

A Review on the Mortality Pattern of *Rhesus macaque* at Basistha Temple, Kamrup district of Assam, India

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Abstract : The study was conducted from November'2018 to April'2019 to know the Mortality Pattern of Rhesus Macaque at Basistha Temple Kamrup district of Assam. During the whole survey it has been found that among the groups of Rhesus macaque in Basistha Temple the mortality cases are very frequent. As our survey reports presenting the macaques are mostly injured due to Accident that is 63%. Accidents occur due to playing on the electricity poles, beaten by human, during playing and by Vehicles in the temple premise. The macaques are suffered from a lot of Viral, Bacterial & fungal infections. An around 32% percent case has been found where these macaques are suffered because of infections as reported. During the survey from September 2018 to April 2019 around 5% cases of Death has been found. The deaths occurred due to disease, accidents, vehicular accidents, electrocution and beaten up by human have been found.

Keywords: Temple Primates, *Rhesus macaque*, Electrocution, Accident, Disease, Death.

I. INTRODUCTION

Mostly temple primates are dependents upon mixed food stuffs primarily leaves, twigs, fruits and seeds. The human provisioned diets are highly nutritious also contain various chemicals which may alter their metabolic activity of the body. It may change their nutrients absorption rate time and behavior. People usually provide during the day hours and the people living in the temple itself provides them some amount of fruits and other foods. But they are mostly harmed by the food provided by the visitors which also comprises biscuits and chips. Primates are at high risk of extinction as a result of unsustainable human activity, which is causing extensive habitat loss and degradation. Mortality patterns in non human primates are influenced both by diet and degree of environmental seasonality. Emerging and reemerging infectious diseases remain a major treat to these animal colonies. Often these animals carry and transmit diseases without any visible signs. They are more likely to contract hepatitis A, measles or poliomyelitis from humans or as part of laboratory experiment to transmit these diseases to humans. Diarrhoea and respiratory diseases were major causes of morbidity in non human primate and were associated with high mortality in some primate colonies. Conflicts between humans and non-human primates are recognized as major issues in conservation of primates. Various forms of human-wildlife conflicts occur with various negative results, including damage to crops and property, habitat destruction, injuries and death of people and wildlife, and livestock depredation. Monkeys destroy home gardens, fruit trees and crops. On the other hand, monkeys are also beaten, injured and killed by the local people. Monkeys are highly vulnerable to electrocution by electric wires because of their habit of jump, play and movement in human dwellings in search of food (Sengar *et al.*, 2014). High-voltage injury patients commonly present with devastating burns requiring prolonged hospitalization with multiple complications. Electric injuries lead to severe systemic disturbance and massive local tissue injuries (Slatter, 1993). Electric shock is a traumatic physical state caused by the passage of electric current through the body. It generally involves unintentional contact with exposed parts of electric circuits in home appliances and domestic power supplies but may also results from lightning or contact with high-voltage wires. An injury can result from wet vegetation contacting energized components, creating short circuits from power lines to the ground (Kumar and Kumar 2015). Reported death rates after electric shock range from 31% to 36% (Kumar and Kumar 2015; Slade 2016), with individuals dying from the effects of electric current passing through the body (Schulze et al. 2016), or from the subsequent impact of falling from a height (Kumar and Kumar 2015). Survivors of electric shocks are frequently left with injuries to the hands, head, and chest, and may later die from secondary infection (Kumar and Kumar 2015). So, the following objective has been taken:

- 1) To find out the habit and habitat of Temple primates in Temple of Basistha.
- 2) To find out the social behavior of *Rhesus macaques* and accidental cases in temples.
- 3) To find out the mortality and morbidity pattern among *Rhesus macaques*.

II. REVIEW OF LITERATURE

The major threats to temple primates of the region is the loss of natural habitat through human settlement in and around the temple sites is evidently the primary threat for the temple primate populations in most cases. The resulting loss of food sources from the natural habitat leads to increased conflicts through crop raiding, and the greater persistence of the monkeys near to humans, their habitation and place of worship. People in more remote parts reported increasing incidences of human-primate conflicts. The monkey destroying property and household objects are the most common manifestations of this conflict. The people's attitudes toward the monkeys are changing due to conflicts.

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 intense conflicts between human and non-human primate. Various forms of human-wildlife conflicts occur with various negative results, including damage to crops and property, habitat destruction, injuries and death of people and wildlife, and livestock depredation. Monkeys destroy home gardens, fruit trees and crops. On the other hand, monkeys are also beaten, injured and killed by the local people. These interactions may increase the risk of bidirectional disease transmission (Jones-Engel et al. 2008).

Electrical injuries in animals occur most often accidentally. They comprise contact to various forms of currents, including alternating, rotary, or direct currents. Electrical currents passing through the victim can cause sudden death by disruption of neural regulatory impulses. Furthermore, electro thermal injuries may occur at the source and ground contact points and in inner organs. High-rate electrical cardiac capture overrides the physiological regulation of the heartbeat and leads to reduced cardiac output in a situation when the myocardium has an increased demand for oxygenated blood due to its frequent beating. A mechanism leading to cell membrane injury is electroporation, which causes disturbances of cellular functions even when the current flow is too low or too short to induce thermal injury. The principal lesions in a larger current flow are electrothermal injuries to skin and internal organs by Joule heating, and the effects of electroporation are easily overridden by heat in the case of typical electrical accidents involving household, machinery, or overhead power lines. In earlier days, people used to feed macaques along the road by offering them gram or bananas. These days people offer all sorts of food including biscuits, chips and other snacks which are thrown in the middle of the roadway (Gogoi, 2018 & Patgiri, 2019). Based on discussions with some passers-by and truck drivers, it was learnt that the people have adopted the practice of feeding macaques because they believed that monkeys do not get anything else to feed on. This irregular feeding makes macaques aggressive in their behavior towards humans and other species (Bernstein & Mason 1963; Koford 1963; Loy 1970; Southwick et al. 1976). It is a common observation that when vehicles halt, macaques surround them forcing traveler(s) to offer eatables. In retaliation some people pelt stones.

III. MATERIALS & METHODOLOGY

Primary source:

1. Visited the study area 16 times per Month (100 Days throughout the study period. 1 observation has been done in 4 days.) From November '2018 to October' 2019.
2. Information on *Rhesus macaque* Mortality was collected through filling in a self-prepared questionnaire survey in Basistha Temple. A total of 12 persons were randomly selected for the interview. The aims and objectives of the study were explained to the interviewees to make a report on mortality of Rhesus macaque. The interviewees were the localities Shopkeepers, Pandits, workers of Temple (≥ 18 years), who were willing to participate in the interview as a representative of Temple. Questionnaire was written in English then for interview it was translated into Assamese and Hindi. It took 5-10 minutes to complete one questionnaire.
3. Data collections of physical injuries due to such as accident, conflicts, electrocution is done.
4. The causes of deaths of *Rhesus Macaque* were recorded.

Secondary:

1. Journals, Internet and Research Publications.

Instrument Used:

GPS, DSLR Camera, Notebook, Pen.

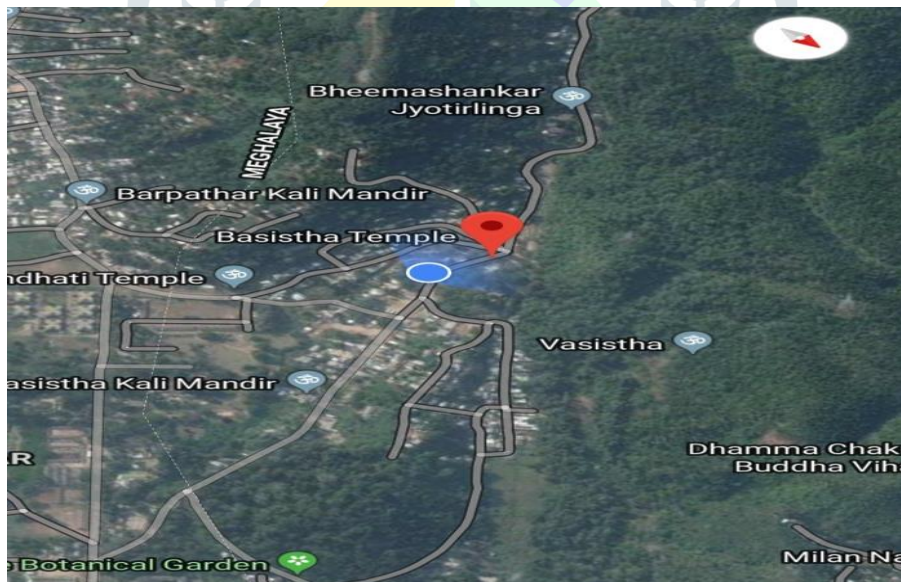


Fig1: Map of Basistha Temple

GPS Points:

Temple Site:

1. N 26° 05' 43.72" and E 091° 47' 05.13" Elevation 88m
2. N 26° 05' 40.80" and E 91° 47' 07.19" Elevation 75m

Basistha Temple Road Sites

1. N 26° 05' 44.74" and E 091° 47' 15.89" . Elevation 66m
2. N 26° 05' 49.84" and E 091° 47' 35.26" . Elevation 55m
3. N 26° 06' 06.64" and E 091° 47' 51.74" . Elevation 67m
4. N 26° 05' 42.62" and E 091° 47' 03.49" . Elevation 55m

IV. RESULTS

The most of the Rhesus macaque found died due to electrocution by electric wires because of their habit of jump, play and movement in human dwellings in search of food. The total three rhesus macaque deaths were reported due to electrocution and many are left injured which make them sickness, weak, burning of skin, Paralyzed and fall from top trees or current post etc. The Temple Rhesus macaque usually goes in search of food to the roads, where they are usually meet with an accident. Lots of temple primates are found to be physically injured such as some broken limbs, bones etc. Conflicts between human and rhesus macaque are seen many times. The snatching of foods of Rhesus macaque, which in return they are chased away by the sticks, and thrown stones to them. They again damages to household properties. For which people of certain area hate those primates. And the human aggression towards the rhesus macaque, lead them to be beaten, injured and killed by the local people.

Analysis of Primate Disease, Accidents, and Death occurred in Basistha Temple during survey period November'2018 to April'2019

1)

Parameters	1st Observation	2nd Observation	3rd Observation	4th Observation
Groups	3	2	1	3
No. of males	14	8	7	12
No. of females	18	6	6	14
Juvenile	13	5	4	8
Infant	12	2	2	3
Accident Occur	1	2	3	0
Diseases	2	1	2	2
Death	0	0	0	0

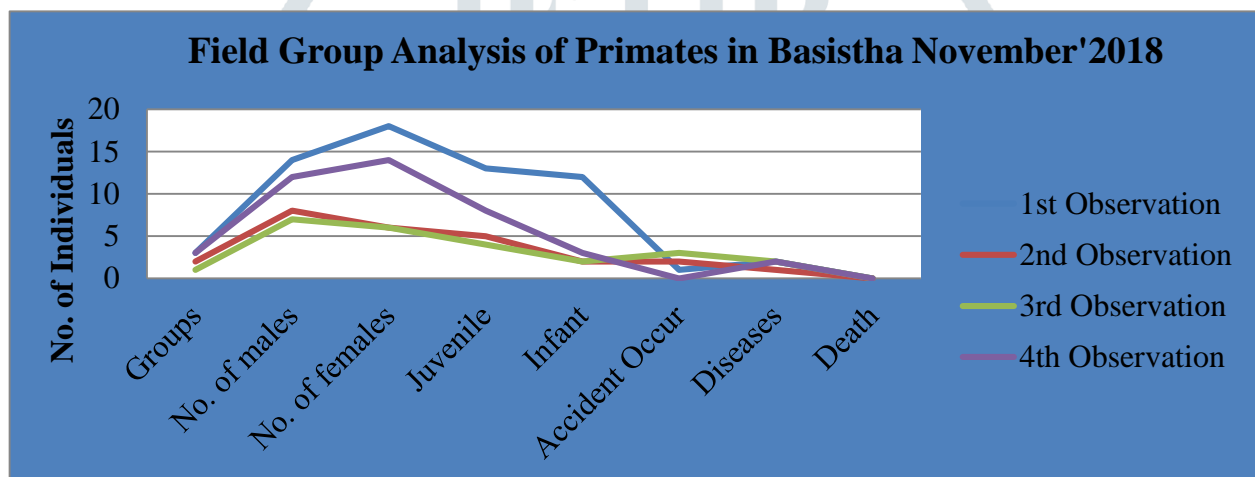


Fig2: Field group analysis November'2018

2)

Parameters	1st Observation	2nd Observation	3rd Observation	4th Observation
Groups	2	7	1	2
No. of males	8	21	7	13
No. of females	13	26	6	14
Juvenile	6	11	3	7
Infant	5	9	4	4
Accident Occur	1	4	0	2
Diseases	1	0	0	0
Death	0	0	0	0

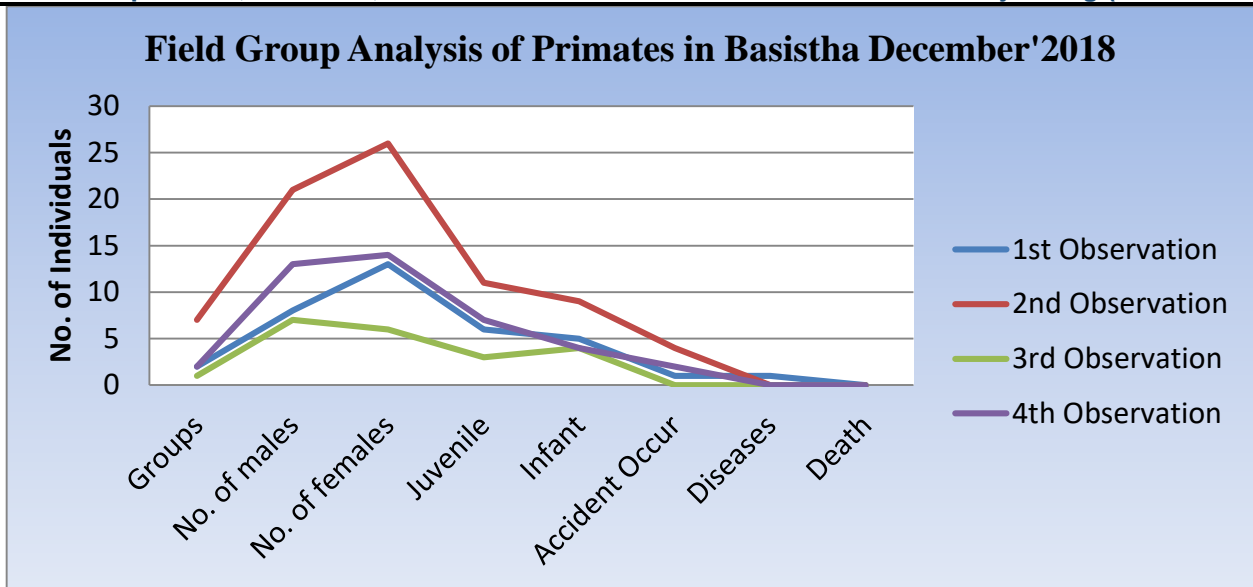


Fig3: Field group analysis December'2018

3)

Parameters	1st Observation	2nd Observation	3rd Observation	4th Observation
Groups	3	5	1	3
No. of males	14	21	7	12
No. of females	18	18	6	14
Juvenile	13	7	4	8
Infant	12	5	2	3
Accident Occur	1	2	3	2
Diseases	2	0	1	1
Death	0	0	0	0

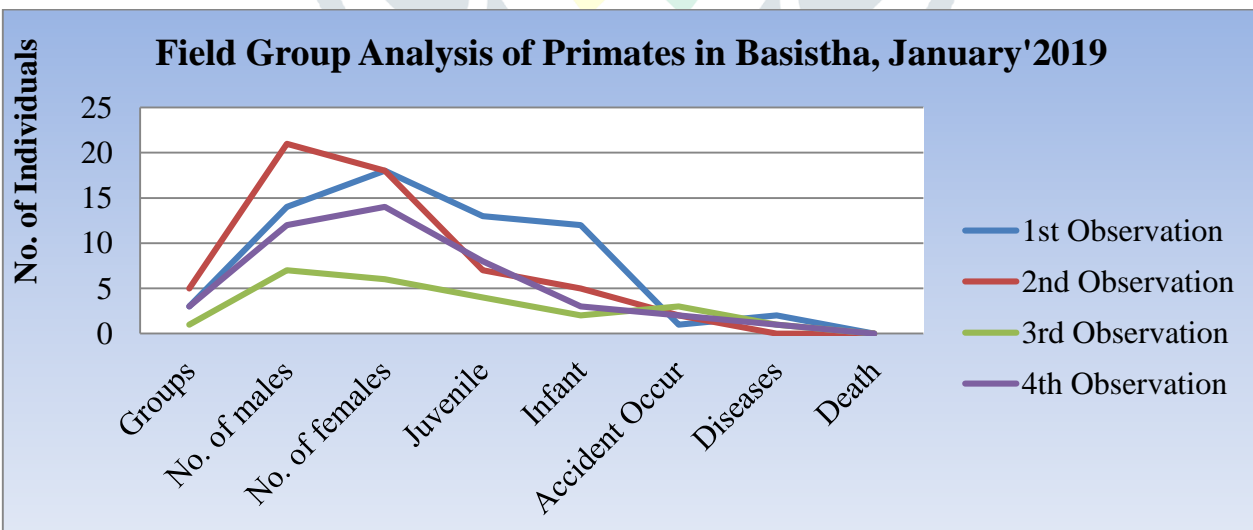


Fig4: Field group analysis January'2019

4)

Parameters	1st Observation	2nd Observation	3rd Observation	4th Observation
Groups	5	8	1	4
No. of males	21	22	5	18

No. of females	25	27	8	21
Juvenile	8	13	4	8
Infant	11	11	3	7
Accident Occur	2	2	0	2
Diseases	1	0	0	0
Death	1	1	0	0

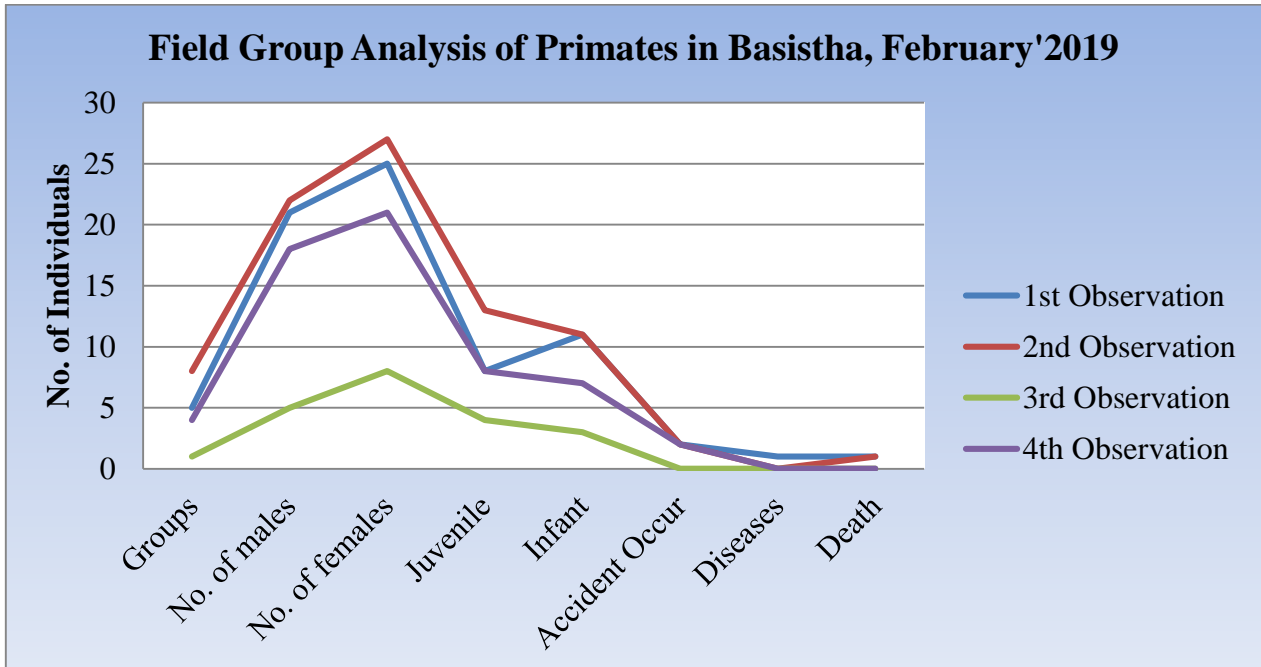


Fig5: Field group analysis February'2019

5)

Parameters	1st Observation	2nd Observation	3rd Observation	4th Observation
Groups	5	8	1	4
No. of males	21	22	5	18
No. of females	25	27	8	21
Juvenile	8	13	4	8
Infant	11	11	3	7
Accident Occur	2	2	0	2
Diseases	1	0	0	0
Death	0	1	0	0

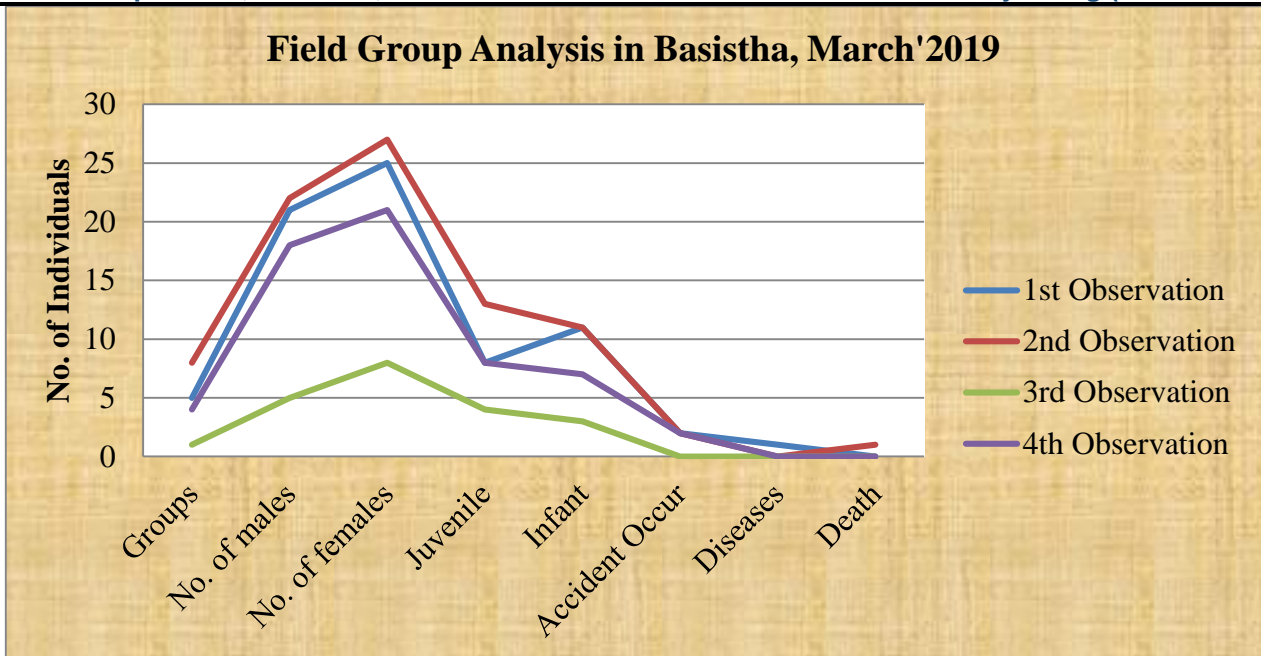


Fig6: Field group analysis March'2019

6)

Parameters	1st Observation	2nd Observation	3rd Observation	4th Observation
Groups	2	7	1	3
No. of males	7	12	5	12
No. of females	12	19	6	14
Juvenile	8	9	4	8
Infant	7	11	2	5
Accident Occur	0	0	0	1
Diseases	0	0	0	1
SDeath	1	0	0	0

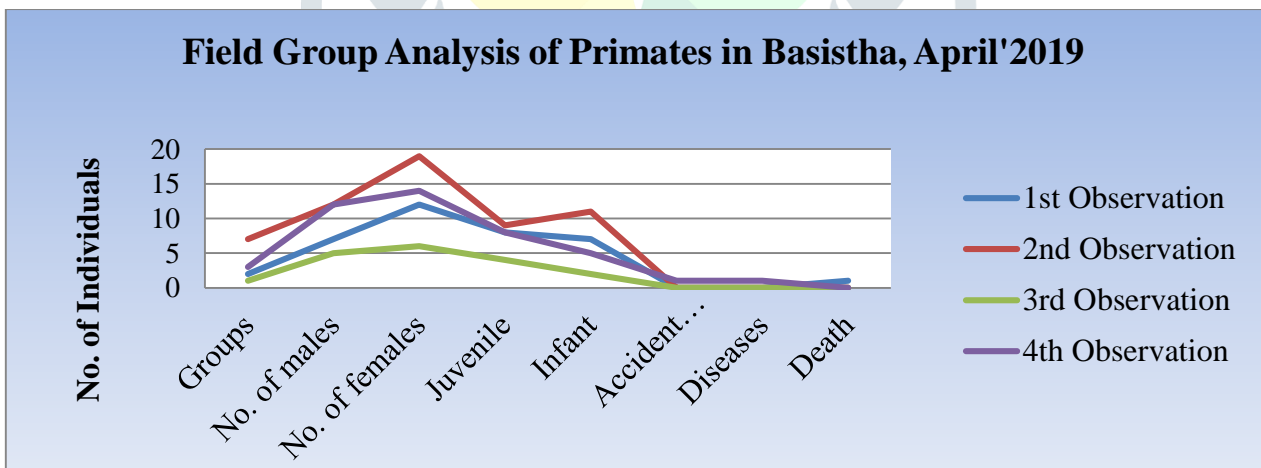


Fig7: Field group analysis April'2019

7)

Observations	November	December	January	February	March	April
Accident	6	7	8	6	6	1
Diseases	7	1	4	1	1	1
Death	0	0	0	2	1	1

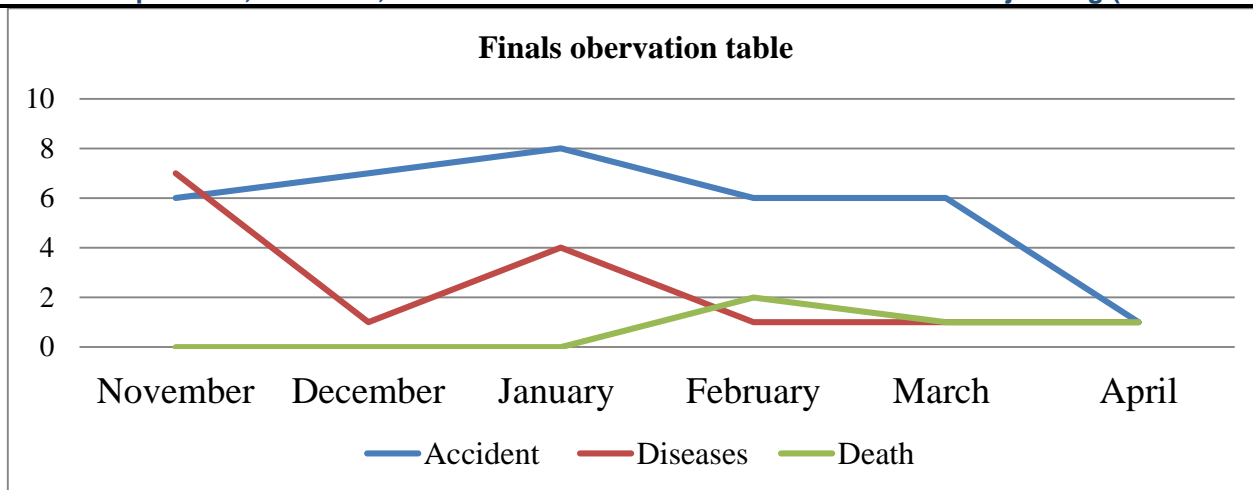


Fig 8: Mortality & Morbidity Rate in Rhesus macaque in Basistha Temple, Basistha during survey period November 2018 to April 2019

Table8 : Mortality & Morbidity Ratio	
Mortality & Morbidity	%
Accident Occur	63.01
Diseases	31.51
Death	5.48

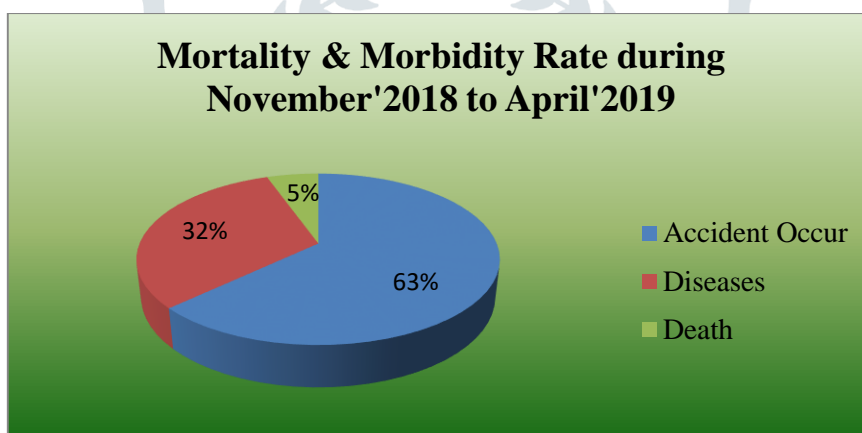


Fig 9: Pie diagram showing the percentage of Mortality & Morbidity.

V. DISCUSSION

During the whole survey it has been found that among the groups of Rhesus macaque in Basistha Temple the mortality cases are very frequent. As our survey reports presenting the macaques are mostly injured due to Accident that is 63%. Accidents occur due to playing on the electricity poles, beaten by human, during playing and by Vehicles in the temple premise. The macaques are suffered from a lot of Viral, Bacterial & fungal infections. An around 32% percent case has been found where these macaques are suffered because of infections as reported. During the survey from November'2018 to April'2019 around 5% cases of Death has been found. The deaths occurred due to disease, accidents, vehicular accidents, electrocution and beaten up by human have been found. So, it is a major issue to save these animals being disappeared from their natural as well as artificial habitat because of the said reasons. To reduce the mortality of wild animals, the study of their pathological condition, habitat, physical injuries is necessary to take preventive measures and control programs. Keeping the above facts in view, the present study recorded the causes of death of non human primates in Assam. For the survival of animal emergency and critical care is essential. Treatment may involve such measures as cardiopulmonary resuscitation, defibrillation, and intravenous administration of electrolytes to help stabilize vital functions.

Electrocution is an issue for many threatened primate species, yet the development of effective evidence-based mitigation strategies is limited. This study provides a framework for systematic spatial prioritization of high-risk areas that will contribute to more effective mitigation planning. This framework can be used across the world to understand and reduce primate electrocutions. 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. These injuries can lead to necrosis of superficial or deep tissue. High-voltage current produces more heat than low-voltage current and can cause burns, coagulation, and necrosis of affected body parts. Severe electric shock commonly causes unconsciousness, respiratory paralysis, muscle contractions, bone fractures, and cardiac disorders. Even passage of small electric currents through the heart can cause fibrillation. Furthermore, electrocution hotspots should be profiled

to identify risk factors such as habitat and high-risk power line components, to guide a proactive mitigation approach that aims to reduce the risk before mortality has occurred. Hotspots identified in this study show that most primate electrocutions occurred on a small proportion of the power grid. This pattern is similar to that reported for Hanuman langurs in India, where a high incidence of electrocutions occurred in one location at the same power pole. Future studies should aim to objectively evaluate and compare current mitigation measures, especially comparing fatalities before and after.

VI. CONCLUSION

Many Non-human Primates are infected by many diseases and can carry a variety of zoonotic diseases. Therefore proper care should be taken by anyone handling these animals to prevent potential exposure to zoonotic pathogen. To facilitate the detection and control of potential pathogen, all facilities that house non human primates should implement comprehensive microbial quality programs. This will help to reduce the morbidity and mortality of these wild animals. Conflict between human and non-human primate generally occurs due to overlapping of food resources and Damages made to house hold poverties. The interaction almost have negative result on both human and nonhuman primates. To sustain their life non-human primate search food on the garbage waste, roads etc. Non-human primate greatly influence in different cultural aspect of human being. It is high time to save these animals in our surrounding and a strategic decision required for their safety in their habitat being encroached by humans. As the study reveals conservation of these wild species, many of which are globally endangered, developing long term strategy is of outmost importance. Although, a majority of the population is protected in the various parks and sanctuaries, the coverage is still inadequate.

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PHOTO PLATES



Image 1



Image 2



Image 3

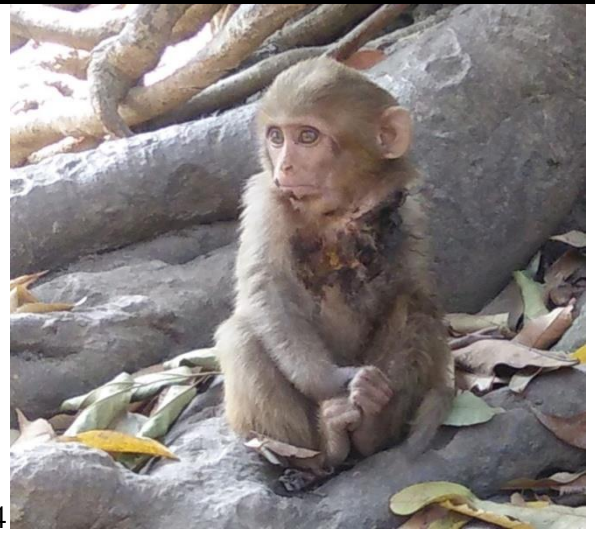


Image 4

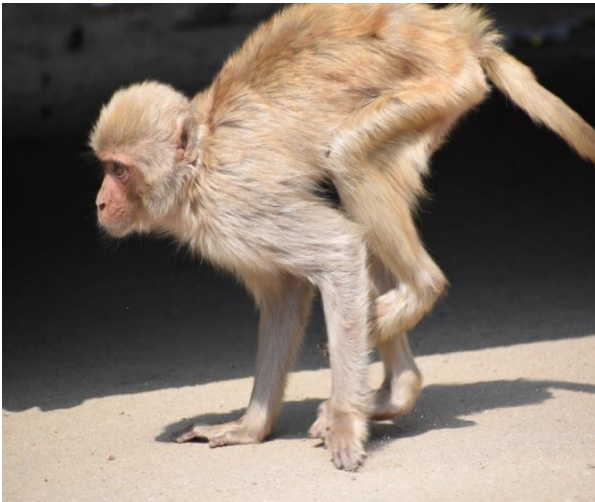


Image 5



Image 6

