occult recipes. Unfortunately, practices linked to rituals of worship around monitor lizards and snakes tend to disappear and the consumption of meat is more and more frequent (Bio Ouré et al., 2015; Toudonou et al., 2004a; Toudonou et al., 2004b).

The present study reveals that the citation frequencies of the use categories strongly depend on the variables linked to the profession. The non-dependence of uses on ethnic groups can be explained by an inter-cultural mixing linked to the phytogeographic distribution of reptile species. This could also explain the (high) ethnic coverage rates recorded at the level of the local taxonomy. Farmers, hunters and healers have a very good diversity of uses and exploitation of reptiles. This diversity is testament to the importance of reptile species to the populations that depend on them. It also partly shows the threats to the survival of species, in particular P. regius, which is the most exploited. Of all the types of specimens cited, only the whole animal is used much more and this results in a strong pressure focused on adult individuals, especially parents. This confirms the drastic regression of reptile populations (Sinsin et al., 2008; Toudonou et al., 2004b). The immediate consequence is that we are observing a demographic explosion of rodents. For example, in nature, monitor lizards played a biological and ecological role to the advantage of crops (Sandjong Sani et al., 2013; Ciliberti et al., 2011; Sinsin et al., 2008; Savey, 2009).

The present study also reveals that healers have more knowledge about the uses related to the spiritual practices and traditional medicine. This observation can be explained by the fact that python species, in particular P. regius, are used in rituals serving as protection for the population. Regarding the food category, we note that it is mainly farmers who use the species for food, while

hunters use it more as a job that provides them with monetary income. This observation can be justified by the fact that hunters are also collectors of specimens who collect eggs, juveniles, adults, females and males indiscriminately (Chabi-Boni et al., 2019; D'Cruze et al., 2020a). These results corroborate those of Toudonou et al. (2004a) who find that snake specimens including Python spp. are ceded by hunters on several form (fresh or dried, alive or dead) to traditional healers. And certain snake organs such as the head, hooks, bones, skin, fat and viscera are highly sought-after for preparing various products, notably gris-gris and drugs (Toudonou et al., 2004a).

Other uses related to reptiles are not revealed by this study. These include the use of turtle eggs, the use of fat from monitor lizards to treat tetanus, deafness and to alleviate pain due to sprains (Sinsin et Kampmann, 2010); the use of snake fat to treat rheumatism, sprains; taking the infusion from the skins or the girdle of the snake skin to facilitate childbirth; the child's belt with snakeskin at the time of weaning, to prevent the flow of milk; the use of snakeskin to ward off bad spells (Musset, 2004). These therapeutic virtues show, on the one hand, the knowledge deficiencies of informants and on the other hand, the variation in uses from one region to another (Badou et al., 2019). In the context of our study, this would be due to the fact that most of the respondents (especially traditional healers) did not deliver all of their recipes. This could also explain the inaccuracies related to the description of the recipes of certain uses recorded in our results, and also the absence of certain uses not revealed by this study. To all this is added the loss of endogenous practices which are no longer transmitted from generation to generation, due to the influence of Christianity.

Mode of management of reptile habitats in Benin and strategies for their conservation

The rate of degradation of natural resources, especially wildlife, and the threats of ecological extinction of these resources are an international concern in terms of sustainable management of the environment and ecosystems. Taking wildlife or its habitat into account is now seen as a necessity in the implementation of biodiversity conservation policies (Delassus et al., 2009; Clap et Moral, 2010). Habitat loss is therefore the main cause of the extinction of biodiversity in general and animal species in particular (Djego et al., 2012; Kaeslin et Williamson, 2010).

P. regius is the most important and widely used reptile species in Benin. It has a rapid reproductive rate, and is found in a wide range of savanna habitats, including open forests, rainforest edges, forest mosaics or plantation, and agricultural land (Auliya et Schmitz, 2010). Similar results were obtained in the present study on Python spp. They also corroborate those of Chabi-Boni et al. (2019) and Ahmadi et al. (2018) who report that more than half of the collection are taken from fields and sometimes from fallows close to cultivated areas. This could be explained by the fact that reptile species indeed seek out the remains of crops for their subsistence. Therefore, with regard to the conservation status of P. regius, this species is currently classified as "Least Concern".

As for monitor lizards, they live in different types of habitats and can therefore be terrestrial, aquatic, saxicolous and arboreal (Pianka et King, 2004; Schuett et al. 2009; Openshaw et Keogh, 2014). Our results also corroborate those of Bio Ouré et al. (2015) who affirms that V. exanthematicus is found in savannah, forest, fallow, field formations and the presence of V. niloticus in an environment is particularly linked to the presence of a water point.

Many anthropogenic activities were identified during this study as threats that strongly contribute to the degradation of the habitat of reptiles. This observation corroborates that of Codjia (1996) who reports that poaching, extensive agriculture, extensive and anarchic urbanization of certain regions, lumbering and mining are causing the scarcity of wildlife. This situation is not very good for CITES species, as they do not benefit from any special protection at the national level. Therefore, knowledge of the distribution of these reptile species is important for management decisions. In addition, wild-taken or collection methods have a quantifiable negative impact on the environment and even on the survival of species not affected by international trade. For example, it is common to see gatherers ransacking termite mounds to get inside, blowing up rotting stumps,

turning over pebbles or even digging into the ground (Ineich 2006; Goode et al. 2004); or collecting under dead oil palms or under heaps of grass and leaves (D'Cruze et al., 2020a).

The survival of reptile species depends on the importance that local populations place on them. In certain regions of the world, Africa and Benin, some socio-cultural groups contribute to the conservation of species based on the religious beliefs (Bio Ouré et al., 2015; Kpéra et al., 2014; Kpétéré, 2009; Akpona et al., 2008; Dudley et al., 2005;). The involvement of populations for the conservation of reptile species is one of the conservation strategies which is based on ecological and cultural values. The mechanism of sacralization of species deserves to be studied, because of its importance in conservation. It will therefore be necessary to revive the cult of sacred snakes and monitor lizards which would allow their long-term conservation. Finally, the ecological monitoring of CITES species and their different habitats and the control of ecological niches will also contribute to the sustainable conservation of CITES reptiles.

CONCLUSION

It emerges from this study that the targeted reptile species are well known by the informants. These are endogenous species, with various uses, legally exported from Benin under the control of the authorities in charge of applying the CITES convention. All species are subject to various uses, the most important of which is their demand in food on the form of meat consumption. This form of use, which requires the slaughter of whole specimens, poses a serious threat to the species population, in particular P. regius. We thus note a regression of endogenous practices of worshiping pythons and monitor lizards in Benin. However, some spiritual practices are still held by traditional healers. Numerous medicinal virtues identified could constitute assets of valorization of these species. In addition, the diversity of the vernacular names of the studied species with their high ethnic coverage rate shows an important ethnic mixing which could be linked to the distribution of species, in particular P. regius, which was found almost everywhere, in all the habitats surveyed. It is noted that the collection techniques requiring the destruction of habitats is a danger for the conservation of these reptiles. In addition to this, trafficking of skins is the most important threat revealed by this study. We also retain from this study that all living or dead specimens of reptiles are sold and used, even including fat. Faced with all these pressures, it is urgent to verify the availability of the species studied in their habitats or in the release sites, in particular P. regius, which is the subject of an international issue. This will generally allow the development of conservation strategies for species of snakes, monitor lizards and turtles in Benin.

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