

Human-Nonhuman primate conflict: A fallout of environmental degradation

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ABSTRACT

Assessment of conflict between human and nonhuman primates in Karbi Anglong district, Assam is presented here. Environmental degradation through anthropogenic activities result in overlapping of requirements of human-nonhuman primates which leads to, many a times intense, conflicts. The main threat to the survival of primates in Karbi Anglong is habitat destruction, but there is also an increasing problem of conflict with local people due to crop-raiding. Interviewees reported 410218 hectares, 343012 hectares and 21713.12 hectares of forest land were exploited for shifting cultivation, monocultural practices and encroachments respectively. The present study proposed to envisage the causes of conflict between human-nonhuman primate and perceived impacts of primate crop raiding in Karbi Anglong District. During research it has been reported that 15 numbers of crops species are damaged by primate especially common monkey (*Macaca macaque*) in different season. Interviewees also reported twelve both lethal and nonlethal tools and techniques are used to protect crop and consequently around 158 numbers of primates are harmed every year. However, different marginal mitigation has been proposed to minimize the intense conflicts between human and nonhuman primate.

Key words: Human-nonhuman primate, conflicts, overlapping, monoculture, shifting Cultivation, raiding, Karbi Anglong'

Subtitle: A case study of Human-nonhuman primate conflict among various tribes in Karbi Anglong District, Assam.

Introduction: Non-human primate and human as living in integrated and shared ecological and social space, has become a necessary approach (Fuentes, 2012). Overlapping on food sources and ecology lead to an intense conflicts between human and non-human primate. Various anthropogenic activities including deforestation, urbanization, construction of road, railway tract and alteration of forest land into agricultural field causes serious effect on

non-human primate resulting into a remarkable conflict between human and nonhuman primate. The main threat to the survival of primates in Karbi Anglong is habitat destruction, but there is also an increasing problem of conflict with local people due to crop-raiding. This study proposed to investigate the causes of conflicts between human-nonhuman primate and perceived impacts of primate crop raiding in this hill district. Primate and non-human

primate association is as old as man's existence. In the Indian context the man-monkey relationship is remarkable. One side people consume blood and flesh of monkey as medicine, trap, kill and eat them as food, on the other side people keep them as pets, trained them to play, feed and protect them (Rajpurohit *et al.*,2006).

The hill district, Karbi Anglong is blessed with diverse primate species some of which are rare and endangered. Among the primate Monkey (*Macaca sp.*) is the dominant species. Different ethnic tribes in the region profess varied cultural beliefs about this group of mammals. Many tribes claim their forefathers have originated from some group of primates particularly apes. Assam is the home for various ethnic tribes karbi, boro, dimasa, kuki, garo, hmar, tiwa, tea tribe etc. and ethnoprimateology among this different tribe is since from prehistoric and prevalent till today. Many primates are considered sacred while many other are regarded as taboo and symbol of evil; such practices is likely based on legend and folklore. Some primates are source of beauty and joy and therefore saved as pets and also for entertainment, and while few are considered as having aesthetic value. But such type of healthy traditional knowledge is being eroded in Karbi Anglong day by day as no step has been taken out for proper documentation on it. Karbi Anglong is the habitat of various primates viz. monkey, gibbon, langur, Loris, etc. as it supports favorable ecology for them. But now due to expansion of agricultural field, deforestation, shifting cultivation causes serious threat to primate and produces some unexpected changes about distribution and community

structure of non-human primate. So an attempt has been made to access the causes of intense conflict between human and non-human primates and perceived impact on both of them. The present study is also proposed to formulate certain mitigation to save from the continuous extinction of primates group.

Materials and method:

Study area: The study was carried out in 15th Oct, 2012 to 19th July, 2013 among various tribe in Karbi Anglong, Assam NE India. It lies between 25°26' to 26°36' N and 97°7' to 93°54' E with an area of 10,343 sq Km and the temperature ranges from 14°C to 20°C in winter whereas 30°C to 40°C in summer. This district comprises of two detached parts, each constituting a sub-division the eastern part with its head quarter at Diphu and Western part with its head quarter at Hamren. Karbi Anglong is the home many ethnic communities such as Karbi, Dimasa, Bodo, Mann (Tai speaking), Kuki, Rengma, Naga, Jaintia, Hmar, Garo, Chakma, Hajong, Thadou, Tiwa and Tea tribe (Hanseand Teron, 2012). However, Karbis are the pre dominant tribe of the district and are agriculturist and practices shifting cultivation.

Interview method: The preliminary information was collected from villager, elder, forest officers and farmer. Data and information was collected through oral interview about the causes of conflict and its consequences from different tribes and recorded in research diary.

Freelisting method: In this technique the respondent will be asked to list all of the

primate species and other forest resources they know and finally analyzed the freelist to determine which items in the lists are the most salient. By doing so, data and information can be obtained on what forest resources are important to villagers, as well as which primates are considered the worst crop raiders by villagers.

Direct observation: Through direct observation some more information could have by observing the crop-raiding site during fruiting seasons. And analyzed the raided crop and recorded it.

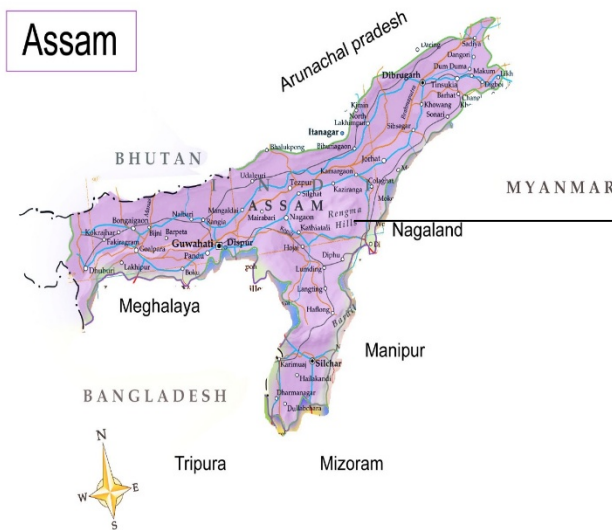


Fig1: Map of Assam



Fig2: Map of Karbi Anglong District.

Result and discussion: Various anthropogenic activities including deforestation, urbanization, construction of road, railway track and agricultural expansion degrade natural habitats of non-human primate resulting into conflict with human.

A. Causes of human-nonhuman primate conflicts

1. **Shifting Cultivation:** Land use pattern particularly shifting cultivation or jhum is the major cause of forest degradation. In Karbi Anglong district jhum is the chief means of agriculture among the diverse ethnic groups namely Karbi (30%), Dimasa (20%), Boro (23%), Rengma (21), Kuki (56%), Hmar (30%), Garo (23%), Chakma (50%) and Tea tribe (40%) and others (20%) (**Table1**). This

practice has greatly affected on primate ecology and their food sources. A study using primate satellite mapping of forest degradation due to shifting cultivation in the hill district of Karbi Anglong, carried out at the Assam Remote sensing application centre , shows that out of 423885 hectares of land under Jhum cultivation in Karbi Anglong

District , 6844 hectares became degraded forest land (Ronghang et. al., 2012).

Table1: Area of shifting cultivation (in hectare) by different tribe

Sl. No	Tribe	Area of Shifting cultivation	Shifting cultivation in percentage
1	Karbi	159747	30
2	Dimasa	45781	20
3	Boro	24523	23
4	Rengma	13452	21
5	Kuki	39672	56
6	Hmar	10673	30
7	Garo	13562	23
8	Chakma	13865	50
9	Tea tribe	45633	40
10	Other	56872	20

(Sources: Forest Department)

2. **Monoculture:** Monoculture including rubber, teak, bamboo, ginger, turmeric and broom grass are excessively practiced by various tribe in the district and greatly impacted on primate ecological structure. Total area occupied by monoculture is 343012 hc; 145234 hc (Rubber, Broom, Teak, Bamboo, sugar cane) by karbis, 42400 hc (Rubber, turmeric, Ginger) by Dimasa, 30652hc (Rubber) by Boro, 23157hc (Broom, orange, ginger, turmeric) by Rengma, 45556hc (Ginger, bamboo, Termeric) by Kuki, 20342hc(Ginger, Termeric) by Hmar, 20125hc (Termeric, ginger) by Garo and 15546 hc (Turmeric, ginger) by chakma (Table2). Most smallholders(85.7%) reported thatfarmers use to cultivate rubber in Telaga (Marchaland Hill, 2009). Interviewees reported planting various species of trees at the margin oftheir cash crop plantations (rubber and oil palm). Durian trees were grown by the majority of interviewees (62.3%). The Sumatran landscape is currently dominated by agriculture with isolated patches of rainforest (Kinnaird *et al.*, 2003).

Oil palm is grown as a monoculture, and provides habitat for 20% or less of the previously resident animals (Laidlaw 1995; Heang and Boo Lia)1998. The remaining forest patches cannot support all the previously resident animals. As a result, primates, for example, are pushed nearer to human settlements and raid crops in farms (Brown and Jacobson, 2005). The province of North Sumatra used to be Indonesia's primary rubber-producing area, but in the 1990s most of the estates were converted to palm oil plantations (Gérard and Ruf, 2001). The area covered by oil palm plantations in Indonesia is 3,107,986 ha, and the Indonesian government is planning to expand oil palm plantations by an additional 4 million ha in Sumatra (Brown and Jacobson, 2005). Large-scale plantation activities are one of the main causes of the ongoing degradation of primate habitat and food resources, which in turn increases crop-raiding in smaller-scale agricultural plots of local farmers. In tropical and subtropical regions, the extension of farming into the forest interior makes wild

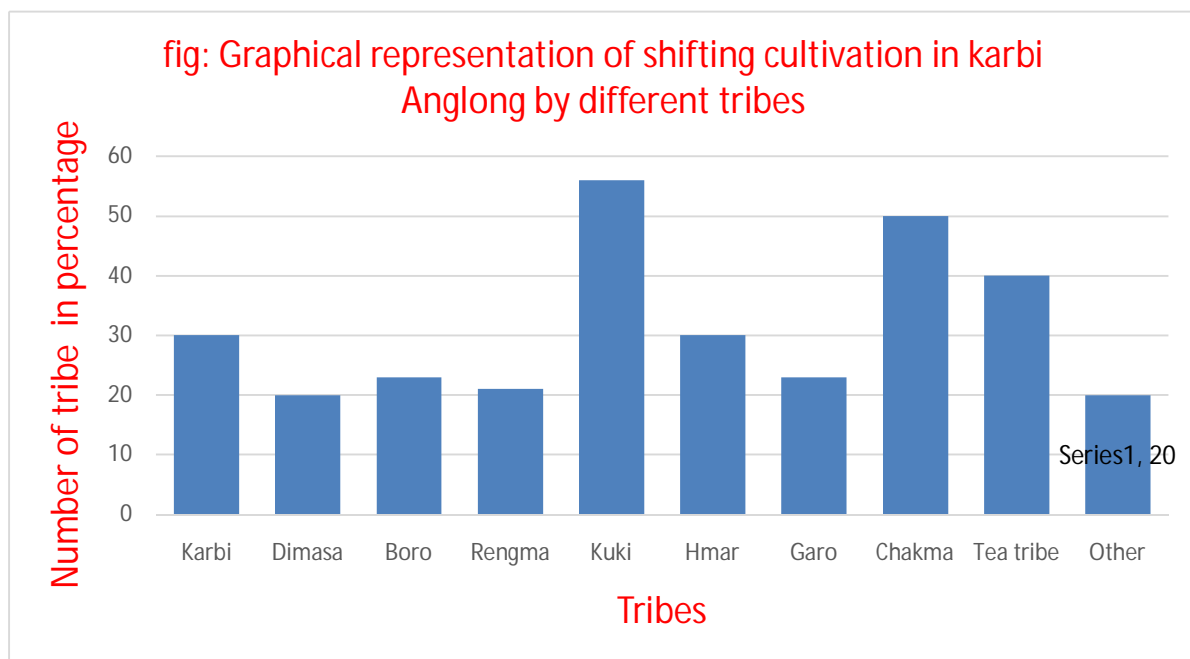
animals become farm pests, and the degree of tolerance of the damage caused changes over time (Knight, 2001).

Table 2: Monoculture plantation by different tribe

Sl. No	Tribes	Area of mono culture in hectare (approximately)	Monoculture practices in percentages	Name of monoculture species
1	Karbi	145234	42	Rubber, Broom, Teak, Bamboo, sugar cane
2	Dimasa	42400	12	Rubber, turmeric , Ginger
3	Boro	30652	9	Rubber
4	Rengma	23157	7	Broom, orange
5	Kuki	45556	13	Ginger, bamboo, Turmeric
6	Hmar	20342	6	Ginger, Turmeric
7	Garo	20125	6	Turmeric, ginger
8	Chakma	15546	5	Turmeric, ginger

Approximately half the interviewees cultivated cempedak, jengkol and petai (55.1%, 51.2% and 49.2%, respectively). Nevertheless, the mean income generated by

rubber plantations was reported to be about two times higher than the mean income from an oil palm plantation (Marchal and Hill, 2009).



3. Encroachments: The reserved forest in Karbi Anglong is being degraded by intensive illegal encroachment. Out of the 21713.117 hectare of encroachments area, 14175.78 hc 5570.00 hc and 1967.337 hc under East forest Division, West forest Division and Hamren division respectively

(Table3). Due to such vast encroachments food sources and habitat of primates are destroyed gradually.

Table 3: Encroachment under Karbi Anglong Forest division during 2000-12

Sl. No	Forest Division	Total area encroached (hc)	Encroachment evicted (hc)
1	East forest Division	14175.78	1420.00
2	West forest Division	5570.00	Nil
3	Hamren forest Division	1967.337	Nil

B. Nature of human-nonhuman primate conflicts in Karbi Anglong: Increased interaction between human and nonhuman primates almost have negative result on both of them.

1.1 Perceived impact on human: Due to limitation of food sources and habitat destruction through various anthropogenic activities primate started to encroach towards human territory and damaged their properties including rice and other household orchards. Moreover, primates damaged intensively various crops in the field. Interviewees reported that monkey is one the most crop raider that basically damage Maize, rice, pumpkin, watermelon, mango, papaya, sesame, pine apple, banana, guava, orange, sweet potato, tomato, carrot and turnip inclusively in different season (**Table4**). Fruits were the plant parts most often reported damaged by primates. However, although primates caused damage to the fruits and leaves of rubber trees, farmers did not perceive this as a problem because it does not affect latex production, which is all they exploit. Squirrels raid fruits of all the crop species, but according to the interviewees, squirrels are less of a problem because they eat much less than the primates. A similar situation was reported from Uganda by Saj *et al.* (2001). Another important aspect that may influence people's perceptions is the size of the animal. Larger animals attracted greater attention from the farmers because

farmers assume that small animals eat fewer fruits and therefore cause less damage than do the larger species. Small species, however, usually have a larger population (for example, insect pests) and consequently can cause significant damage when they raid gardens. Locally, primates were considered more problematic than any other wildlife species; long-tailed macaques ranked first as the most severe crop-raiding species in terms of raid frequency and economic impact, and the next four were Thomas' leaf monkey, pig-tailed macaque, Griffith's silver langur, and orangutan, respectively. Thomas' leaf monkeys were reported damaging fruits of 11 crop species (Marchal and Hill, 2009). They were also reported eating the flowers of durian and petai trees (53.1% and 37% responses, respectively). Long-tailed macaques were reported to cause damage to 14 crop species (Table 6). Even though they damaged fruits crops the most often, they also damaged flowers of petai, durian and banana trees. Sumatran orangutans were reported causing damage to only six species of fruit tree; only a small proportion of respondents claimed that they damage banana, jengkol and mango trees (Marchal and Hill, 2009). Almost 45% of crop growers

reported that long-tailed macaques raided the fruits. Pigs, porcupines and elephants were reported damaging the roots of the oil palm trees. About 64% of rubber growers claimed that Thomas' leaf monkeys damaged the leaves. According to 8.3% of the growers, orangutans were responsible for damage to the bark of the rubber trees (Marchal and Hill, 2009). Damage to oil palm fruits was

mainly attributed to squirrels and long-tailed macaques. Only a small proportion of oil palm growers complained about the other primate species; a situation which is surprising when compared with the oil palm raiding issue in Malaysia. Indeed, orangutan raids in oil palm plantations are commonplace in the lower Kinabatangan, Malaysia (Brown and Jacobson 2005).

Table 4: List of crops damaged by primate

Sl.No	Vernacular name	Name of Crop	Scientific name	Family
1	Thengthe	Maize	<i>Zea mays</i> Lin.	<i>Poacea</i>
2	Sok	Rice	<i>Oryza sativa</i> Lin.	<i>Poaceae</i>
3	Bonghom	Pumpkin	<i>Cucurbita Sp.</i> Lin	<i>cucurbitaceae</i>
4	Thoithe bonghom	Water millon	<i>Cetrullus lanatus</i> Thumb.	<i>Cucerbitaceae</i>
5	Tharve	Mango	<i>Mangifera indica</i> Lin.	<i>Anacardiaceae</i>
6	Mensupi	Papaya	<i>Carica papaya</i> Lin.	<i>Caricaceae</i>
7	Nimpo	Sesame	<i>Sesamum indicum</i> Lin.	
8	Parok jangphong	Pine apple	<i>Ananascosmosus</i> Lin. (Merr)	<i>Bromeliaceae</i>
9	Phinu	Banana	<i>Musa sp.</i> Lin	<i>Musaceae</i>
10	Theso	Orange	<i>Citrus sinensis</i> Lin.	<i>Rutaceae</i>
11	Suprim	Guava	<i>Psidium guajava</i> Lin.	<i>Myrtaceae</i>
12	Ruidok	Sweet potato	<i>Ipomoea batatas</i> Lin.	<i>Convolvulaceae</i>
13	Bokbok	Tomato	<i>Solanum lycopersium</i> Lin.	<i>Solanaceae</i>
14	Sargum	Turnip	<i>Brassica rapa</i>	<i>Brassicaceae</i>
15	Gajor	Carrot	<i>Daucuscarota</i>	<i>Umbeliferae</i>

1.2 Perceived impact on non-human primate: Primate basically monkey is considered as one of the worse crop raider in Karbi Anglong District. Farmers use some both lethal and non-lethal technique to protect their crop and properties. However, ninety percent (90%) of interviewees claimed that they had never done any harm to a primate, and that they had never seen others doing so either. Some interviewees reported

the occurrence of farmers killing primates in the study site and they were mostly monkey. Ten(10) types of different lethal and non-lethal tools and techniques are used by different ethnic tribes to chase primate from the crop fields (**Table 5**). Similarly, seventeen crop protection techniques were reported being used to respond to crop-raiding by wildlife (Marchal and Hills, 2009). About half of the farmers interviewed reported that they

shouted to prevent crop raiding. Shouting was the most commonly used protection in Sampan Getek, Tangkahan and Bukit Lawang (respectively 41%, 66% and 50%). In Telaga Said, the percentage of farmers using guns to injure or kill wildlife was higher than in the other villages (57.1% in Telaga Said, 2.6% in Sampan Getek, 8.6% in Tangkahan and 10% in Bukit Lawang) (Marchal and Hills, 2009). It has been reported that 20, 19, 15, 19, 25, 29,

and 17 numbers primates are harmed every year by Karbi, Dimas, boro, garo, Chakma, Kuki and Hmar respectively (**Table 6**). Deep interaction between primate and non-human primate produces deleterious outcomes are tied to deforestation and landscape conversion which are ongoing at extremely high rates in Karbi Anglong. These threat seem to impact negatively both the indigenous people and non-human primate.

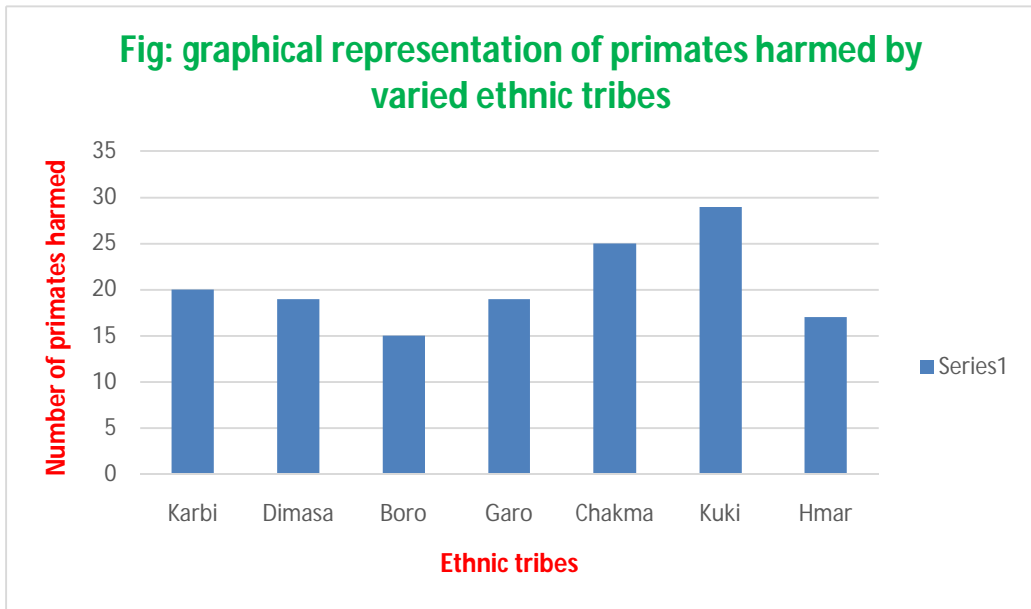
Table 5: Mode of chasing primate from crop field

Sl. No	Tribe	Non-lethal technique	Lethal technique
1	Karbi	Shouting, Belling, Hiding fruits	Cater poll, shooting
2	Dimasa	Shouting, Making fire, Guarding	Cater poll, shooting
3	Boro	Shouting, Effigy, Guarding	Cater poll, shooting
4	Kuki	Shouting, Guarding	Cater poll, shooting
5	Garo	Cracker, Shouting, Dog	Cater poll, shooting, Dog
6	Chakma	Shooting, Bow, Cater poll, Trapping	Cater poll, shooting
7	Hmar	Shouting, Belling	Cater poll, shooting
8	Rengma	Shouting, Cracker	Cater poll, shooting

Table 6: Percentage of interviewees reporting the occurrence of farmers and hunter harming primates at study site (* K=Killed, I= Injured, Trapping =T)

Sl. No	Primate Species	No. of primate harmed by farmer & hunter per year	Percentage of primate harmed	Tribe	Total primate harmed
1	Monkey	10 (I+T)	50.0	Karbi	20
2	Hoolock gibbon	6 (I)	30.0		
3	Slow loris	4 (I+T)	20.0		
4	Monkey	9 (K+I+T)	47.36	Dimasa	19
5	Hoolock gibbon	7 (I)	36.84		
6	Slow loris	3 (I)	15.78		
7	Monkey	7 (I+K+T)	46.66	Boro	15
8	Hoolock gibbon	5 (I)	33.33		
9	Slow loris	3 (K)	20.00		
10	Monkey	11 (K+I+T)	57.89	Garo	19
11	Hoolock gibbon	4 (I+K+T)	21.05		
12	Slow loris	4 (K+I+T)	21.05		
13	Monkey	17 (K+I+T)	68.00	Chakma	25
14	Hoolock gibbon	5(K+I+T)	20.00		
15	Slow loris	3(K+I+T)	12.00		
16	Monkey	20 (K+I+T)	68.96	Kuki	29

17	Hoolock gibbon	5 (I+K)	17.24	Hmar	17
18	Slow loris	4 (K)	13.79		
19	Monkey	12 (I+K)	70.58		
20	Hoolock gibbon	3 (I)	17.64	Rengma	14
21	Slow loris	2 (I)	11.76		
22	Monkey	9 (K+I+T)	64.28		
23	Hoolock gibbon	3 (I)	21.42		
24	Slow loris	2 (I)	14.28		



Mitigation of conflicts ----- A proposal

Different marginal mitigation has been proposed to minimize the worse condition of conflict between human and nonhuman primate

1. Agroforestry
2. Educate people about the consequences of conflict
3. Declaration of protected area
4. Supplements of alternative livelihood to the victims based on their capacity and interest

Conclusion: Conflict between human and non-human primate is likely to intense in Karbi Anglong due overlapping of food resources and ecology. Increased interaction between them almost have negative result on

both human and nonhuman primates. Construction and expansion of urban area, alteration of forest landscape for agricultural practices, population explosion adversely affect primate ecology and produces unexpected changes in their distribution and community structure. To sustain their life non-human primate started to encroach human territory and crop field and then indigenous peoples take advantage to harm them. Ethnoprimate study reveals the biological and behavioural relationship between man and non-human primate as it determines the entire relationship between them. Non-human primate greatly influence in different cultural aspect of human being. Most of the primates are at risk from extinction and some them are endanger due

to over exploitation in various activities of man and also hunted by some predator. Primate act as pets and entertainment in certain part in Assam. Captive primate increase the economic status by entertaining public in zoo, national park, biosphere reserve etc.

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Action is the foundational key to all success.

~ Pablo Picasso