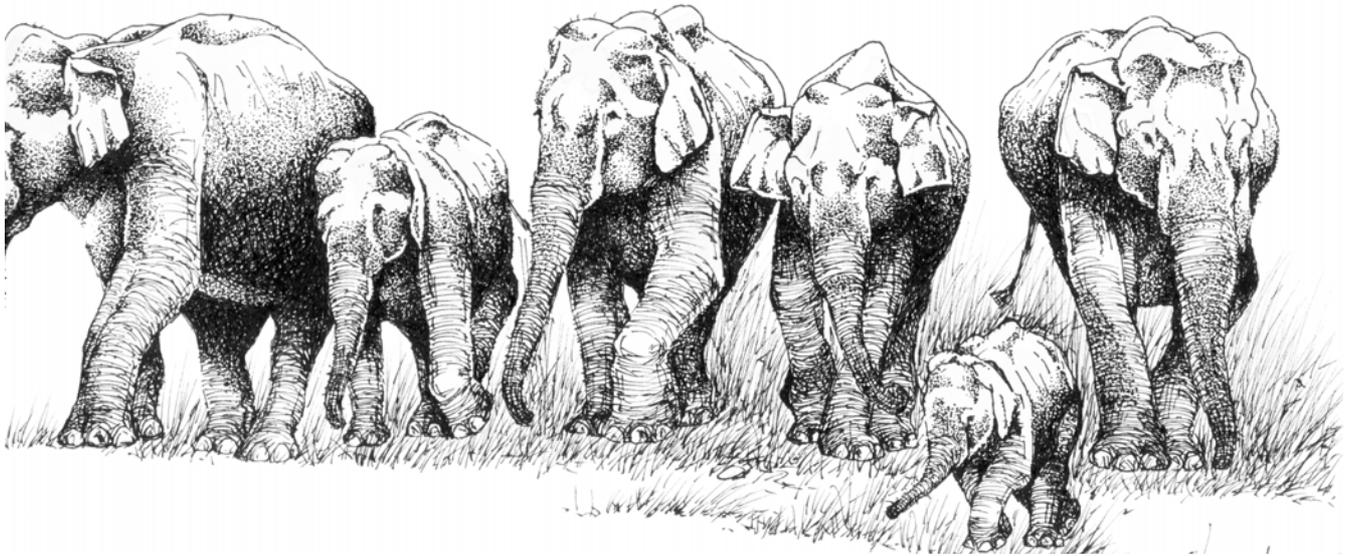


Die hard: Asian Elephant life in south India

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First read and enjoy the following vivid and unforgettable description on the activities of a male Asian elephant (*Elephas maximus* Linn.) in its hilly habitat by the venteran Sangam poet Kapilar of ancient Tamilnadu, nearly 2000 years ago. This verse is (No. 332) included in an anthology of delicate love poems, *Aganankuru*, one of the popular ancient Sangam literature:

*"There, a tusker of shining hue
Breaks the bamboo clusters
Whence germinate shoots,
And grazes in the company of its herd;
It encounters a fighting tiger and kills it;
It is the tiger that beheld it
Near the ford of potable water
After killing the tiger, it gets
Its blood stained and sharp tusk cleansed
It a heavy downpour
And walk slowly over a hill, full of boulders
A swarm of bees follow it humming sweetly
Like a melody of yal
Walking with pride that bespeaks
The victory over its wrathful enemy
It joins its loving mate
And then slumbers on the mountain
Dotted with banana trees"*

Now read the following blood-stained press news and compare it with previous one: "three wild elephants were killed after being hit by a train between Podanur and Madukkarai stations at Coimbatore, Tamil Nadu. A herd of four wild elephants were attempted to cross the track. A thirty year old adult male, an adult female pregnant with a male fetus and an eight year old calf were killed, while a female elephant escaped unhurt. The eighteen month old fetus got aborted (*The New Indian Express*, February 5, 2008)". It is obvious and understandable that Asian elephants in south India are not living the happiest life as sketched by Kapilar in his poem. They live hard and die hard in the sanctuaries and elephant reserves (ER) of South India particularly in Tamil Nadu.

Asian elephants are zoogeographically restricted to south-east Asia. In India, they live in the forest habitats of northwest, northeast, central and south India. In south India, they are inhabitants in ER of Western and Eastern Ghats in four states viz., Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. More detailed information on population status, ecological history and geographic distribution of Asian elephants in India are given in the many authoritative works of Sukumar (1985; 1986; 1989; 2003). Of these, populations of elephants living in Tamil Nadu appear to be cursed in their present status of life in terms of interactions with man and their outcomes in favour of man. The interaction between elephants and man was wrongly phrased as "human-elephant conflict" in mammological literature in the past. The term conflict is entirely misused only to blame the innocent animal. Actually it is a negative type of inter-specific interaction in which human beings are always benefited by projecting elephants as potential threats for human existence in and around the corridor-edge villages of ER.

In fact it is we human beings who degraded the ER and extend the villages as "semi-cities" towards the edges of the corridors of ER, but we ironically blame the innocent animal as intruder into our habitats. Men as a superior primate develop conflicts with not only elephants, but with whole nature for their hi-tech life. Most of the present day ecological menaces to elephants in southern Indian ER have been seeded and developed in the past within these protected areas as anthropogenic disturbances.

For instance, hydroelectric projects and canals (Nelliampathies – Anamalai-Palani hills) extensive teak plantation (north Wyanad-Nagercoil), railway tracks and high ways (Agasthiyamalai-Ashampur hills) and private estates (Periyar-Elamalai- Varusanadu hills) are some of the examples. More details on such anthropogenic disturbance

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to elephants within the ER of south India are given in Sukumar (1986). The most prominent and deliberate misbehaviors of human beings against elephants in south India are:

- Encroachment of habitat patches located in the core and corridor zones of the ER
- Establishment of the obstacles (human settlements, agro-ecosystems, plantations, deep wells, factories and other institutions) in their traditional migratory routes or home range
- Evoking aggressive behaviors by indiscriminately using fire crackers, search light and depredation squad
- Developmental activities of hydroelectric power stations, dams and estates inside the core areas of ER
- Physical modification of natural landscape by plantations and transport facilities in and around ER
- Unauthorized entry into the ER for antisocial activities and for exploitation of minor forest products
- Continuous agricultural activities with edible crops along the corridor zone of the ER
- Misuse of electric fencing deliberately to kill elephants by applying high voltage current
- Spreading rumors and false sensational news about the intruded herds
- Projecting elephants as dangerous animals by describing their activities in inappropriate terms, especially mass media like press and television
- "Autonomous control" measures by local people without informing to forest officials at site of intrusion
- Overexploitation of major food resources (bamboo and cane) of elephants
- Deforestation inside the core areas of ER and creation of forest gaps
- Poaching males for ivory and creation of imbalance in sex ratio

We made a net-survey of a selected Tamil daily, *Dinamalar* to ascertain the major anthropogenic as well as unfamiliar threats that were experienced by intruded herds of elephants within the human habitats especially in Tamilnadu in the recent past as well as human reactions towards such intruded herds.

Information pooled from the press news confirmed a sad fact that wild elephants suffered extremely in many dimensions after intrusion. They are not treated with mercy and "evolutionary maturity" by human beings at the site of intrusion. They are not enjoying the human habitats and resources by troubling humans as projected by mass media and claimed by public. They suffered in a variety of ways within human territories, which are not ecologically identical to that of their forest habitats. Sadly in many occasions, these innocent giants scarifies their life just for water and piece meal foods. These events equally show the inhumanity towards elephants in Tamil Nadu. Our dependency on press reports to collect the desired information is mainly due to lack of adequate scientific data on elephant – man interactions in south India for the recent past. Few earlier reports (Sukumar, 1985; 1986; 1989; 1990; 2003) need new outlook in relation to current complications in this problem. A few reports focused on spatial distribution and habitat usages by Asian elephants in selected ER of Western Ghats in Tamil Nadu (Varma, 2008; Varman *et.al.*, 1995). However, adequate scientific information available for elephant species lives in the

continents other than Asia with reference to their interaction with man (Thouless & Sakwa, 1993; Thouless, 1994; Barnes *et.al.*, 1995; Helman-Smith *et.al.*, 1995; Hoare, 1995; Kangwana, 1995; Kiira, 1995; Nigure, 1995; Tchamba, 1995; Barnes, 1996; Hoare, 1999). The most common activities of elephants in the human habitats after intrusion are: (all news from *Dinamalar* and dates are given in parenthesis).

- Raiding, competitive exploitation and destruction of economic crops in agroecosystems (21.2.08)
- Free roaming in the interior areas of human habitats, agro-ecosystems and plantations (28.2.08; 21.8.08)
- Intra-herd conflicts and fights and expression of aggressive behaviours
- Bathing, playing and drinking water at dangerous sites of dams in core areas of ER (4.3.08)
- Disturbances to traffic by blocking roads in highways crossing the ER
- Under tensed conditions in unfamiliar habitats, chasing and threatening the local inhabitants and travelers of highways (8.3.08)
- Falling into the deep wells dug out in agroecosystems while straying into the habitats or drinking water (9.3.08)
- Missing the mothers by calves while the herd roaming or escaping into the forest (19.3.08)
- Self damage and death of elephants near Erode and Mudumalai (25.05.2009, 11.06.2009)
- Crop raiding and intrusion for water in Srivilliputhur (31.05.2009)
- Death after hitting electric fence when chased by the local people (18.06.2009)
- Intrusion in the plantation by herds after breaking electric fence (29.06.2009)
- Death due to electric shot while attempting to cross the electric fence at Coimbatore (14.07.2009)
- Death after hitting by train at Coimbatore (17.07.2009)
- Killing a forest official while mass chasing at Krishnagiri (19.07.2009).

Death of wild elephants within the human habitats or corridor zone of the ER occurred in the following ways in the recent past. These tragic events may reoccur in future, if we fail to implement some strong measures in favour of elephants:

- By accidents while crossing the railway tracts within the core and corridor zones of the ER (8.5.08)
- By physical contact with illegally setup high voltage electric fence around the agro-ecosystems (2.2.08)
- By starvation and dehydration while intruding long distance into the human habitats without timely food and water
- By burial in the muddy sand at dam sites while visiting for water (5.3.08)
- By poaching activities of antisocial elements within human habitats
- By falling into the deep wells of agro-ecosystems or plantations
- Becomes handicapped by self damage to body parts; death at the site after medical treatment

Beyond a threshold limit of tolerance, they become desperate and kill human beings incidentally or accidentally. For instance, 44 persons were killed in Coimbatore district of Tamil Nadu alone by wild elephants from 2001–2008

(5.2.08). Many more unique problems and ways of death may arise in future with the increasing intensity of habitat encroachment, urbanization, extension of agriculture towards ER, deforestation, fragmentation of ER and other intensive land use changes associated with rural developments around ER. The most sensitive areas that could be more physically modified are the corridor zones between developing villages and degraded ER. Thus there is a clear-cut indication of mounting anthropogenic pressure on this vanishing elephant in south India. We willingly forced the elephants to adopt a violent life style "intrude and exist". In a classical and pioneer report an ecological problem of elephants and their links with human beings, Sukumar (1986) made some major conclusions:

- There are significant and long term anthropogenic disturbances to elephants in and around the ER of south India
- Their seasonal movement patterns is mainly to optimize the diet and obtain water
- They require relatively large home range (100-500 km²)
- ER in south India need a proper assessment of their carrying capacity (number of elephants/ km²)
- Reduction in forest habitat areas increased the crop raiding incidents

At present measures are being implemented to prevent elephants entries into the human areas without raising any question regarding what we did loyally for their life at core areas of the ER. Our present status of knowledge on ecological constrains to them inside the ER surely appears to be inadequate and this area remains as under-researched one by elephant ecologists. Thus the following measures should be taken to restore the ideal ecological conditions at least to certain extent in the core areas of ER.

- Restoration of most preferred food resources amidst the core zones of degraded ER
- Initiation of such a restoration (especially browsing shrubs) before monsoon to ensure a considerable food stock during dry summer; in latter season grasses become unpalatable while browses retain a higher protein level than grasses (Sukumar, 1986)
- Speed control regulation in highways and railway tracks those criss-crossing the core or corridor of the ER
- Exploration of their new migratory routes either to preciously driven them back into the forest or to prevent their entry into the human habitat
- Identification of major fragments of elephant habitats within the ER and bridging them by intensive, long term afforestation programmes
- Researches on status and ecological constraints of elephants population trapped at present in such fragmented habitats
- Taxonomic studies on alternative food plants used by elephants during dry season or at degraded zones of ER
- Avoiding construction of any more infrastructure or roads in the core areas of the ER
- If possible, abandoning the use of highways trespassing the core zones of ER and construction of bye-pass roads along the corridor zone
- Experimental translocation studies of a considerable number elephants (with care on sex ratio) from degraded habitats to healthy habitats
- Desilting or removal of mud from the dam sites where they usually visit for drinking water, bathing and playing

- Vacating families of forest and hydro-electric power station officials from quarters area by allowing only the workers to stay inside the ER
- Banning the forest entry by local inhabitants during dry seasons (like banning the fishing during spawning season marine ecosystem) to avoid unwanted encounters with elephants and loss of life
- Physical engineering of perennial rivers and streams inside the ER in order to suit them for safety visit of elephants
- Control of invasive weeds which suppress the growth of indigenous diet plants and grasses
- Control of forest fire to prevent ecological dominance of unpalatable tree species which are resistance to fire (Sukumar, 1986)

The following aspects with reference to design of ER need attentions which actually we failed to do in the past:

- Maintenance of a "biological boundary" along the edges of the ER rather than "legal boundary"; the former controls biological and physical processes for ecological functions of the ER (Schonewald Cox & Baylees, 1986)
- Maintenance of a minimum dynamic area with only natural disturbances to postpone the biological extinction of the elephants
- Maintenance of the heterogeneity within the ER in terms of internal habitat patches as created by natural disturbances and ecological process (Pickett & Thompson, 1978). ; optimum environment for elephants is one with a diversity of habitat types (Sukumar, 1986)
- Expanding the core zone of ER as maximum as possible; since small reserve faster the rate of extinction particularly in large mammals (Beloesky, 1987; Newmark, 1987). Asian elephants require relatively large home range area (Sukumar, 1986)
- A proper Population Viability Analysis (PVA) to determine the minimum viable population in different south Indian ER (Shaffer, 1990; Boyce, 1992).

At the site of intrusion the local community, mass media and forest officials need more patient, positive approach and matured behaviours as human beings rather than negative behaviours towards elephants. In fact these innocent animals are treated by intellectual human beings most cruelly at the site of intrusion in almost all occasions. Some of the easily practicable measures to treat them with mercy are:

- Supply of excess fodder and browse together with water to calm their nerves and tensed behaviours in new habitat as well as to prevent further intrusion (5.4.08)
- Avoidance of any kind of immediate violent measures (bursting crackers, fire works, depredation squad) to driven them back into the ER; bursting of fire crackers is an useless measure (Sukumar, 1986)
- A short term behavioural study immediately by experts to guess their intentions and next course actions
- Prohibition of entry of local inhabitants as well as media people into the site of intrusion to avoid induction of violent behaviours by negative human behaviours
- Taking more care of males and calves; males already reduced in numbers in many ER
- Capturing and translocation into the forest after tranquilizing them in case of extremely aggressive behaviours or life threatening activities

- Prevention of spreading sensational news about intruded herds by mass media

We used the term corridor to refer not only the border between human habitats and ER but also the interior areas of human habitats in villages adjacent to ER, up to which wild elephants intrude. The following measures are useful to treat the intruded herds at corridors:

- Identifying and mapping the man-made dangers (electric fence, deep wells, lakes, ponds, chemical or heavy machinery industries, weak bridges, unprotected railway gates etc.) around the sites of intrusion to protect them from death or damage while they enter as well as return to ER; such assessment must be made for the entire corridor zones of ER
- Physical removal of above stated dangers if possible legally
- Identifying their new migratory routes in highly or partly degraded corridors
- Legal recovery of forest lands occupied by the local communities at corridors by suitable legislation
- Regular inspection and legal action against illegal high voltage electric fencing which often kill the young ones, aged elephants
- Dislodgment of peoples who live in the areas more inside the ER than corridors
- Establishment of drinking water sources at corridors to prevent further intrusion towards human water sources
- Establishment of water storage systems (ponds and lakes) with local manpower to save the rain water, which could be shared by both man and elephants in summer
- Selection of earlier maturing variety of crops and well planned "mass harvest" along the entire corridors of ER to discourage crop raiding

Strictly speaking, we must take some socially disruptive measures in favour of elephants in this problem instead of costly and futile measures (trenches and electrical fencing). These measures have to be enforced legally with strong political will to achieve the desired goals. They should not be left as "paper laws" as in many in earlier acts concerned with protection of forest and wildlife.

- Removal of all man-made obstacles along the traditional migratory pathways at corridors of the ER
- Removal of all encroachments (houses and agro-ecosystems) at corridor of the ER
- Acquisition of agricultural lands located at the edges of ER with due compensation to expand the home range of elephants
- Introduction of "repellent cropping"(opposite to "trap cropping" in insect pest control) in conflict prone areas in which crops least preferred by elephants could be cultivated
- Establishment of drinking water resources at corridors of ER to prevent intrusion for water by ensuring water supply from projects established for local communities
- Construction of high and strong walls around the deep wells in plantations to prevent falling of elephants into them
- Inclusion of more forest department officials to monitor the movement of herds particularly in conflict prone areas of ER

It is well known that biodiversity conservation and *in-situ* management indispensably need cooperation and definite social roles from local ecosystem inhabitants. Therefore certain community based measures are possible and fruitful in this problem. For instance, a clan of people, the *Bishnoi* prevent the hunting and protect the wildlife in forest based villages of Rajasthan particularly the Black buck, *Antelope cervicapra* (Prakash & Ghosh, 1980). The local community can ecologically coexist with elephants if they realize the ecological problems of elephants. Hoare and Toit (1999) investigated the relationship between observed density of African elephants and human population density in African savannas in Zimbabwe. The results did not fit a linear regression model. It has been showed that the coexistence of elephant and man at various levels of human density, up to a threshold of human density beyond which elephants disappear. This threshold appears to be related to a particular stage in the process of transforming natural forest of elephants into agricultural lands. These measures are essential:

- Acquisition of agricultural lands along the corridors of ER to expand the core zone
- Prevention of further transformation of forest into agricultural lands
- Selection and planting of perennial crops for agriculture instead of annual crops, the latter are more attractive to elephants
- Community education by extension programmes, mass medias and others to local people to deal the elephant problems properly
- Intensive afforestation programmes with economic incentives to local communities to green the degraded ER and boundaries
- Augmenting local, frequent "forest visitors" to monitor and inform the suspicious movements of herds towards corridor zone during dry seasons; earlier use of satellite telemetry to monitor the movement patterns of Asian elephants has been suggested²⁷
- Selection of "para-ecologists" from local community (similar to para-taxonomists in biodiversity research) to collect basic information like population structure, food preferences etc.
- Establishing professional links between forest officials and local inhabitants in periodical survey and other conservation plans
- Celebration of "man – elephant day" like *Vanamahostva* to strengthen the mutualistic interactions between man and elephant
- Organization of "voluntary food supply service" (fodder and browse) during dry season in the core areas of the ER where, we encounter them most commonly (similar to food donation to bonnet monkeys during summer in Kutralam, 28.3.09)

We need fine ecological data to solve the complex ecological problems of elephants for instance Rode *et al.* (2006) studied the nutritional ecology of forest elephants in Kibale National Park, Uganda, relative to crop raiding behaviour. They critically examined the nutritional differences between crops and wild diets consumed by elephants. The data revealed an important crux of the problem that the wild diets had very low concentration of sodium when compared to crops. This nutritional factor is responsible for crop raiding behaviour and changes in habitat use by wild elephants. Sukumar (1990) also

interpreted the crop raiding behaviour of Asian elephants in south India as an extension of its optimal foraging strategy for crops (cereals and millets) rich in protein, calcium and sodium which are relatively low in wild grasses. We need the following information on wild diets of Asian elephants:

- Biochemical profiles of common wild diets in relation to phenology of plants and seasons
- Taxonomic composition of diets in the degraded ER with data on their nutrients
- Identification of "compensatory diet" (means diets with required nutrients and compensate the most preferred diets) in the core zones of the ER
- Complete such biochemical data for plant diets in moist and dry deciduous forest habitats where elephants attain maximum population density (Sukumar, 1986)
- Analysis of variation in food preference in relation to forest types (evergreen, semi evergreen, moist and dry deciduous)

In conclusion man's inhumanity towards Asian elephant has been more and more pronounced in recent times in TN compared to human/elephant interactions in ER of Kerala and Karnataka. Asian elephants are now fighting a losing battle with man for existence in their natural forest habitats. We should not play ducks and drakes with the survival of elephants. Conservation and management of elephants under *in-situ* conditions in south Indian ER appears to be an acid test for the research potential of conservation biologists and elephant ecologists of India. Healthy, vibrant, sensitive and honest forest department officials can do wonders in this problem. A team of elephant ecologists, local community, NGOs and forest department officials, who are integrated well in both thoughts and actions is essential for fruitful outcome. In the recent past, considerable information on large mammals – man conflicts and many solutions for problem arising from them (Sillero-Zubiri, *et al.*, 2007). However even though our suggestions appear to be elementary in nature but will be surely effective than any costly measures, if practiced properly in local elephant related issues.

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