

# **Saving Asian Elephants**

- Dr. T. V. Venkateswaran

Asian elephant or *Elephas maximus* Linn is an endangered species listed in Appendix I of CITES. World over it is estimated that there are about 48,000 Asian elephants in the wild. Scattered through thirteen countries, the wild elephant is nearly everywhere severely threatened by habitat destruction, poaching, and fragmentation into small, isolated groups. Many population biologists believe that nowhere in Asia is there a single wild population large enough to avoid inbreeding over the long term. In addition to elephants in wild there are about 16,000 domesticated elephants are kept in captivity in eleven different Asian countries and an estimate of 1000 elephants are kept in zoos all over the world.

## **Asian elephant**

The Asian elephant is smaller than the African Elephant. It has smaller ears, and typically, only the males have large external tusks. Indian elephants are lighter grey in colour, with depigmentation only on the ears and trunk. Males can weigh about 5000 kg and are herbivore. The elephant lives longer than any mammal other than man. The elephant has the longest mammalian gestation period, 21-22 months, and a very long reproductive span, with some cows calving even past sixty years.

Elephants live in a structured social order. The social lives of male and female elephants are very different. The females spend their entire lives in tightly knit family groups made up of mothers, daughters, sisters, and aunts. These groups are led by the eldest female, or matriarch. When a group gets too big, a few of the elder daughters will break off and form their own small group. They remain very aware of which local herds are relatives and which are not.

In contrast adult males, on the other hand, live mostly solitary lives. As the male elephant grows older gradually it leaves the herd and lives on its own or in bachelor herds. Males spend much more time than the females fighting for dominance with each other. During the breeding season, especially the battles can get extremely aggressive, and the occasional elephant is injured. During this season, known as musth, a male elephant will fight with almost any other male it encounters, and it will spend most of its time hovering around the female herds, trying to find a receptive mate.

## **Domestication of elephant**

Conventional wisdom has it that the Asian elephants were first domesticated 4,000 or more years ago by the Harappan culture at Mohenjo-Daro. Harappan seals which show elephants with ropes on them. Scholars content what this implies- since no seal or image shows a rider, the seals prove only that elephants were kept captive, not that they were trained or domesticated. The theory of the origin of domestication suggests that the ability to control a fierce or large animal was a challenge to, and proof of, the physical prowess of individuals in ancient human civilizations. In ancient India,

aristocratic elephant-keeping cultures arose across the subcontinent as mark of superiority. Elephants have been a part of Indian cultural motifs ó from Lord Ganesha to While elephant (Iravatham) of Lord Indira elephants have a role in the cultural fabric of India including Jain and Buddhist traditions in addition to Hinduism. This magnificent animal has been an integral part of Indian land and culture for millennia.

For thousands of years, elephants were used as war machines, labourers, and modes of transportation. Male elephant in his periodic condition of *musth* is dangerous and difficult to control. Therefore elephants used by humans have typically been female. Nonetheless as female elephants in battle will run from a male, only males could be used in war. It is more economical to capture wild young elephants and tame them than breeding them in captivity and hence often tamed elephants are used to capture wild elephants and tame them.

### **Threat to Asian elephant**

Asian elephants once extended from the Tigris Euphrates basin across southern Asia, from India to Indo-China and north to the Yangtze River and beyond. Today whole of Asia has a total population of just about 45,000 elephants. Wild Asian elephants are distributed in 13 Asian countries: India, Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, Thailand, Laos, Cambodia, Vietnam, China (only southern Yunnan), Malaysia (peninsular Malaysia and Sabah) and Indonesia (Sumatra and Kalimantan). With more than 28,000 elephants, India is home to about 60 percent of the world's Asian elephant population. Of these, the largest populations, totalling between 10,500 and 14,500 are found in southern India, primarily in the Western Ghats region. Wyanad-Mysore region alone has about 8000.

Large mammal like the elephant is by nature a long-ranging mammal. Although the elephant possesses a large stomach, it suffers from poor digestion. Hence, the elephant spends a large part of the day, nearly 18 hours, eating. It also defecates an equal number of times. This continuous eating helps it to gather the essential nutrients. A large appetite requires a large habitat! Studies show that the elephants travel over an area of up to 1000 square kilometres each year, thus indicating that the maintenance of large, contiguous tracts of forest and grassland habitat is important to ensure their long-term survival. Hence, the elephant is constantly on the move, looking for food and water resources.

Hence for its normal survival it needs large area to make up its habitat. As India's economy burgeons, more and more development projects, including roads, dams, canals, railways, mines, pipelines, agriculture and human settlements encroach upon forest area elephant habitat is getting shrunk. Rubbing salt to the injury, not only the area is getting sparse, it is getting fragmented. Habitat loss is the primary cause of species extinction. But fragmentation also has severe impact. "If you look at a map depicting wild Asian elephant distribution today, you'll see a shattered kingdom," says Dr. Raman Sukumar, an elephant scientist at Indian Inst of Sciences, Bengaluru. Fragmentation of elephant population into small, isolated groups makes it more and more not viable. Approximately 40 separate elephant populations currently live in India with few opportunities to intermingle, and thereby exchange genetic material. Inbreeding results and the elephants

are becoming genetically less vigour. Thus one of the major threat to the survival of the species is habitat loss due to fragmentation.

Loss of habitat and fragmentation also has resulted in elephants coming in conflict with farmers and local populace. For example, crop raiding is a major problem in areas abutting elephant territory. Farmers may be injured or killed by foraging elephants and can lose an entire year's provisions in a single night's raid. Further, about 200 people a year are killed by elephants on the move. A report prepared by the Assam State Forest Department reveals that altogether 452 persons were killed by wild elephants and many injured in Assam from 2001 to May 24, 2009.

Farmers resort to traditional methods of driving elephants from their fields, like creating noise through firecrackers and carrying flame torches. They erect illegal electric fences by tapping electricity from the main transmission lines, which kill crop-raiding elephants. Locals often retaliate by killing the 'problem' or rogue elephants, or even worse, injuring them badly. Injured elephants may become even more resentful of humans. Thus elephants, few left also come under intense pressure. Another threat to elephant survival derives from the illegal ivory trade. The demand for ivory in the international market has not declined even after numerous international legislations banning all domestic and international trade in ivory and ivory products. Southeast Asia and Europe are gobbling up ivory like no time in history. Although a major portion of this ivory comes from African elephants, a significant portion of Asian elephant ivory is traded-off as African ivory. Unlike the African elephants, only the males have tusks in the Asian elephants. Severe poaching of tuskers has skewed the sex ratio of the Asian elephants drastically in many parts of India in the last few decades.

Thus two significant issues that affect elephants today, other than poaching, are habitat fragmentation and elephant-human conflict that result in local antagonism towards the elephant and its conservation.

### **Managing the conflict**

Conserving the Asian elephant is primarily India's responsibility, as the population of the Asian species both in the wild and in captivity is concentrated in India. Mitigating human-elephant conflict is one of the major focuses of elephant conservation efforts. This is a challenging task, because crop raiding by elephants is certain to increase as crops like sugarcane, beets, banana, mango, jackfruit, coconut, cereals and millets are planted either in proximity to forests or in the migratory corridors of elephants. When the animals find a more attractive food variety in cultivated areas, it is a powerful lure. The result is crop raiding.

Many measures have been taken to protect and conserve Asian elephants. Anti poaching activity is undertaken by forest and wild life departments. But important problem remains : human-elephant conflict. Noise, elephant-proof trenches (EPT), 'chilli bombs' that release pungent smoke, electrified fences and capture or culling of rogue elephants has been tried with various levels of success. In some areas, elephant-scaring squads equipped with firearms, firecrackers, vehicles and kumkies (tamed elephants used to chase or capture wild elephants) are used to chase elephants away from the crop fields

and plantations. The idea of a mechanical steel fence using old railway tracks is also being given due consideration. Nevertheless they provide only short term solution.

A long-term plan will have to aim for reduction of human-elephant conflicts through a variety of measures. The solution will have to emerge from rigorous study and understanding of elephant biology and behaviour. Sustained policy support and the goodwill of people are equally important. Local population living on the fringes of the forest or along the path of elephant movement will have to be part of the solution.

### **Elephant conservation and population model**

Elephants are under immense pressure. Loss of habitat, poaching, revenge killing and many other human induced activities is decimating elephant population in the wild. It is indeed true that no species is strictly speaking has 100% probability of surviving over long time period. Nevertheless, common sense dictates that smaller the population size more vulnerable it is to extinction in the wild. Conservation effort therefore should not only be looking at curbing poaching and delimiting parks and reserves. They indeed are essential. However, if the population being conserved is small, over a period of time, naturally the species become extinct. Therefore it is necessary to model population and take steps to maintain viable populations.

Models of population of elephants indicate that effective population below 50 will continuously lose genetic variation. Identifying viable population then is a scientific question that needs answer for effective conservation. If the population is small the main issue is inbreeding and loss of genetic diversity that makes the species survive over long period. Viable population implies keeping inbreeding at less than 1% per generation. Mathematical modelling and simulations show that under a potential growth rate of 2%, a population of 25630 elephants would have a 99% probability of surviving for 100 years. It should be noted that effective population is not total population, but is the number of adult or reproductive individuals. However if the growth rate were potentially lower at 0.5% or stable, a population size of 65680 individuals was needed to ensure its survival with the same probability. These sizes are arrived at when the adult sex ratios begin at 1 male to 4 female elephants. With a skewing of the ratios to 1 : 8 or 1 : 16, which is more commonly observed at present in most southern Indian populations, the probabilities of extinction increase considerably. With a 1 : 16 ratio, for instance, a starting population of 150 elephants (at  $K = 150$ ) has only a 92% probability of surviving for 100 years. It is only when  $K$  is increased to about 250 that this population would have a 99% survival probability.

Further given the mating behaviour of elephants, male-female ratio also plays an important role. Poaching has skewed the male-female ratio among the Asian elephants. Observations at Periyar forest range during the 1950s and 1960s by naturalists indicated an abundance of large-tusked bulls. A survey in 1969 indicated an adult male-to-female ratio of about 1: 6, which changed to 1: 122 by 1987-1989. Another survey during 1994 showed this ratio to be 1: 101. In any case the adult males are vanishing. Selective poaching of adult elephants was rampant. Over the 20-year period (1974-1994), an estimated 3366388 tusker had been poached and 3,2566 3,334 kg of ivory harvested, with a large proportion of this coming from the 10- to 20-year-old age class. In a study

conducted in southern India between 1976-2000, it was found that while 41% of male elephants were killed by poachers it was just 4% for female elephants. Among the male elephant the natural causes accounted for 44%, 5% accident, 8% human-animal conflict, 41% poaching and 2% unknown; with regard to female elephant 72% were due to natural causes, 13% accident, 8% conflict 4% poaching and 3% unknown causes.

Lower adult male to female ratio will have two implications. Firstly it will result in single male siring many calves thus reducing the genetic variation in the population. Secondly as selectively tuskers are poached over a period of time the Asian elephant may have more tuskless adult male and the tusk size may get reduced. The ability of males to obtain mating was a function of the proportion of tusked or tuskless males in the population. It was assumed that tuskless bulls would fail to win fights against tusked bulls and thus fail to obtain matings when the proportion of tusked bulls is high. The frequency of matings by tuskless bulls would then increase with a decrease in the frequency of tusked bulls in the population.

In brief, populations of 1006300 individuals, depending on demography, sex ratio, and ecological pressures, is perhaps minimum viable size for the surviving relatively short term of one or two centuries.

### **Elephant corridors and modern science to rescue**

Humans and elephants can co-exist harmoniously in India only when there are set boundaries for both. Their respective landscapes are so intermeshed that the challenge of sustainable elephant conservation is becoming ever more complex. Establishing parks and reserves is one way of ensuring assigned and assured habitat for elephants. However as elephants get fragmented into these isolated patches they may inbreed and become unviable over a period of time. Thus a mechanism is required to connect the isolated patches. Indian wild life scientists have come up with a radical solution to the problem. Using modern technology such as GPS, satellite tracking, rigorous study of the movement of elephant herd and understanding the behavioural pattern of elephants they have offered solutions that mitigate human-elephant conflict and also provide viable habitat for elephants.

Fragmented habitats were studied and elephant movements patterns were recorded. From the GIS mapping and GPS tracking, scientists have found that if certain patches of land connecting two vegetative forest regions are connected then elephant may hardly come into conflict with human settlements nearby. Called elephant corridors these identified and selected patches conserve fragments and link to other fragments and/or protected areas, assist with several issues that are critical to conserving any wildlife population. More connectivity means that animals can migrate, which ensures genetic movement among groups of animals that in turn lessens inbreeding. By interconnecting isolated herds effective population size could be increased thus making it more viable in the long run. Corridors provide wildlife access to former isolated food sources, which ensures more viable populations in the long term. Protected pathways between forests fragments can help decrease the number of human-animal conflicts that often prove fatal for one or both species.

Effective corridors require an extensive understanding of the local ecosystems, a keen understanding of local socio-economic factors and the biology of elephants. An elephant corridor lies along the traditional routes that elephants follow and allows the elephants to move safely between protected areas. A novel solution to crop raid by elephants is to radio collar them. Using modern technology such as radio collar and GPS wild life scientists such as Raman Sukumar have studied the movement and migration pattern of elephant herds. Through mapping their movements and identifying routes, elephant corridors have been charted. Elephant corridors are a step towards stopping further population fragmentation. Usually the notorious crop raiding elephants are fitted with transmitters and through GPS their precise movements are tracked in near real time. The data is retrieved regularly through the satellite system, and used to set up an early warning system that alerts both the forest department and villagers. Villagers take preventative measures to avoid crop raid by rough elephant.

Elephant conservation is paying off, and even a solution to increasing man-elephant conflicts is on the horizon. Its population, decimated to a low of 15,627 in 1985, had at last count in 2002 grown to 26,413, thanks to conservation efforts.

-----