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PERCEPTIONS OF MAJOR STAKEHOLDER ON PANGOLIN (*Phataginus* spp) ECOLOGY, MARKETING AND UTILIZATION IN SOUTHWEST NIGERIA

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ABSTRACT

This study assessed the perception of major stakeholders on the ecology and exploitation, marketing and utilization of pangolin in southwest Nigeria. Qualitative sampling method was employed to elicit information from the respondents. This involved the use of informal interviews with unprepared interview guide. The interest groups such as hunters, wildlife vendors (marketers) and traditional medical practitioners were interviewed. In this study, 34 hunters, 76 marketers and 19 traditional medical practitioners were interviewed. Majority (91.18%) of the hunter agreed that bush burning and deforestation are the major cause of vulnerability of pangolin. All marketers agreed that sudden and high demand of pangolin contribute to its scarcity. All traditional medical practitioners believed that disobedient of pangolin is the cause of its vulnerability. However, conservation program should primarily focus on these major stakeholders to forestall extinction of pangolin in Nigeria. There should be advocacy and capacity building program to discourage them from hunting pangolins.

Keywords: Hunters, marketers, pangopup, scales, termites, ants, nocturnal

INTRODUCTION

Wildlife resources form part of rural economy and food security in Nigeria. The livelihood of rural dwellers depends on these resources. According to Etemike and Efanodor (2015), Nigeria's rural economy system comprises of five major components, which includes; human resources, agricultural activities, non agricultural activities, primary production and natural resources. Agricultural activities comprise cultivation of crop, livestock, forestry products and wildlife hunting. Wildlife hunting is mainly undertaken by rural populations to meet their nutritional needs and to earn income from the sale of game at local or national markets (Lescuyer and Nais, 2016).

Wildlife also contributes directly to household income through hunting, trade in bushmeat, trophies. Markets for bushmeat and other wild animal products help to fuel rural economies and provide income sources for the rural communities. Hunting and bushmeat trade involves several levels of participants, from hunters to middlemen and meat processors and therefore provides income not only for hunters but a wide cross-section of both rural and urban communities. Even among communities where the main occupation is farming, income from hunting/collection of wild animals and wild animal products often represent a substantial proportion of the household income which cannot be easily removed without causing significant hardships (Ntiamoa-Baidu, 1997).

The indiscriminate exploitation of wild animals by rural dwellers has caused many of them to be vulnerable to extinction. This is the case of pangolin. Globally, there are eight species of pangolins distributed between African and Asia both has four species each. But, there are three known species of pangolin in Nigeria which include *Phataginus tetradactyla* (black-bellied pangolins), *Phataginus tricuspis* (white-bellied pangolins), *Smutsia gigantean* (giant ground pangolins). Likewise, each species of pangolin is threatened with extinction according to the IUCN Red List of Threatened Species. This is attributed to poaching and hunting for international wildlife trafficking and domestic use (Challender and Waterman 2017).

All African pangolin species are threatened by hunting for bushmeat in local markets, traditional medicine and demand in international markets (Waterman *et al*. 2014, Pietersen *et al*. 2014). Therefore, as a mean to protect pangolin from extinction, Convention on International Trade on Endangered Species of Wild Ffauna and Flora (CITES) at her 17th meeting of the Conference of the Parties to CITES (CoP17, Johannesburg, 2016), transferred all eight species of pangolin including all Nigerian pangolins *vis a vis Phataginus tetradactyla* (black-bellied pangolins), *Phataginus tricuspis* (white-bellied pangolins) and *Smutsia gigantean* (giant ground pangolins) from Appendix II to I which bans hunting/poaching and commercial trade of the animal (Challender and Waterman 2017). This conservation steps however, had not stopped hunting, marketing and utilization of pangolin in Nigeria. Therefore, this study aims to assess the perception of major stakeholders on the ecology and exploitation, marketing and utilization of pangolin in Nigeria; as a mean to assess its level of exploitation, distribution and abundance in Nigeria.

MATERIALS AND METHODS

Study Site

The study was carried out in the south west states in Nigeria between February and October, 2019. Pangolin is well distributed across south west states of Nigeria (Ofusori *et al*., 2008; Challender and Waterman, 2017). There are six states in the south west of Nigeria; these include Ekiti, Lagos, Ondo, Ogun, Osun and Oyo States. Three states were randomly selected; the selected states were Ogun, Osun and Oyo States.

Sampling Method

The study on the perception of major stakeholders on pangolin was carried out in the southwest States of Nigeria. Qualitative and quantitative sampling methods were employed to elicit information from the respondents. This involved the use of informal interviews with prepared interview guide. The interest groups such as hunters, wildlife vendors (marketers) and traditional medical practitioners were interviewed. The selection of respondents was purposely carried out in local communities with history of pangolin population and local utilization of pangolin (Sodeinde and Adedipe, 1994).

Data Collection from Hunters

The hunters were visited during their normal scheduled periodic meeting. Hunters were chosen as a focus in this study because they are the major or primary source of supply of pangolins to every other personnel along the trade and supply chain of pangolins trade. They have information about the species, behaviours, habitats and ecology of pangolins. Other respondents under this category are farmers, palm wine tappers and loggers. They can be regarded as opportune hunters. The visited villages were: Ijebu-Mamu, Dali, Lamolo and Longe in Ogun State; Ikire in Osun State and Onigambari, Ibuso gboro in Oyo State.

Data Collection from Marketers

Market days in villages in south west Nigeria are periodic with five days interval. Therefore, different market days were investigated and some village markets were visited. Pangolin marketers were chosen as a focus in this study because they are the link between the primary sources and suppliers and the end users. The visited markets are: Ijebu-Mamu in Ogun State, Ikire in Osun State and Odo-ona, Bode and Oranyan markets in Ibadan.

Data Collection from traditional medical practitioners

These are the local principal or major end users of pangolins. They hold the cultural believes of pangolins. The visited cities are Ikire in Osun State and Ibadan in Oyo State. The responses of the respondents were documented.

RESULTS

Table 1 shows the perception of 34 hunters that were interviewed. Majority (82.35%) of the hunters agreed that there only two species of pangolins in south-west Nigeria. Pangolin inhabits different habitats but majority (91.18%) of the respondents agreed that it lives in tree holes. Pangolin is a fossorial animal; all hunters agreed that it burrows. Most (64.71%) hunters agreed that pangolin is a nocturnal animal; it is more active in the night. They are all agreed that pangolin can be easily noticed or detected during hunting by their movement along the forest. Pangolin tail that is little lifted above the ground always produce sounds especially during the dry season with dried leaves along its paths. Likewise, pangolin also produces sound with their fore limbs claws when burrowing and seeking for prey inside trees or termite mounts or ant hills. They can also be detected by their characteristics odour, which offensive and when captured it usually urinate, which also contribute to their offensive odour. During the night, pangolins are very active. Hunters usually catch them with their guns when they are trying to escape capture. Pangolin can survive gunshot if escape with bullet, although the pangolin may be living with the scar.

There is no agreement among the hunters about the types of ants and termites consume by pangolins. Most (55.88%) hunters believe that pangolin do not eat all types of ants and termites. Majority of the hunters agreed that pangolins attract ants and termites by tongue, nose and scale. It detects ants and termites with the smell of its nostril, scatter or burrow with its claws, open its scales to gather ants and termites and use its long and sticky tongue to gather and swallow ants and termites. Likewise, majority of the hunters agreed that pangolin sense the environment with the smell of its nostril; they believed that it has poor sight. All hunters agreed that pangolin is not destructive to farm produce and it does not attack man; it is harmless and passive. They are easy to hunt and take as prey during the day when most of the time, they are seen rolling into ball shape resting or sleeping on top of trees or in holes or walking seeking their prey. All hunters agreed that pangolin is a solitary animal. It is reported that capture of pangolin is an opportunity. No hunters usually preconceived the idea of seeking pangolin as prey because of its scarcity in the wild. It is usually said that '*one will not be too poor to be seeking or hunting pangolin; likewise, one will not be too rich to ignore a pangolin when seen*'.

None of the hunter can give information about the gestation period of pangolins. But, all agreed that pangolins give birth to one kid (pangopup) at a time. Majority of the hunters reported to have caught mother pangolins at night moving around with either pregnant or carrying its kid on its tail, chest or at the back. Pangolin usually takes good care of its kids. Some hunters reported that when pregnant pangolin is caught and dissected, it carries only one foetus. However, majority (91.18%) of the hunters agreed that pangolin is vulnerable due to bush burning and deforestation; although its own characteristics (79.41%) and indiscriminate hunting (58.82%) contribute to it. Indiscriminate hunting of pangolin, especially juvenile or immature pangolin has been implicated in loss of biodiversity. Bush burning and deforestation also contribute to their vulnerability during the dry season. Some of them may be suffocated with smoke and died or burnt to death inside holes. Three types of hunters were identified during the observation and interview. The first category is those who are hunting for subsistence to meet family needs. These types of hunters kill any type and any size of animals. The second category of hunters is opportune or part-time hunters. They hunt wild animals whenever they have the opportunity to supplement their income. The third category of hunter is genealogy hunters. These are hunters that are trained and have family history of hunting. But the first two types of hunters are not trained they were identified as the cause of unsustainable hunting and poaching.

Table 1: Perception of hunters on pangolin ecology in south-west states in Nigeria

Variables	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Pangolin species				
1	0	0	0	0
2	28	82.35	6	17.65
3	6	17.65	28	82.35
Pangolin inhabit				
Trees hole	31	91.18	3	8.82
Land hole	11	32.35	23	67.65
Ant hill / Termite mount	24	70.59	10	29.41
Pangolin burrows	34	100	0	0
Daily activities				
Diurnal	12	35.29	22	64.71
Nocturnal	22	64.71	12	35.29
Pangolin eats all ants/termites	15	44.12	19	55.88
Pangolin attracts ants/termites with				
Tongue	30	88.24	4	11.76
Mouth	7	20.59	27	79.41
Claws	23	67.65	11	32.35
Nose	28	82.35	6	17.65
Scale	33	97.06	1	2.95
Pangolin sense environment with				
Eye	0	0	34	100
Nose	34	100	0	0
Scale	10	29.41	24	70.59
Ear	26	76.47	8	23.53
Pangolin has				
Long tongue	32	94.12	2	5.88
Short tongue	2	5.88	32	94.12
Pangolin activities				
Violent	20	58.82	14	41.18
Destructive	0	0	34	100
Passive	34	100	0	0
Easy to catch	34	100	0	0
How do you detect the presence of pangolin				
Its characteristics odour	34	100	0	0
Sound of its movement	34	100	0	0
Sound of its activities during prey searching	34	100	0	0
Association				
Solitary	34	100	0	0
Group	0	0	34	100
Kidding				
1	34	100	0	0
2	0	0	34	100
Causes of pangolin vulnerability				
Indiscriminate hunting	20	58.82	14	41.18
Bush burning and Deforestation	31	91.18	3	8.82
Own characteristics	27	79.41	7	20.59

Table 2 shows the perception of 76 marketers that were interviewed. There are two major types of pangolin marketers differentiated by their target customers; 57.89% were pure bush meat sellers while 42.11% were herbal marketers. The bushmeat marketer does not attach special importance to pangolin; they sell pangolin just like any other wild animals. However, they keep its scales to be sold at special price on demand. The herbal marketers are those that sell directly to traditional medical practitioners and to those that want to use pangolin for purposes other than consumption. They have some information about the traditional utilization of pangolin. One of this type of marketers said '*pangolin scales can be used to treat asthma and cough by licking burnt pangolin scales with either palm oil or pure honey*'.

Majority (77.63%) of the marketers agreed that pangolin has medicinal value. Majority (92.11%) of the marketers agreed that the scales of pangolin are most expensive while all of them also agreed that whole body of pangolin is expensive. All of them attributed this to sudden and high demand for pangolin and its scales, while majority (96.05%) believed that this is due to its delicacy. All marketers agreed that pangolin scales are expensive or special because it is high demand for it and exported to foreign countries while majority (82.89%) believed that it is because it is medicinal. Majority (88.16%) of the marketers agreed that the price of pangolin is varied between ₦6,000 and 10,000 with respect to their sizes but pangolin scale is sold with local weighing plastic.

All marketers sold whole pangolin; majority (86.84%) sold pangolin scales while 42.11% sold any part of pangolin on demand. All marketers preferred to buy and sell big, fresh and live pangolin while herbal marketers can also buy and sell dead and wounded pangolin. All marketers bought or source their pangolin from hunters while few marketers bought or source their pangolin from farmers (9.26%) and lumberjack (2.63%). All marketers agreed that size is the major determinant of price of pangolin while majority (94.74%) believed that live pangolin is expensive than dead pangolin. Majority (84.21%) of the marketers agreed that pangolin is always available in every market's day while 11.84% believed that its availability on the market's day cannot be predicted but 3.95% believed that it is scarce. Figure 1 shows specialized cage use to keep pangolin while Figure 2 shows researchers with pangolin in a market day.

The perceptions of traditional medical practitioners were presented in Table 3. Traditional medical practitioners are the principal or major end users of pangolins (Plate 3). They hold the cultural believe of pangolins. They all agreed that pangolin is a sacrificial and timid animal. They all believed that pangolin has relevance in tradition. It occupies a special place in *ifa* oracle. About 176 out of 256 chapters (*Odu ifa*) oracle talk about pangolin. They all agreed that vulnerability of pangolin is due to its disobedient to *Ifa oracle*. It is reported that pangolin was asked to sacrifice its scales which are the cloths covering it but refused. This is believed to have been responsible for high demand for its scales locally and internationally. Although, some other agreed that its utilization (68.42%) and delicacy (53.63%) also contribute to its vulnerability. All agreed that the whole body especially its scale is most useful. In case it cannot be readily found, they all agreed that it can be substituted for any animals as demanded by *Ifa* oracle for sacrifice. They all source or bought their pangolin from herbal sellers, however, most (68.42%) of them hunt pangolin themselves. They all agreed that pangolin can be use for security, sacrifice, divination for new born baby and kleptomania. However, they admitted the knowledge of its utilization varies among them; other few uses identified are presented in Table 3.

Table 2: Perception of marketers on pangolin in south-west, Nigeria

Variables	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Types of marketers				
Bush meat sellers	44	57.89	32	42.11
Herbal sellers	32	42.11	44	57.89
Pangolin is medicinal	59	77.63	17	22.37
What parts of pangolin is most expensive				
Scales	70	92.11	6	7.89
Whole body	76	100	0	0
Why pangolin is special or expensive				
Delicacy	73	96.05	3	3.95
Sudden and high demand	76	100	0	0
Scarce	65	85.53	11	14.47
Medicinal use	55	72.37	21	27.63
Why does pangolin scale become special				
Has medicinal use	63	82.89	13	17.11
Export to foreign countries	76	100	0	0
There is high demand for it	76	100	0	0
What parts of pangolin do you sell				
Whole body	76	100	0	0
Scales	66	86.84	10	13.16
Parts on demand	32	42.11	44	57.89
Preferred pangolin state sold				
Big	76	100	0	0
Fresh	76	100	0	0
Live	76	100	0	0
Dead	30	39.47	46	60.53
Wounded	13	17.11	63	82.89
Source of pangolin				
Hunters	76	100	0	0
Farmers	7	9.21	69	90.79
Lumberjack	2	2.63	74	97.37
Prize of pangolin varies with				
Size	76	100	0	0
Season	5	6.58	71	93.42
Sex	5	6.58	71	93.42
Live	72	94.74	4	5.26
Dead	56	73.68	20	26.32
Price of pangolin (₦)				
1,000 – 5,000	4	5.26	72	94.74
6,000 – 10,000	67	88.16	9	11.84
11,000 – 15,000	3	3.95	73	96.05
16,000 – 20,000	2	2.63	74	97.37
Availability of pangolin				
Every market day	64	84.21	12	15.79
Cannot be predicted	9	11.84	67	88.16
Scarce	3	3.95	73	96.05

Plate 1: Specialized iron cage for pangolin

Plate 2: FRIN Researchers in market with pangolins

Table 3: Perception of traditional medical practitioners on pangolin in southwest Nigeria

Variables	Yes		No	
	Frequency	Percentage	Frequency	Percentage
What type of animal is pangolin?				
Taboo animal	14	73.68	5	26.32
Sacrificial animal	19	100	0	0
Ordinary animal	0	0	19	100
Timid animal	19	100	0	0
Does it have relevance in tradition?	19	100	0	0
What is responsible for its vulnerability?				
Delicacy / Taste	10	52.63	9	47.37
Utilization	13	68.42	6	31.58
Disobedient	19	100	0	0
Indiscriminate hunting	5	26.32	14	73.68
What part(s) of pangolin's body is most useful?				
Blood	11	57.89	8	42.11
Scale	19	100	0	0
Meat	4	21.05	15	78.95
Internal organs	9	47.37	10	52.63
Limbs	3	15.79	16	84.21
Head	11	57.89	8	42.11
Whole body	19	100	0	0
Can it be substituted for by another animal?	19	100	0	0
Where do you source your pangolin?				
Self hunting	13	68.42	6	31.58
Buy from herbal sellers	19	100	0	0
Buy from hunters	9	47.37	10	52.63
What are some uses of pangolin?				
Security / Protection	19	100	0	0
Sacrifice	19	100	0	0
Divination	19	100	0	0
Incense	12	63.16	7	36.84
Kleptomania	19	100	0	0
Crop fruiting	7	36.84	12	63.16
Forestalling death	15	78.95	4	21.05
Hypertension	12	63.16	7	36.84
Boldness	16	84.21	3	15.79
Asthma	10	52.63	9	47.37

Plate 3: Meeting of FRIN Researchers with Traditional Medical Practitioners

DISCUSSION

Pangolins inhabit different places in the forest with respect to their species. Basically the habitat of pangolin is divided into two as described by the hunters, so we have tree (arboreal) and land (terrestrial) pangolins (Hua *et al*. 2015). There are three species of pangolins in the visited villages based on their experience; they are *Phataginus tricuspis* *Phataginus tetradactyla* and *Smutsia gigantean* (Sodeinde and Adedipe 1994; Maurice *et al*. 2019). Some hunters believed that a particular pangolin do not dig holes to live in but occupy any available holes. But, Maurice *et al*. (2019) reported that pangolin digs its own burrows, or enlarges passages made by termites. Pangolins are known to be shy animals, which are passive during the day and very active in the night, they are nocturnal, although occasionally they may be seen active during the day. This corroborates the report of Maurice *et al*. (2019) that pangolins are nocturnal animals and the report of Pietersen *et al*. (2014) that these pangolins are known to be active in the day. Pangolin can be easily detected by is characteristics odour. This corroborates the report of Maurice *et al*. (2019) that pangolin can secrete a fluid with an irritating odor from their anal glands when disturbed or distressed by predators or humans.

Hunters kept pangolin passive when agitating during capture by tying its long tongue. This corroborates the report of Livescience.com that pangolins have long tongues and when extended, their tongues are longer than their bodies and head combined. Pangolins are solitary animals, which is consistent with the report of Hua *et al*. (2015). Pangolin produces one kid per time. This observation is consistent with the report Hua *et al*. (2015) that all eight species of pangolins both in Africa and in Asia are known to give birth to single kid per gestation, although the gestation periods differ. Earlier, Sodeinde and Adedipe (1994) reported that pangolin which was acquired in December 1988 gave birth to one young. Moreover, Livescience.com reported that female pangolins have a gestation period of five months and give birth to just one live baby. Three types of hunters were identified in this study. This is consistent with the report of Nogueira and Nogueira-Filho (2011) that wildlife hunting may be classified into three categories: subsistence hunting, sport hunting, and trade or commercial hunting. Subsistence hunting is when humans depended on hunting and collecting for survival (Larsen 2003).

Two types of marketers were identified in this study. This corroborates with the report of Sodeinde and Adedipe (1994) that these two types of marketers as market women and bushmeat sellers; but hunters prefer to sell to the former than the latter because market women can buy fresh or badly wounded pangolins of any size. Pangolin is very useful and has relevance in tradition and *Ifa oracle*. Challender *et al*. (2015) reported that pangolin has history of being an integral part of traditional medicine in Africa and Asia, with scale being the major ingredient The utilization of pangolins obtained during the field survey are consistent with the findings of Soewu and Ayodele (2009), Soewu and Adekanola (2011), Boakye *et al*. (2014, 2015).

CONCLUSION

Conservation program should primarily focus on hunters, farmers, loggers and other forest users. All groups of hunters should be identified. There should be capacity building program to discourage them from hunting pangolins. They should be sensitized to allow pangolin to live. The marketers should be contacted and sensitized on the effects of illegal trade of pangolin. Traditional medical practitioners should be encouraged to find suitable alternative for pangolin to reduce demand for its utilization.

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