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Appraisal of Natural Saltlicks Management of Old Oyo National Park for Wildlife and Eco-Tourism: A Baseline Study

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Abstract. The use of natural saltlicks (NSs) as valuable hotspots for game viewing and research findings has been embraced by many conservation areas. Currently, there is increased attention of scientists on saltlicks and its utilization, but this has rarely been extended to management strategies for its sustainability. The available studies less focused on guidelines principles for management of NSs, especially in tropical areas like Nigeria. Consequently, there seem to be no regulatory framework specifically meant for the management of such an important niche in Nigeria. This study assesses the effectiveness of management of saltlicks of Old Oyo National Park (OONP). An in-depth interview method of qualitative research was used to harness information from 25 respondents among members of staff purposely selected from among different sectors (ranges) of the study area. The result revealed no specific management guidelines for the protection of NSs of OONP, except for general regulatory laws for the management of wildlife habitat. Many of the park protection staff has little knowledge of the locations of NSs in their respective area, because of incessant transfer of appointment from one range to the other. The study therefore concludes that the impact of threat to NSs at OONP is still at an overwhelming rate but the effectiveness of the management in curbing the disturbance around the NSs is potentially low, especially against the night poachers.

Keywords: Management, Natural Saltlicks, Regulatory Framework, Measures, Principle, Old Oyo

1. Introduction

Natural saltlicks (NSs) are unique sites usually visited by different taxas of mammals with the aim of consuming the soil for nutrition and/or medication purpose(s). The voluntary consumption of such soil is termed geophagy (Krishnamani & Mahaney, 2000). Because of several roles play by such an important resource, NSs are not only regarded as a keystone resource but also essential components of wildlife ecosystem. Thus enhancing the conservation status of the area where they are found. It is however, unfortunate that such places are usually targeted by poachers to perpetrate their evil act (Bashir, 2014). Apart from tourists utilizing the sites for game viewing and photographing, researchers may station their cameras at the sport for scientific study (Pebsworth et al., 2011). The management of such essential spots is as important as the wildlife itself, since their survival critically depend on the available nutrition in their habitat. Apart from the one mentioned by Rea et al. (2004), there has been a neglect of guidelines specifically for the management of natural licks in several protection areas. The government of Canada, Ontario, Quebec, Saskatchewan, and Alberta have also stressed the importance of the licks and suggested measures for its management. Still, such measures of management appear to be more of general than being specific. Therefore, vacuum of knowledge still exist on a standard management guidelines for the protection of natural licks in almost all conservation areas of the world, where NSs predominate. As a result, many countries have suffered a number of irregularities base on peculiar nature of the places being conserved or protected (Adewumi et al., 2018).

Hence, the need for standardized guidelines for management of licks is necessitated. Many countries are now beginning to take legal framework seriously (Adewumi et al., 2018), especially on NSs by formulating special laws. For instance, the wildlife conservation law of Malaysia (2010) under section 81 and 85 states that: Any person found hunting wildlife, in possession of arms, luck within 400m of the saltlick area or negatively impacting the saltlick areas, on conviction, becomes guilty of a criminal offence that is liable to a fine of RM50, 000 and/or otherwise be imprisoned for a jail term not more than two years. Unlike Malaysia law, similar, but not specific law can be found in section 6 of the National Park Service Act of Nigeria, stating that: "the protection of endangered species of wild plants and animals and their habitats; the preservation of outstanding scenic, natural, scientific, recreational and other values in the National Parks" shall be vested on National Park Service .This non-specific regulatory guideline for management of NSs in Nigeria may, however affect effective management of such keystone resource, since high rate of poaching activities are common in our various parks, especially in OONP (Akinsorotan, 2017). Though, several other regulatory agencies for conservation of protected areas in Nigeria was mentioned by Adewumi et al., (2018); Federal Environmental Protection Commission, the Environmental Impact Assessment Commission, the Urban and Regional Planning Agency, but none of these had specific guidelines for managing NSs in Nigeria. While OONP had a record of being very rich in various biodiversity resources, however, little is known about the utilization and management of wildlife lick resources of the area. Most of the available information is probably based on a mere gesture or too scanty for making management decisions.

The purpose of this study is therefore to examine the significance of NSs to its users, as well as the effectiveness of management measures used for the protection of NSs in OONP. This was accomplished by assessing information on the presence, location, utilization and management of NSs through available secondary data and structured interview, using the following hypotheses: (1) the impact of disturbance such as poaching, tourism and encroachment around NSs of OONP is potentially low (2) the effectiveness of the management in curbing the disturbance around the NSs is potentially high. The research questions employed for the study include: (1) how do the management staff describe the presence, location and utilization of NSs in OONP (2) how are the NSs being disturbed in OONP.

2. Methodology

2.1 Study Area

The name Old Oyo National Parks (OONP) was coined from the ruins of Oyo-Ile, the then political capital of Oyo Empire. It is located in the west central part of Nigeria in Northern Oyo State and lies between latitude 8°10'N and 9°05'N and longitude 3°S and 4°20'E with a total park area of 2,512km^2 and categorized into five ranges; Marguba, Tede, Oyo-Ile, Sepeteri and Yemoso. It is one of the seven National Parks in Nigeria created by decree number 36 of 1991 and is endowed with historical monuments and abundant varieties of biodiversities, characterized by a high forest and dense savannah mosaic woodland ecosystem, with wildlife like oribi (*Ourebia ourebi*) , western hartebeest (*Alcelaphus busalaphus*), roan antelope (*Hippotragus equinus*), waterbuck (*Kobus defassa*), baboon (*Pabios Anubis*) and kob (Kobus kob) .

2.2 Data Collection

2.2.1 Study Design

This study assesses information on the location, utilization and management of salt licks from the staff of OONP. To fulfill this, a semi-structured interview was designed for field protection staff to elicit the findings, with a topic guide organized around the following themes: demographics, background information on users and pattern of utilization, threats impacted by various users, sustainability for wildlife, contribution of NSs to tourism developments and NSs location, type, number and management. The topic guide (guided by interview questions) was aimed to just moderate the interview and not necessarily meant to strictly direct the interview so as to allow the interviewees some flexibility (freely talk) during the interview so that other themes could emerge.

2.2.2 Sampling Techniques

Both primary and secondary data were employed for this study. From May through July, 2019, the primary data on wildlife saltlicks and management of OONP were obtained through an in-depth interview and direct field observations (qualitative research method), using semi-structured questionnaires in relation to the objective of the study, while that of the secondary data were gathered from published literatures. To ensure reliable data collection, several fieldtrips were made to each of the camp/bit/ town with field note and tape recorder for recording the

face-to-face interview. While purposive sampling methods were adopted for the collection of the primary data, to avoid being bias, the study follows the recommendation of Creswell (2003).

The heads of Akoto Base Camp, Ecotourism and Research Units were selected as the first three key informants (at Sepeteri), from whom suggestions were made using "snowball" technique to select other 22 respondents across the other sectors (Ibuya at Marguba, Tede, Yemosho, Sepeteri and Oyo Ile) of the park, based on their knowledge and experience on NSs of OONP. Only respondents who had been in the area (their respective range) for a period of at least two years were selected for interview. All the participants (a total of 25 persons, see table 1) were asked for permission and their inform consents were willingly given before the commencement of the interview.

Table 1: Visited Range, Number of Interviewee and Corresponding RF / Interviewee

Range (Division)	Camp/bit	Town	No of staff Interviewed	Reference Number
1. Marguba	Akoto base-camp	Sepeteri	03	MAS-1, MAS-2, MAS-3
	Ibuya camp	Sepeteri	02	MIS-1, MIS-2, MIS-3
	Ecotourist base	Sepeteri	03	MES-1, MES-2, MES-3
2. Tede	Tede camp	Tede	03	TTT-1, TTT-2, TTT-3
		Erin	02	TTE-1, TTE-2
3. Yemosho	Oloka bit	Oloka	03	YOO-1, YOO-2, YOO-3
	Yawota bit	Yawata	02	YYY-1, YYY-2
4. Sepeteri	Sepeteri camp	Igboho	02	SSI-1, SSI-2
5. Oyo-Ile	Ogundiran bit	Ogundiran	01	OOO-1
	Booni bit	Booni	03	OOO-1, OOO-2, OOO-3
TOTAL			**25**	

RF: Reference Number

2.3 Data Analysis

For a workable form of information, data in the form of recorded interviews were first transcribed verbatim (into Microsoft Word 2007) and carefully arranged thematically using matrix to ensure easy handling of the data. Themes were analyzed for each individual case and across different cases. To avoid any left out, all the transcripts were revised several times, until emergence of new themes was saturated. The newly emerged themes were identified, evaluated and added for analysis and key findings were used to draw conclusion following Creswell (2003).

3. Result and Discussion

3.1 Demographics

A total of 25 participants were interviewed and all of them were males, as park services (rangers work) are believed to be more of masculine nature than feminine. Four (4) of them were less than 30 years of age, majority (13) of them were between the ages of 31-50 year-old and the rest (8) of them were above 50 years of age. Of the 25 respondents, five, three, nine, five and three of them had O'Level, OND, HND, BSc, MSc respectively, while two, three, six and fourteen of them were eco-tourists, research officers, heads of camp and rangers respectively.

3.2 Knowledge of Location, Types and Number of Licks

Fifteen out of twenty five acknowledged the presence of NSs in the park, while the remaining ten had no knowledge of the NSs at all, because it is either they just resumed duty in their respective location (MAS-2, MIS-1, TTE-2 and YYY-1), barely a year after their transfer or they have no work related to NSs (MES-1, MES-2, MIS-1 and MIS-2) in the park. The work of the tour guide in the park is usually undertaken by the research officers and sometimes in the company of the rangers. So the eco-tourists (MIS-1 and MIS-2) may not know much of the activities in relation to NSs, as they are mostly involved in the hospitality aspect of Akoto base Camp. Even the knowledge of those who acknowledged the presence of NSs in the park was not comprehensive enough, as they claimed to only encounter NSs accidentally during patrol (TTT-2, TTT-3, YOO-2, YOO-3 and OOO-3). However, the research officers (MAS-1 and MAS-2) showed some mastery of the NSs location in the park. Of the 25 participants, 15 of them (15/25) mentioned a total of 12 NSs at different places (2 at Asanwanle, 4 at Ibuya, 3 at Wawa, 1 at Odo koko, 2 at

Balelayo), most of which are at Marguba range. This indicated that the knowledge of the NSs across the whole park may not be comprehensive enough, since the park is reasonably large and has a number of rivers flowing across it, having a potential of the presence of NSs besides them, since NSs are thought to be found besides river bank (Mahaney and Krishnamani, 2003).

Asides artificial licks (that are not found in the park), almost all the respondents emphasized that there are two major types of NSs found in the park; wet lick and dry or upland lick. The wet NSs are usually found at river banks area, water logged or gullied area, usually called abata or fadama area (figure 1), while the dry NSs, though do not actually mean that the natural licks are found in a completely dry area, but only signifies that these NSs are not found along the river bank, but rather usually created in an area after run off from rainfall or flooding, where the soil beneath it becomes exposed (figure 2). These areas most times are flooded with alluvia deposit, loaded with lots of nutrient serving as natural salts for the animals. These types of licks (wet and dry NSs) have been reported in Muskwa-Kechika Management Area (MKMA) by Parker and Ayotte, (2004). All of which characterized NSs as an important ecological component of an ecosystem (Ayeni, 1971; Chong et al., 2005).

Figure 1: *Wet Natural saltlick beside Ajaku River at Marguba range, OONP.*

Figure 2: *Dry natural saltlick at Oyo Ile range (Boni bit), Abata Narasa Lick, OONP.*

4. Background Information on the Poachers, Community and Wildlife around Licks

NSs are important diet, critical to the metabolic functioning of wildlife body (Chong et al., 2005), especially in a tropical region, characterized with lots of rainfall and leaching. Several respondents confirmed that poachers especially hunters usually luck around the licks, especially in the midnight to poach on the wildlife that come to eat

the soil, since nobody will be there protecting the NSs at that time. This was also confirmed by physical observation during visitation to NSs (figure 3).

Generally, it has been reported that not only the hunters utilize licks, but also man, particularly the pregnant women .This was attributed to craving or a sign of psychological malady (Young et al., 2011; Nyanza et al, 2014). Again, children have often been observed eating soil inadvertently when growing up. In contrast to our expectation that people will also compete with the wildlife by sneaking to get the NSs, none of the respondents attested to any traces of human geophagy in and around OONP. It is however possible that some hunters might help users fetch lick soil during their poaching hours in the night, which may be unknown to the park protection staff. Also, since kobs are the symbol of OONP, it is not unexpected that all the respondents reported kobs as a common geophagic wildlife around the licks. Several other respondents also reported animals like oribi (*Ourebia ourebi*), western hartebeest (*Alcelaphus busalaphus*), roan antelope (*Hippotragus equinus*), waterbuck (*Kobus defassa*), baboon (*Pabios Anubis*) and porcupine as common users of the licks in OONP (MIS-1, MIS-2, TTT-1, YOO-2, YOO-1, YYY-2, SSI-1, OOO-1, OOO-1, OOO-2 and OOO-3).

These animals (listed above) are mostly seen eating the licks early in the morning and late in the evening. Very few of them (like the kobs) may be found eating licks in the afternoon (SSI-1 and SSI-2).

5. Lick Users and Pattern of Utilization

Apart from hunters and pregnant women who are reportedly known to be utilizing licks (Young et al., 2011; Bashir, 2014), several interviewees mentioned that NSs may also be utilized by the following users: Game viewers and researchers (for tourism and educational purposes) , who usually mount their cameras near the NSs. Though, seldom recorded in OONP, it was mentioned that NSs may be utilized by wildlife photographers as well.
*One of our directors sometimes asked us to photograph natural licks, to show case them for advertisement (*MAS-3)

When asked whether there are any regulatory laws guiding the NSs in OONP, all the respondents submitted that, apart from the general rules under the Wildlife Park Services Act, there are no specific laws single out for the protection of NSs. This may have negative impact on the animals utilizing NSs at OONP. Country like Malaysia has specific law that safeguard wildlife around NSs. For instance, in the Wildlife Conservation laws of Malaysia (section 81 and 85, 2010), as well as in the Protection of Wild Life Act in Malaysia (Act 76, 1972), it rules that: Any person found negatively impacting NSs, is liable to a fine of RM50,000 and/or otherwise be imprisoned for a jail term not more than two years, on conviction.

6. Threats / Disturbance to licks

Poaching activities

Majority of the respondents in all the ranges rarely find evidence of poaching around the NSs. However, minority of respondents at Marguba held a contrary view, claiming that used cartridges and hunters hideouts are not uncommon around NSs. These were physically observed in one of the visits to the place (figure 3, figure 4 and figure 5). This indicates fearless attitude of the poachers, as most of the NSs at Marguba are closer to Ibuya camp, though the respondents claimed that these poachers will come only in the night, when they can hardly be noticed. The high intensity of poaching activities has been reported by Akinsorotan (2017). A possible approach to curb these kinds of poaching activities may be night or early morning patrol at routes close to some of these NSs.

Figure 3: *Fresh blood and used cartridge used overnight by the poacher in Marguba range*

Figure 4: *Freshly used cartridge found around one of the Natural saltlicks at Marguba range*

Figure 5: *Used firewood and scattered scrapped hairs of grasscutter, indicating evidence of poaching activities by hunters around natural licks at Marguba range.*

Unsustainable land use

One of the commonly reported poaching activities in OONP is mostly perpetrated by the Fulani herdsmen (Akinsorotan, 2017). Foot prints of cattle and cut down branches of trees used to feed the cattle are usually found in places around the NSs as evidence of poaching perpetrated by the Fulani. These poaching activities are most intense in the dry seasons, as Fulani herdsmen go to the extent of climbing trees to cut folder for feeding their cattle (figure

6). Illegal fishing lines set by poachers were also observed at the banks of the rivers, where some of these NSs are found. This also indicated a great disturbance of the NSs, as majority of NSs have been reportedly found along the river banks (Mahaney & Krishnamani, 2003). Though, it was generally emphasized that it is not that the Fulani herdsmen were uncontrollable, at least the rangers killed their cattle, when they could not be caught, but still their stubbornness for a repeated offence are usually frustrating (figure 7). Almost all the respondents mentioned the activities of the Fulani herdsmen as most disturbing:

One of the ways by which Fulani herdsmen circumvent the laws is by poaching during festive period, as they believed this is the time when most rangers might not be in the park (MAS-3).

*Another way is by utilizing the park in the night when rangers are usually not present (at work). They also have informants among the communities that notify them of our daily movement (*MAS-2).

Sometimes, Fulani herdsmen will only allow the herd of cattle to graze the park without following them. This way will prevent them from being caught. However, where we could not convict the Fulani herdsman, we usually kill at least one or two cattle as punishment for their crime. Some of such cattle can be seen littering the park. (MES-3).

And when convicted, the leaders of the Fulani sometimes mount pressures on the management not to prosecute them, but we hardly yield to (MAS-2),

The use of informants to monitor our security strategy is rampant among the poachers and sometimes they try all ways to make us their friends. Where these are impossible, they threatened us with arms in other to escape being caught whenever we encounter them in the park. This is why we usually take daily patrol carefully. (TTE -1).

Fulani people usually destroy the habitat and therefore scared animals away from their natural habitat (TTE-1).

Figure 6: *Scattered branches of trees cut down to feed cattle indicating evidence of poaching activities by the Fulani herdsmen at Marguba range.*

Figure 7: *Cow found intruding into Marguba range and got killed by the rangers when the herdsman cannot be caught.*

Again, some charcoal makers have also been caught in the past and prosecuted (MAS-1), but the threats of Fulani herdsmen and their cattle seem to be incomparable to all other poaching activities combined. It is noticeable all around the park that the impart of Fulani herdsmen alone in poaching activities in OONP seems to be extremely overwhelming or require other strategic measures, as this will go a long way in correcting the menace around NSs (MSE-1 and MST-2). Additionally, the need to find a lasting solution to their ferocious act is imperative.

Unsustainable Tourism

When asked whether tourism activities threatened the NSs or not, several interviewees strictly opposed this statement, but claimed that tourism rather promote the use of the NSs in a sustainable manner, because most of the tourism activities are usually undertaken during the day, not early or late in the evening when the animals mostly utilize the NSs. Nevertheless, it is possible that some nocturnal animal that utilize NSs can still be affected by tourism activities. Not only should such activities be regulated, but conscious efforts are needed to use less of the most active NSs for such purpose. In addition, all respondents agreed that there is no specific law guiding the NSs like that of Malaysia, except for general laws found in the National Park Service Act (section 6).

Asides general code of conducts like no perfume, no noise making, there is no specific code of conducts in regards to natural licks of OONP and it is not a written law (OOO-2).

7. Identification of salt lick

Though, the act of identifying more NSs is a continuous effort and requires rigorous search periodically, as animals create more licks according to their needs. All the respondents confirmed that the NSs of OONP have not been identified, much less to be mapped, and there is need for it.

Asides fewer lick being identified and used for educational purpose in Marguba range. Most of the NSs in the park have not been identified and mapped. Though, efforts were made in the past to do so by even numbering them accordingly (up to like six), but most of them have been destroyed by the Fulani herdsmen, who sprinkle some table salts on them in other to feed their cattle (MSE-2).

The identification and mapping of NSs of OONP will make it far easy to trace the poachers along such part and guide the tourists in game viewing. It will also aid easy monitoring of such NSs (TTT-1).

8. Salt lick sustainability for wildlife

The creation or detection of a keystone resource like NSs is not enough but how sustainable it is for the mutual benefits of the users (wildlife and human) is most important. All respondents testified that there are no dedicated rangers to monitor NSs specifically, as there are no sufficient man power and equipments for efficient periodic patrol in the Park.

Majority of them however advocate for the building of hideouts (like tower), at least, near all active NSs being utilized by the tourists and the researchers, so as to minimize rate of disturbance. This will positively impact the sustainable development of the area in the future.

The building of tower for game viewing at NSs areas will help curb unnecessary disturbance. Though, the park once had one in Marguba range, near kob feeding site, but this has long been destroyed and it is not even close enough to any of the already identified NSs in the park (YOO-2 and YOO-1).

Figure 8: *An abandoned wildlife hide at Marguba range formally used for observing animals that visit the feeding area.*

9. Contribution of Natural Licks to Tourism Developments

NSs play vital roles in the attraction of tourists in several parks where they exist; of which OONP is no exception. Nearly all the respondents confirmed that tourists are usually very happy when allowed game viewing around NSs, so much that many afterwards still look forward to viewing the games exceptionally at NSs, in case of another visit. Though, records of number of NSs users (eco-tourists) are not available, except for records of all tourists that enter the park.

10. Conclusion

The study revealed that the vast majority of the respondents lack comprehensive knowledge (in terms of number and location) of the NSs of the park and confirmed that most of the NSs have not been identified, let alone being mapped, particularly in all the ranges except for Marguba, where very few NSs, used for educational and research purposes were once identified but not mapped. Even these identified NSs, however, were still not free from threats resulting from poachers (hunters and Fulani herdsmen), whose acts of circumventing conviction are not only threatening to the lives of the protection staff, but also have a negative impact on the management of the destination. Hence, the need for more sophisticated measures to curb their menace of these poachers is imperative. Although, the present use of general law such as National Park Service Act, for the conservation of NSs in OONP is not out of place. Nevertheless, developing a guidelines that seek to spell out the details of dos and don'ts, as well as the penalties of the offenders, specifically for the protection of NSLs, will go a long way in curbing or limiting all the threats associated with the abuse of the NSs will go far in helping to adequately protect the NSs and promote the priority it deserves, as a keystone resource for wildlife.

11. Suggestions to Improve Management of NSLS for OONP

(i) There is need for a comprehensive survey mapping of all NSs of OONP. This will not only help to track down poachers at NSs spot, but will assist in periodic evaluation of each ever identified lick.

(ii) All identified NSs, should be mapped and classified (into actively utilized, moderately utilized, and abandoned) for effective management. For instance, to ensure least disturbance, the use of the licks by the tourists should be restricted to only moderately utilized NSs, and if active NSs must be used , then the use of hideouts should be made compulsory. An hidden tower should be carefully stationed around the place for game viewers to utilize with least disturbance.

(iii) Creation of buffer zones around the NSs will also help tremendously in curbing unnecessary disturbance. Not less than 400m radius around the NSs will be excellent. Also, activities such as tourist visitation and especially those related to water, like the use of boat for whatever reason, should be restricted, since majority of the NSs are found very close to the river banks.

(iv) There is nothing wrong in co-opting some selected, trust worthy members of the community toward participating in the protection of the park, especially the NSs. Though, this practice has been found in Yemosho range, where a man, probably due to his experience, is conferred the status of honorary rangers, though not gainfully employed as ranger, but seem to be even more conversant with the terrain of the park than some of the rangers. Increasing the numbers of such honored rangers may go far in helping not only to easily identified most of NSs of the area, but may also serve as a source of information for the rangers. However, such member should be selected carefully. Also, some of the local villagers can secretly be used as whistle blowers (informants) of illegal users of licks.

(v) Records of wildlife species or evidence of it presence (like footprint, hair, saliva) found around NSs is very important to keep. Such data will greatly help in future studies and in matter that relate to management decision making (in relation to NSs). Similarly, data of visitors around licks and their purpose of visit are equally important.

(vi) Monitoring by intensifying anti-poaching patrol near NSs is very important too. Strategy like use of camera may be deployed to identifying the night poachers.

(vii) Furthermore, guidelines for use of NSs in OONP should be defined and communicated to all legal users of the resources. And no users should visit the place except in the companying of the rangers, while adhering to the guidelines.

References

Adewumi, A.A., Edward, J.B., Agunbiade, R.O., & Oyeniran, B.H. (2018). The Nigerian Wildlife Management Policy, Institutional and Legal Framework. *Journal of Scientific and Engineering Research*, 5(8):6-13.

Akinsorotan, O.A. (2017). Status and Determinants of Large Mammal Occupancy in a Nigerian Protected Area. Ph.D. Thesis, Nottingham Trent University.

Ayeni, J. S. O. (1971). Mineral Licks: A Literature Review. *Obeche*, 7:46-53.

Bashir, A. Z. (2014).Wildlife diversity near natural saltlicks in the Ulu Muda Forest Reserve. WWF-Malaysia, Petaling Jaya, Malaysia.

Chong, M.H.N., Tang, S.H. & Suksuwan, S. (2005). Management Recommendations for Wildlife Saltlicks with Particular Reference to Sira Air Hangat at Ulu Muda Forest Reserve, Kedah. WWF-Malaysia, Petaling Jaya.

Creswell, J.W. (2003). Research Design: Qualitative, Quantitative and Mixed Methods Approach. Thousand Oaks, CA: SAGE Publications.

Krishnamani, R. & Mahaney W. C. (2000). Geophagy among Primates: Adaptive Significance and Ecological consequences. *Animal Behaviour*, 599: 899 – 915.

Mahaney, W.C. & Krishnamani, R. (2003). Understanding geophagy in animals: Standard procedures for sampling soils. *Journal of Chemical Ecology*, 29 (7):1503-1523.

National Park Service Act. Act 6: Laws of Nigeria.

Nyanza, E.C., Joseph, M., Premji, S.S., Thomas, D.S.K & Mannion, C. (2014). Geophagy Practices and the Content of Chemical Elements in the Soil eaten by Pregnant Women in Artisanal and Small Scale Gold Mining Communities in Tanzania. *BMC Pregnancy and Childbirth: 14*-144. doi:10.1186/1471-2393-14-144.

Parker, K.L. and Ayotte, J.B. (2004). Ecological importance of mineral licks in the Tuchodi watershed, north-central British Columbia. Prepared for: Muskwa-Kechika Advisory Board Muskwa-Kechika Trust Fund. University of Northern British Columbia.

Pebsworth, P.A., Bardi, M. & Huffman, M.A. (2011). Geophagy in chacma baboons: Patterns of Soil Consumption by Age Class, Sex, and Reproductive State. *American Journal of Primatology*, 73:1–10.

Protection of Wild Life Act 1972. Act 76: Laws of Malaysia.

Rea, R.V., Hodder, D.P. & Child, K.N. (2004). Considerations for natural mineral licks used by moose in land use planning and development. *Alces*, 40: 161-167.

Wildlife Conservation act of Malaysia (2010)

Young, S.L., Sherman, P.W., Lucks, J.B. & Pelto, G.H. (2011). Why on earth? : Evaluating Hypotheses about the Physiological Functions of Human Geophagy. *The Quarterly Review of Biology*, 86 (2): 97-120.