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HUMAN-MONKEY CONFLICT IN INDIA: SOME AVAILABLE SOLUTIONS FOR CONFLICT MITIGATION WITH SPECIAL REFERENCE TO HIMACHAL PRADESH

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ABSTRACT

'Monkey Management' is the most challenging issue, the forest and wildlife managers of India are facing today. On one hand monkeys have cultural, scientific and economic significance, on the other hand they have become a big nuisance as on today. The monkeys are leaving forests and are constantly migrating to urban, semi urban and rural areas. because of their shrinking habitat, and availability of delicious and easy food in urban areas. Human-monkey conflict has today attained a serious proportion. The human-monkey conflict management includes use of bioacoustics that produce distress noise and to scare away the monkeys, Immunocontraceptive vaccines, sterilization to control their population growth and protecting agriculture crops and orchards with live/appropriate fencing etc. The future management strategies could include oral contraceptives which can be fed with food, though their effectiveness is limited to only zoos. Himachal Pradesh (HP), which is the most affected due to Rhesus macaque, has resorted to sterilizing Rhesus. Himachal Pradesh Forest Department (HPFD) is well convinced with the success of monkey sterilization programme and is set to sterilize most of Rhesus population of the state. However, a change in the behaviour of sterilized monkeys has been observed and therefore, HPFD has been constantly proposing establishing 'Vanar Vatikas' (monkey shelter homes) with proper facilities for drinking water, shade, resting, feeding and ranging. An account of non human primate species found in India, human-monkey conflict mainly due to *Rhesus macaque* (*Macaca mulatta*) and status of its management in India with special reference to its sterilization programme in Himachal Pradesh has been discussed in the paper.

Key words: Rhesus macaque, *Macaca mulatta*, Sterilization, Vermin.

Introduction

Human-monkey conflict is the most talked about wildlife topic in the world today. Monkeys have scientific, mythological, historical and cultural significance. They are very close to human beings in anatomy and physiology and especially *Rhesus macaque* has been used for understanding various aspects of human physiology and anatomy. In Indian mythology, monkey is considered the incarnation of Lord Hanuman– the supreme commander of army of monkeys of Thretha Yuga, who is venerated for his dedication and devotion to Lord Rama. Therefore, the monkeys are not killed. They are offered food out of devotion and that attracts them further close to human habitations making them more and more human dependent. But in the past one and half decade or so, the monkeys (especially *Rhesus*) are in news due to bad reasons. Among all species of monkey found in India, *Rhesus macaque* has today become a big nuisance in the eyes of humans. Besides entering into direct conflict with human beings, an army of *Rhesus macaque* eats away the eggs of birds and so on, thereby causing lot of ecological disorders. Crop destruction by *Rhesus* is the biggest issue today.

Agriculture Department's Report, 2011 about losses to agricultural crops suggest that in Himachal Pradesh about 1609 Panchayats are affected by monkeys alone and about 1169 Panchayats are affected by other wild animals. The loss to food grains and vegetables has been assessed about 150 crores per annum. Similarly, the Horticulture Department Report, 2011 hint a loss of about 105 crores to horticultural crops assessed for the period of 2006-10. Farmers who dare to protect their crops, have to spend more than what they earn, as they have to deploy guards to protect their crop. *Rhesus macaque* is a scheduled animal in categorized in Schedule II Part I of Wildlife (Protection) Act, 1972, and hence enjoys the legal protection against killing. As a result of this, man-monkey conflict has touched a new peak and people want this conflict to be resolved amicably. At present, people of one village emphatically want that the monkeys should be captured from the vicinity of their habitations and released at some other place, but this is temporary solution and nothing more than shifting a problem from one place to another. Renowned primatologist of India Dr. (Mrs.) Iqbal Malik suggests establishing primate parks, improvement in habitats, planting fruit trees preferred by

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monkeys, and planting trees used by monkeys as their habitat could be one of the probable solutions for tacking this issue. (Iqbal Malik *et al*. 1984). Other options include sterilization of both male and female monkey, use of acoustic devices to produce irritating noise to the monkeys. Till 1977, *Rhesus macaque* and *Bonnet macaque* were being exported from India to America and Europe, where they were being used for biomedical research. But later, the export was banned in 1977, followed by Bangladesh in 1979 (Shirley McGreal, 2007) as there were reports of harsh treatment being meted out to them during transport, handling and study. State of Himachal Pradesh has tried all the methods such as rubber bullets, use of acoustics, sterilizations (is still continuing at a good pace) to control the populations or scare them away from human habitations.

Species of Monkeys in India

Owing to variety of habitats, forests, grasslands, wetlands and deserts, a number of monkey's species are distributed in India from evergreen forests of Western Ghats and North East to dry forests of Rajasthan and Gujarat. The species of monkeys are found in India include: Rhesus Monkey *(Macaca mulatta*), Bonnet Macaque (*Macaca radiata*), Assam Macaque (*Macaca assamensis*), Arunachal Macaque *(Macaca munzala),* Stump Tailed Macaque (*Macaca arctoides*), Pig Tailed Macaque (*Macaca leonine),*Grey Langur (*Semnopithecus entellus),*Lion Tailed Macaque (*Macaca silensis*), Capped Macaque (*Trachypithecus pileatus),* The Golden Langur (*Trachypithecus geei),* Male Neelgiri Langur *(Trachypithecus johnii)* and Hoolock Gibbons (*Hoolock hoolock*). While some of them are rare and endangered, others have population beyond desired level.

Monkey menace

Many monkey species found in India are docile, shy and restrict themselves to forests except a few spp. of macaques. Mainly due to religious protection, delicious food offered to them and their flexibility in adapting to a variety of habitats, three Indian monkey species namely the rhesus macaque (*Macaca mulatta*), the bonnet macaque (*Macaca radiata*) and the Hanuman langur (*Semnopithecus entellus*) have become commensal. There is no doubt that human -monkey conflict is seen throughout the areas where they are found. Though, it is the *Rhesus*, which is the main macaque species of the human- monkey conflict and the voices are being mainly raised against this macaque only. But besides Rhesus, bonnet and grey langur are also creating lot of problems. There are reports that Assamese macaque is also now following the same line and snatches articles, purses, terrify human beings enter residential areas, tear clothes and sometimes attack human beings. The conflict is being seen not only in human settlement areas but also in forests. The monkey menace is not restricted to crop raiding, biting, and fear psychosis but it also includes raiding kitchens, breaking chimneys, breaking electricity bulbs, chewing internet and electric wires, bursting water pipes and transmission of deadly diseases like tuberculosis as well.

Himachal Pradesh seems to be suffering the most, the farmers are unable to grow crops like maize in Una, Bilaspur, Hamirpur, Kangra and Mandi districts. The orchardists in entire Himachal Pradesh are suffering huge losses. The farmers and orchardists are either being forced to change the cropping pattern or abandon the lands and sell it at throw away prices. The urban dwellers are not able to grow vegetables in their kitchen gardens. It is a chain reaction. Some farmers are even finding it hard to earn their both ends meal. No industrialist is willing to take up any industrial activity and people are not ready to build houses in monkey infested areas. The land is drastically losing its monetary value. The water storage tanks, street electric poles, bulbs and solar power system etc. have to be closed with sharp iron structures as monkeys damage them badly. They roam free on roads and streets making it difficult especially for the kids to cross the road. Sometimes, they create traffic hazards as they don't move away from the road. In temples, so long as the *Rhesus* gets plenty of food, they are fine but the moment they do not get the food, they start teasing, snatching eatables, pick spectacles of elders as in the case of famous Jhaku temple in Shimla. They also defecate on paths making them dirty and scaring people.

The magnitude of the problem in some states is so high that farmers have formed associations to raise their voice against monkey problem. In Himachal Pradesh 'Kheti Bachao Andolan Smiti' and in Bihar 'Bandar Mukti Abhiyan Samiti' are vigorously taking up the cause of monkey menace. People in holy town of Vrindavan, Uttar Pradesh have to virtually get encaged inside their houses. People are so much scared of monkeys that they stopped moving out alone or without a stick in their hand.

Recent ecological problems due to monkey menace include eating away eggs of red jungle fowl (*Gallus gallus*) and kalij pheasant (*Lophura leucomelanos*). Similar reports have also came from Keoladeo National Park, Bharatpur, Rajasthan where Rhesus monkey eats the eggs of painted stork and other resident birds. In H.P., *Rhesus* is also affecting the regeneration of Chyuli/Silk Tree (*Albizia stipulata)* by eating its pods. They eat the buds of poplar trees affecting the growth of the trees and also walnut damaging the pods before they get matured.

Not just village residents, city dwellers are also struggling to cope with monkey menace. According to the Primate Research Centre, Jodhpur, which is one of the three Union government-run institutes on primates, more than 1,000 cases of monkey bites are reported every day in Indian cities (Chakarbarty, 2015). The bite of Rhesus can transmit Herpes virus that can cause a potentially fatal swelling of spinal cord and brain (Seanmaclain and Malhotra, 2014).

The extent of injury caused to human is classified into four categories as simple, grievous, permanent incapacitation and death. Of the total number of cases reported in HP, simple and grievous injury accounted for to about 99% and 1%, respectively. The amount paid to the monkey-attack victims as compensation from the government exchequer in HP has been nearly ` 66 lakh rupees.

Macaque management

In view of the above, mitigating human-monkey conflict is necessary. The following management practices can be followed to manage Rhesus monkey in India particularly in north India. It involves both preventive and reactive management practices. Rhesus being the main problematic species, the management practices have been mainly described for *Rhesus macaque*.

Preventive management

Feeding of monkeys

Behavioural biologists and primatologists narrate that offering food is to accept the dominance of a species and monkeys are strongly guided by this principle. By offering food to monkeys, we accept the dominance of monkeys. And so, the monkeys start commanding us. All primatologists are against the feeding of monkeys in public places except within permanent shelters/parks specially designed for them. But at present, there is no law to prevent feeding of monkeys on roads or at any public place. In Shimla, though during 2004, feeding of monkeys in public places, except temple premises was prohibited within Shimla municipal limits, under section 302 of Municipal Corporation Act, but even the same is not applicable in other parts of the HP. So, the people offer bananas, gram and bread to monkeys along the roads. This often results into traffic jams and accidents. Sometimes, people who come out of their vehicles to help injured are fatally attacked by troop of monkeys hiding nearby. This sometimes even results into death of human beings. So, there is a strong opinion evolving in the minds of the people for declaring feeding of monkeys outside designated places as an offence under the provisions of Indian Penal Code, 1860.

However, the Hon'ble courts have also started playing their role in monkey related issues. Honourable High Court of Delhi vide its order dated 14.03.2007 in WP (C) No 2600/2001 in the matter of New Friends Colony Residents Welfare Association Vs Union of India and Others has directed that no person will feed or give food to monkeys in public areas. But at the same time, the Hon'ble High Court of Delhi has also made it mandatory to feed monkeys in shelter by the managers besides the plant species used by monkeys for food and shelter. The Hon'ble Court has also asked to collect food offered by devotees at feed collection centers and arrange to transport that feed for monkeys in shelter. The MCD/NDMC has been entitled to challan and impose fine in case anybody violates Hon'ble High Court's order. In pursuance to this Hon'ble Court's order, Department of Forests and Wildlife, Govt. of NCT Delhi has issued public notice not to feed monkeys at public places. However, feeding of monkeys being a religious issue, Govt. of Delhi has arranged for monkey feed collection centers for the devotees from where the food is transported by MCD arrangement.

Habitat improvement

The reversal of habitat conditions with the overall objectives of ecosystem management holds the key to reducing the monkey problem both in rural and in urban areas. The monkeys have also been found to feed on a number of herbs, shrubs and climbers. These plants need to be identified, propagated and planted as a part of habitat improvement. Trees like Bargad or Barh (*Ficus benghalensis*), Sacred fig/Peepal (*Ficus religiosa*), Cluster Fig/Gullar (*Ficus glomerata*), Wild Fig/Anjir (*Ficus carica, F. palmata*), Kadamb (*Neolamarckia cadamba= Anthocephalaus cadamba*), Lasora (*Cordia myxa*), Wild Mango (*Mangifera indica*), Mulberry (*Morus alba*), are loved by monkeys as their habitat and their fruits are relished. Like human beings, monkeys love sweet taste and hence, groves of banana should also be planted in their shelter homes where ever it is feasible climatically.

Using the optimal foraging theory

Optimal foraging is a theory, first formulated in 1966 by R. H. MacArthur and E. R. Pianka, stating that natural selection favours animals whose behavioural strategies maximize their net energy intake per unit time spent foraging. The theory was originally devised in an attempt to explain why, out of a wide range of foods available, animals often restrict themselves to a few preferred types. Simply, it means a choice between more nutritious and less nutritious food. Rhesus monkeys in the forest spend whole day in search of food. But when they move close to human settlements, they find nutritious food in less than

10 minutes. As a result, they spend more time procreating (Chakarbarty, 2015). So, there is need to plant nutritious food plants in the forest itself. There is nothing wrong in planting a few banana plants in marshy forest lands as a part of habitat management and attract monkeys back to their habitats in wild.

Use of langurs

It is believed that, *Rhesus* is scared of langur (though not established scientifically). Therefore, some people and organizations use langurs to scare monkeys. But keeping langur in captivity or roping it, falls within the meaning of hunting as per the provisions of Indian Wildlife Protection Act, 1972. Hence, this method can't be used for mitigating human- Rhesus monkey conflict. Though, it is believed that, Rhesus is scared of langur, but there seems to be a change in the bahavour of Rhesus. Langur and troops of Rhesus have been seen moving together without any sign of fear or conflict.

Use of monkey calls

Some communities in India produce sounds which mimic the sound of alpha males. So, they produce loud voice ah, ah, ah followed by ooh, ooh. This scares them away. However, this is a temporary solution. They start creating similar problems at other places.

Live fence

Thorns terrify monkeys, hence, crops, vegetables and orchards can be protected by establishing live fences. The best species for this purpose is *Opuntia*. But it is not very useful plant in terms of other benefits. Efforts should be made to select a species for live fence which gives some economic returns to the locals as well. Christ's thorn (*Carissa carandus*) and Gray nicker (*Caesalpinia bonduc)* are the best options for live fence. They have lot of food and medicinal value respectively. Planting of these species along the boundary of the fields give very good protection against monkeys.

Use of oral contraceptives

Capturing, and performing vasectomy and releasing monkeys back into forests is not only cumbersome, but also is a costly and time consuming process. It takes lot of time to catch a monkey. Not only there are chances of injury to the monkeys but also the monkeys are at great risk of catching zoonotic diseases as according to various reports, the Rhesus carries contagious diseases like tuberculosis. Wildlife Institute of India, Dehradun, therefore, is working on the possibility of developing oral contraceptives, which can be given to monkeys with food. If they come out successfully, contraceptives can be fed to monkey with the food (Nelson, 2013). But, it is not very useful as same monkey has to be fed continuously these oral contraceptives to have an effect, which is again not feasible.

In situ sterlization

Immuno-contraceptive vaccine Porcine Zuna Pellucida (PZP) can be provided after anesthetizing the animal. This vaccine infact reduces the fecundity in monkeys in the long term. Zona pellucida is infact a protein layer which protects mammalian oocyte. Injection of PZP prevents fertilization, thus preventing pregnancy (Singh *et al.*, 2005).

Bioacoustics

Bioacoustics is the sound produced by animals and birds. The bioacoustics is of three types. First type is alarm call, which is produced by an animal when it sees a danger. Second type is the distress call, which is produced by an animal when caught by a predator. The third type is the predator call, which is produced by predatory animal which preys on animal in question. The bioacoustics conveys the message to target that the area is dangerous to venture in. There is no single sound for all animals or birds. Bioacoustics equipment is available in India, which does not kill but simply repels the monkeys. The company supplying or manufacturing ultrasonic monkey repeller claims it to be very successful to the extent of 90% in areas where there is no human disturbance. However, in urban areas where there is lot of human presence, this equipment is not successful. The equipment works for 15-25 days and then it is required to be switched off for 3-4 days. Thereafter, the equipment is required to be shifted to new locations. The problem with this equipment is that the ultrasonic frequencies of this equipment jams mobile signals and internet (Chakarbarty, 2015) but harmless to human beings. Wildlife officials of HPFD, however, have filed an affidavit in the Hon'ble High Court of HP, Shimla in CWP No. 8149/2010 titled as People for Animals, Kasauli Vs. Union of India that the equipment was not effective. Hence, filed an application before the Hon'ble High Court for vacating the stay imposed by it for hunting of Rhesus from issuing permits under Sec 11(1) b of Wildlife Protection Act, 1972.

Trapping monkeys

This is an age old practice of dealing with monkeys in India. It has been recorded in Chamba circle as early Chamba princely state that monkey were transported out of town to give respite to the people. There are people in India who traditionally catch monkey for their livelihood. People get relief for sometime in the area from where they are caught. The monkeys are caught at one place and are released at another place. This is just transmitting the

problem from one place to other. If they are released in the forest, they either put additional burden on the forest or quickly migrate to the nearby habitations.

Steps to declare monkeys as a vermin species

Mainly due to crop raiding behavior of monkeys, farmers particularly in Himachal and Uttarakhand, are being put to great losses, who have left their agriculture lands fallow, even without cultivating, now they have raised hue and cry to declare monkeys as vermin under Sec 62 of Wildlife Protection Act 1972. Govt. of Himachal Pradesh had approached the Ministry of Environment, Forest and Climate Change (MoEF& CC), either to allow the export of monkeys as in the past or declare *Rhesus macaque* as a vermin, based on the monkey hot spots identified after an elaborate survey in the entire state, on the basis of administrative boundaries of Tehsils. In response to this, MoEF &CC by a gazette notification dated 14th March, 2016, has for six months declared *Rhesus macaque* as vermin but only within the municipal limits of Shimla town under the provision of section 62 of Wildlife Protection Act, 1972. The results available after six months will be guiding the future course of action for the state and elsewhere in the country.

Creative management

Translocation

Keeping in view the problem of *Rhesus macaque*, one of the world's largest translocations of monkeys ever has been successfully done in the pilgrimage town in Vrindavan in Mathura district of Uttar Pradesh, India. A total of 600 individuals were translocated in January 1997 to eight sites in semi natural forested areas within the same district under the supervision of famous primatologist of India Dr. (Mrs.) Iqbal Malik. The translocation was successful as the translocated monkeys were settled and appeared to be exhibiting normal behavior (Ekwal Imam *et al*., 2002). So, the translocation of commensal monkeys to forested areas can be a successful technique for their rehabilitation, is a viable option but it is not a widespread option, simply because already forests are supporting Rhesus monkeys beyond their carrying capacity. Renowned primatologists like Iqbal Malik are in the favour of establishing 'Primate Parks' exclusively for monkeys. In compliance to High Court of Delhi order dated 14.03.2007, Singh *et al.* (2005) have come out with a management plan for monkey menace management and have suggested the following guidelines for the capture of monkeys under the conflict situations within public places. They recommend the use of light weight but sturdy walk in cages (which can't be overturned by trapped monkeys) or nets. Whereas cage traps are suitable for built up areas, the nets are suitable for open areas. The doors should be self locked and all parts of the cage should be smoothened and there should have no projections so that the animals are not injured. The cages should be camouflaged in such a way that, maximum number of monkeys are trapped.

The plan necessitates tranquilizing monkeys immediately after trapping and treatment for wounds, parasites and insertion of transponder microchip while the animal is still under anesthesia effect. The transportation cages should be of minimum dimension 3.5' (L) x 3.0' (W), 3.0' (H) constructed of steel or its alternatives, in which only one animal should be transported at a time. The transport vehicle should have arrangement for circulation of fresh air and the animal should have access to water. The veterinarian must accompany the transport vehicle. The transportation should be done during morning hours and the transportation vehicle should be covered with wet gunny bags to create cool conditions during summer.

The said action plan prescribes requirements for housing, feeding, retiring, open air, hiding, squeeze cages, isolation cages in the case of extended family, presence of veterinarian, pre operative room, operation theatre, X ray Room, laboratory facilities and quarantine facilities within the shelter house for the translocated monkeys. The plan also prescribes sterilization of both males and female monkeys by vasectomy and immune contraceptives. In response to this, Delhi Forest Department has identified Asola Bhati Wildlife Sanctuary as shelter for translocated Rhesus, but the concept of Vanar Vatika has not been approved in the context of Himachal Pradesh as according to the Central Zoo Authority, it is not a wildlife sanctuary and comes under the definition of a zoo. Catching and trans-locating monkeys is not an easy process. The primatologists stress the need to trap the entire troop but that rarely happens. And when only few members are trapped, the monkey's social group is disrupted. The mother is away, the infant is here, the father monkey unable to take care of it, and so on. This chaos causes monkey groups to be divided, one into two and two into four and so on. Their ecological balance thus gets disrupted by selective trapping led to what Iqbal Malik calls "chaotic fission," and they started entering houses to look for food. That is how monkeys came into our homes (Vij, 2012). First, we offer them food and then we withdraw or do not give it. So, they become aggressive. They win when they learn that food can be easily won by showing aggressive dominant behavior.

Sterilization

Himachal Pradesh is a pioneer state in the county, which started thinking of monkey management in a

scientific way as long back as 2004, firstly by carrying out estimation of its population, beat wise, and later having taken up monkey sterilization in a big way since 2006-07. For sterilization purpose, the latest population estimations have been done in much more scientific manner making use of GPS and computer programmes and methods of statistical analysis using Max Ent Algorithms. For this purpose Singh *et al.* (2016), conducted *Rhesus macaque* survey in H.P. based on the density, average group size and suitable area available in each division, the abstract of relevant facts and figures of Macaque population in the state of HP. They estimated average home range size of Rhesus Macaque as 5 Km^2. Average Group size is 31 $\pm$ 9 numbers. Mean Encounter Rate is 1.38 $\pm$ 1.35 groups per Km length. Total no of estimated Macaque groups is 5153 over an area (suitable for macaque habitation) of 27276.83 Km^2 of the state, which comes to 0.18+/-0.09 group per Km^2. Total Macaque population of the state is 2,07,614 with an error range of 10215 or 4.92%.

Accordingly, suitable area of habitat for *Rhesus macaque* was found to be 27276.83 Km^2. Northern parts of HP comprising high altitude alpine habitats are not suitable for them. Although overall trend of population compared to two previous estimations showed a decline in HP, due to the pioneering work done by the state of HP by sterilising 1,10,521 (One lakh ten thousand five hundred twenty one) monkeys as on 15.08.2016 in 8 monkey sterilization centres (MSCs) of the state which is again a record in the country, but some forest divisions viz. Rohru, Renukaji, Bilaspur, Palampur, Nurpur, Dharamshala, Pangi and Dalhousie have shown sharp increase in Rhesus population, probably due to migration of individual macaques after sterilisation as sometimes they are not accepted by their own social groups or due to increase in religious tourism as devotees continuously encourage the migration of monkeys to the concentration of devotees who feed them or due to food available in these areas due to upcoming horticulture crops. At least, 10 divisions namely Sarahan, Shimla, Anni, Rajgarh, Suket, Kullu, Great Himalayan National Park, Chamba, Bharmour and Nalagarh have shown a marginal change, thus the situation of conflict remains standstill.

Based on the density calculation of monkey groups, considering a density of >0.36 and above as a hot spot (place of maximum conflict with humans), a total of 348 beats were identified in 83 ranges of the state, in 39 tehsils, HP Govt. has approached MoEF &CC for declaring it as a vermin under section 62 of WLP Act 1972, in the above hot spots to mitigate the conflict situations and to protect their crops and lives. Based on this the monkey hot spot map is generated as under:

Accordingly, Himachal Pradesh has taken initiative and made successfully operational eight Monkey Sterilization Centers (MSCs), at Tutikandi (Shimla), Sastar (Hamirpur), Gopalpur (Kangra), Sarol (Chamba), Salappar (Mandi), Paontasahib (Sirmour) and Boul (Una), Ispur (Una) in the State. Himachal Pradesh Forest Department is mandated to sterilize its majority of *Rhesus macaque* owing to its past success in reduction of birth rates of Rhesus.

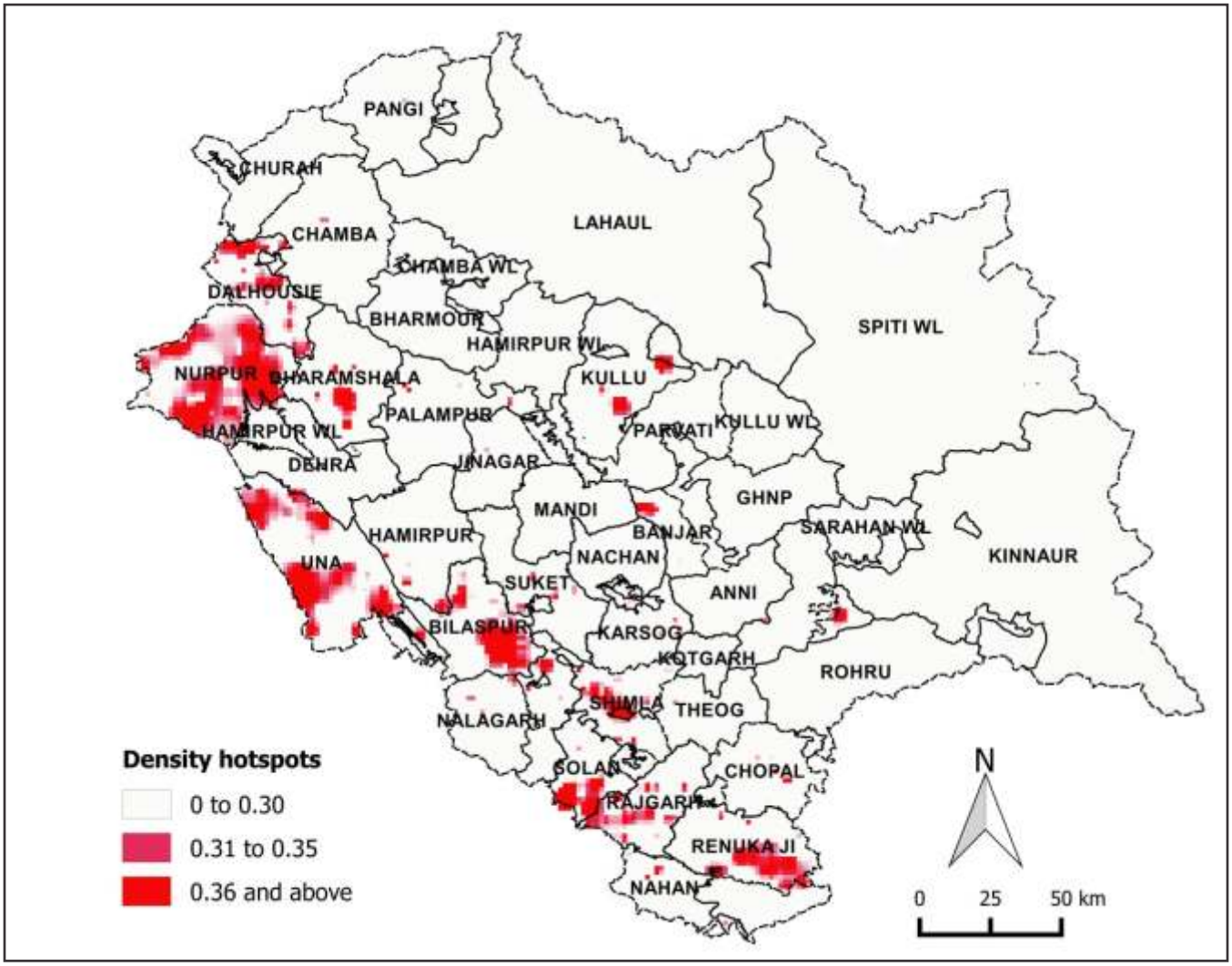
So far, Himachal Pradesh has sterilized more than half of its population, which is a pioneering and exemplary work in the entire country, towards control of monkey population. HPFD is of firm belief that the sterilization in monkeys is successful and it has reduced birth rate in Rhesus and accordingly, they will put an effort to sterilize most of the monkeys in the state at least to the extent of 80%. Convinced with the success of HPFD in this field, the technical know how about the macaques is being shared with various states like Uttarakhand, Sikkim and J&K, by sharing the census methodology and also deputing their veterinarians to train the doctors in monkey sterilization in the state of Uttarakhand.

The trends on account of monkey attacks after sterilization in H.P. has been given in Fig. 1.

The perusal of figures of HPFD,2016 Fig.1 related to the attacks of Rhesus on human beings since the start of sterilization in 2006 revealed that the number of monkey attacks was somehow directly related to the rate of sterilizations, indicating that the monkeys behaved differently when they are sterilized and left into their own social group. The increase in the number of attacks is presumably due to the change in the behavior of the monkeys when released into their social group back after sterilization, as it is believed that they are not accepted by their own social group.

Method of Sterilization adopted in HP

The sterilization is done in both male and female Rhesus. The sterilization in the case of male Rhesus macaques is carried out manually by vesectomy (removing vas deferens of both testis). As regards the procedure, a small cut is made on the triangular point of the pelvic bone at the base of the penis about one inch toward umblicus by the help of electro - cautery pencil. Then a vas holding forceps is inserted through the cut and with the help of thumb and fingers vas deferns is palpated and dragged out of the cut with the help of vas holding forceps. Then the vas deferns is cut out with the help of cautery pencil. After removing vas deferens from both testis, the monkey is given post operative treatment, kept for three days under



Map 1: Monkey Hotspots in H.P. Source: HPFD, 2016

observation and treatment and then released if healthy.

The sterilization in case of female Rhesus macaque is carried out by method of (laparoscopic electro-cauterization of fallopian tube) tubectomy. For this purpose, a small cut is made with the help of scalpal one inch toward head from umblicus on linea ulva and another cut is given parallel to it on lateral side. A laproscope probe connected to carbon dioxide gas cylinder and a light source is inserted in one side with the help of trocar canula and a cauterization forceps is inserted on other cut with the help of trocar and cannula. Carbon dioxide gas is passed to the abdomen, that'll help in the distension of abdomen to provide space to proceed for the process of sterilization. With the help of cautery forceps and laparoscope, manually the clear image of pelvic area is obtained on the screen and cautiously the fallopian tubes are removed with the help of cautery forceps. The gas is released and after drawing all the instruments from body of monkey, it is passed to post operative and treated for three days and then released when found safe to be released into their own social group again.

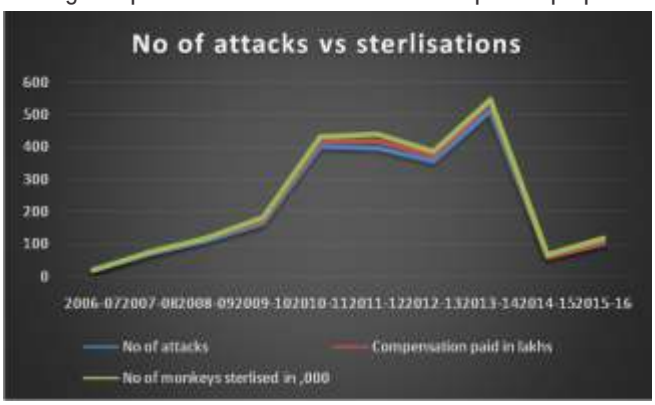


Fig. 1: Number of attacks and sterlization (Source: HPFD, 2016)

Export of Rhesus monkey

Till 1977, Rhesus monkey was being exported from India to USA and Europe for biomedical research. For U.S, India was the second largest exporter of Rhesus and on an average 1, 20,000 (One lakh twenty thousand Rhesus)

were being exported to U.S. annually, between 1956 to 1960. India's annual export of Rhesus to U.S. was at peak till late 1950's. Annually, as many as 2,00,000 (Two lakhs) Rhesus were being exported to U.S. till late 1950's, but declined by 1978 when India banned primate exports (Lynn Gray Schofield, 1983).

Voices are arising from many farmers' association to permit export of Rhesus after making suitable amendments in Indian Wildlife Protection Act-1972. However, there is a divided opinion on this issue. One group states that it is the only practical option to manage Rhesus monkey menace in India amicably. The primatologists and animal right activists however, do not agree to this. They say that juvenile monkeys of the age of 3-5 months were being exported. This used to separate the parents from their young ones and this made them aggressive. They proceeded to human habitations and this is the reason why monkeys have become a menace in human habitations. The primate experts say that, the pre-requisite for export of monkeys, is that the export should be from the wild habitat and secondly they should be free from diseases. Whereas the problem is the commensal and semi commensal monkeys which need translocation in the shape of export, but many of them are diseased and hence, are not acceptable for export. Thus, we can say, that this option is not a much viable one.

Culling

Animal activists argue that every living creature enjoys protection, under the Indian constitution and so has *Rhesus macaque*, and say that we should not talk of killing monkeys. Article 51A (g) of the Constitution casts fundamental duties on every citizen to have 'compassion for living creatures'. Citizens of the country are duty bound to show respect for animate world. “All living creatures have inherent dignity and a right to live peacefully and right to protect their well-being which encompasses protection from beating, kicking, over-driving, over-loading, tortures, pain and suffering etc.” But a provision has been made in Wildlife Protection Act, 1972, that if any wild animal becomes dangerous to life and property, shooting permit can be given by the chief wildlife warden of the state. But, most of the affected groups agree that the culling should be the last option and should be resorted to in extreme cases, when other management methods fail.

Do's & Don'ts about Monkeys

Don'ts

We must avoid the following actions while living with monkeys for mitigating human-monkey conflicts. These include:

1. Not to have eye to eye contact with monkeys as they take it as challenge or treat it as a mild threat
2. Not to carry plastic bags as they think they contain eatables
3. Disposing of food in monkey proof bins
4. Should not hold (especially children) or eat food near monkeys
5. Not to go near mother monkey carrying her young ones
6. Never provoke monkeys intentionally. Monkey behavioural biologist interpret coughing, sneezing, yawning, laughing, and even putting the hand or fingers in front of the mouth; to be treated by monkeys as a major threat and the monkeys will react accordingly. It will either submit with fear or it will react strongly with counter threat.
7. Making noise is treated as major threat and the monkeys will get panic. Behavioral biologists interpret it as extremely dangerous situation. There are more than ninety percent chances of attack especially when the monkeys are moving in troop. To get out of this situation, the best way would be to divert the attention of the monkeys. The activity by some other person on the other side will divert their attention.

Do's

1. The behavioral biologists stress the need for understanding the mood of the monkeys. They say that the best way to respect monkeys, is to lower the eyes.
2. The facial expressions and body gestures are similar to monkeys, but all this is not like human beings, as sometimes, this does not help understand the mood of monkeys. Monkeys treat smile as bad gesture.

भारत में मानव-बन्दर संघर्ष : हिमाचल प्रदेश के विशेष सन्दर्भ में संघर्ष न्यूनीकरण हेतु कुछ उपलब्ध समाधान

ए.आर.एम. रेड्डी और जगदीश चन्दर

सारांश

‘बन्दर प्रबंधन’ सबसे चुनौतिभरा विषय है, जिसे आज भारत के वन एवं वन्यजीव प्रबंधक सामना कर रहे है। एक तरफ बन्दरों का सांस्कृतिक, वैज्ञानिक एवं आर्थिक महत्व है, वहीं दूसरी ओर ये आज एक बड़े उपद्रवी बन गए हैं। बन्दर वनों को छोड़कर लगातार शहरी, अर्ध- शहरी और ग्रामीण

इलाकों की ओर जा रहे हैं, ऐसा इनके सिकुड़ रहे आवास और शहरी इलाकों में स्वादिष्ट एवं आसान खाद्य की उपलब्धता के कारण है। आज मानव–बन्दर संघर्ष एक गंभीर अनुपात में पहुंच गया है। मानव–बन्दर संघर्ष प्रबंधन में शामिल हैं – जैवधनिक का उपयोग जो कष्टकारी शोर उत्पन्न करता है और बन्दरों को भगाता है, प्रतिरक्षा गर्भ निरोधक टीका, इनकी आबादी की वृद्विको रोकने के लिए बन्ध्यीकरण और उपयुक्त तारबाड़ लगाकर कृषि फसलों और उद्यानों को सुरक्षित करना। भावी प्रबंधन रणनीतियों में मौखिक गर्भ निरोधक शामिल हो सकता है, जिसे खाने में मिलाकर दिया जा सकता है, यद्यपि इनकी प्रभावकारिता केवल चिड़ियाघरों तक सीमित है। रीसस मैकाक के कारण सबसे ज्यादा प्रभावित हिमाचल प्रदेश में रीसस के बन्ध्यीकरण का आश्रय लिया है। हिमाचल प्रदेश वन विभाग बन्दर बन्ध्यीकरण कार्यक्रम की सफलता से पूरी तरह सन्तुष्ट है और यह राज्य की अधिकांश रीसस आबादी का बन्ध्यीकरण पूरा कर लेगा। तथापि बन्ध्यीकृत बन्दरों के व्यवहार में परिवर्तन देखा गया है, इसलिए हिमाचल प्रदेश वन विभाग पीने के पानी, छाया, विश्राम, संभरण और रेंजिग के लिए उपयुक्त सुविधाओं के साथ 'वानर वाटिका' (बन्दर के लिए आश्रय घर) स्थापित करने का सतत् प्रस्ताव कर रहा है। इस शोधपत्र में भारत में पाए जाने वाले गैर मानव प्राइमेट प्रजाति के वृत्तान्त, *रीसस मैकाक* (*मैकाका म्यूलेटा*) के कारण मुख्यत: मानव–बन्दर संघर्ष और हिमाचल प्रदेश में इसके बन्ध्यीकरण कार्यक्रम के विशेष सन्दर्भ में भारत में इसके प्रबंधन के स्तर पर विचार–विमर्श किया गया है।

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