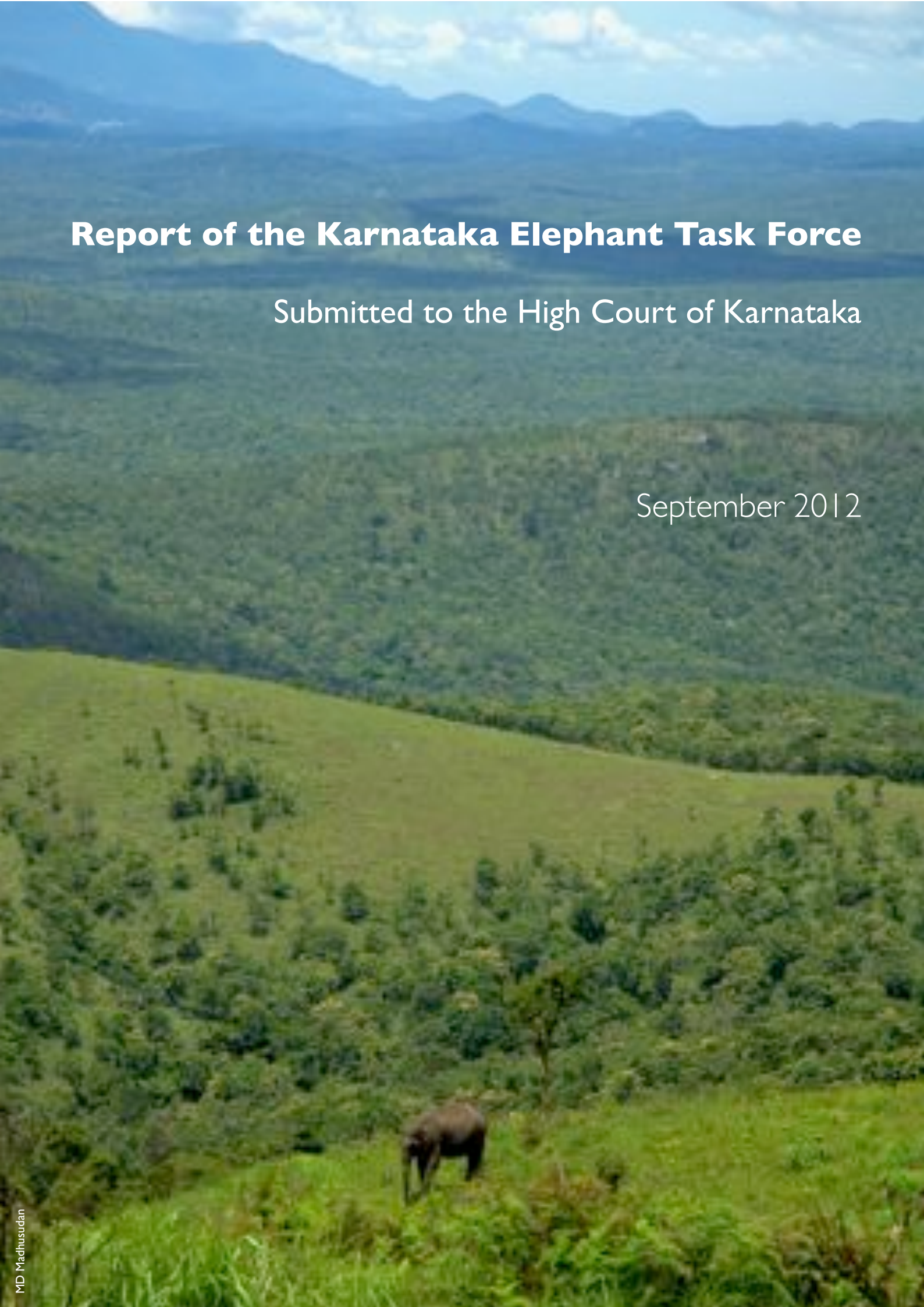
Report of the Karnataka Elephant Task Force

Submitted to the High Court of Karnataka

September 2012



MD Madhusudan

REPORT OF THE KARNATAKA ELEPHANT TASK FORCE

Submitted to Honourable High Court of Karnataka,

September 2012

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Terms of Reference of the Karnataka Elephant Task Force and Measures Recommended

1. **To look into the entire gamut of issues related to human-elephant conflict in Karnataka with special reference to Hassan-Kodagu area and make recommendations to bring about a more effective conservation and management regime for the species and habitat in Karnataka with due focus on participation of local communities.**

Recommendations: The KETF has examined this issue of elephant-human conflict comprehensively, and has made several specific recommendations throughout the report for more effective conservation and management of the elephant and its habitat in Karnataka.	*References*: Entire report but especially Para 7 on page 17, and in Chapter 3.

2. **To study the composition of the elephant population in Kattepura area and its movement pattern.**

Recommendations: A three-week survey during May 2012 conducted in the Alur-Arkalgud-Kattepura area of Hassan and Kodagu districts revealed a minimum population of 26 elephants (25 elephant observed included 6 adult males, 8 adult females, 1 sub-adult male, 3 sub-adult females, and 7 juveniles or calves of varying ages) across this region[1]. The only reliable information on movement patterns comes from the study of a radio-collared bull elephant that has ranged over an area of 30,000 hectares in this region. The indications are that this (sub)population of 26 elephants also moves across this area.	*References*: Para 8 on page 19, and Chapter 3, Section 3.5.4.on page 73

3. **To examine and report on feasibility of providing a proper corridor and/or a habitat, if need be, by acquiring private lands/securing back the unauthorisedly occupied/encroached lands within and on the periphery of forest lands.**

Recommendations: KETF examined in detail the need and feasibility of providing a corridor for elephants though acquisition of private lands in the Hassan district. It concluded that there was no evidence for movement of elephants across the western (Sakaleshpur) and eastern (Alur-Arkalgud) parts of the district but rather that the two populations are separate. Thus a corridor would be superfluous. In any case, the extent of land required would run into tens of thousands of hectares of private land that would not be a feasible or a desired exercise for acquisition, especially when conservation gains would be negligible given the small numbers of elephants involved and the enormous costs.	*References*: Para 9 on page 19, and Chapter 3, Section 3.5.3.on page 60

4. **To consider the need, expediency or feasibility of translocation of elephants or the local inhabitants from the concerned habitats.**

Recommendations: After careful deliberations, the majority of KETF members, including the Chairman, came to the conclusion	*References*: Para 8 on page 19,

[1]Srinivasaiah, NM & Sinha, A. 2012. *Elephant Refugees*. Unpublished Report, National Institute of Advanced Studies, Bangalore.

that there is no other option but to capture and remove the (sub)population of about 26 elephants in the Alur-Arkalgud region because of very high levels of conflict with people. The next question was about what to do with the captured elephants. KETF felt that translocating these to another forest area in Karnataka came with the distinct risk of transferring the problem of conflict to another area, as also the risk of these elephants returning to their original place of capture. The best option therefore was to retain these elephants in captivity for use by the forest department.

Four members (B.R. Deepak, N.H. Kamath, V.V. Angadi and C.H. Basappanavar) expressed a dissenting opinion as follows: "We reiterate that in Hassan District Alur & Arkalgud area human beings (*sic*) should be re-settled in suggested areas."

and Chapter 3, Section 3.5.4.on page 73; but also see Appendix A on page 125 and Appendix B on page 127.

5. To examine and report on the present status/steps taken by Forest Authorities in respect of electric fencing, trenching and/or such other corridor formation, if any, within and outside the forest in Hassan-Kodagu area and where such steps are ill-advised/or improperly implemented, and thereby have contributed to increase in elephants and human conflict.

Recommendations: KETF visited several places in the state where the forest department have erected barriers such as electric fences and elephant-proof trenches. It was entirely satisfied with the recent effort by the department in creating and maintaining barriers, through the Eco-development Committees, along the boundary of Bandipur Tiger Reserve. At other places such as Kodagu the work was in progress and it was too early to make a firm judgment. While we have made more detailed recommendations in the report, KETF also felt that an audit of the effectiveness of functioning of the barriers can only be judged after a period of time, say about 5 years. KETF did not come across any recent instance where the creation of such barriers has contributed to increase in elephant-human conflicts.

References: Para 7 on page 17, and Chapter 3, Section 3.5.1 on page 54 as well as Appendix C on page 129.

6. Examine and report on achievements made/present status of/implementation of short and long-term comprehensive action plan submitted to this Honourable Court.

Recommendations: KETF was overall satisfied with several of the measures undertaken recently by the forest department in implementing short term and long-term comprehensive action plan. Specific observations on some aspects of this implementation have been given in the report.

References: Across entire report, but especially in Appendix C on page 129

7. To consider any other relevant issue.

Recommendations: KETF considered the issue of welfare of elephants in captivity in the state and has made several recommendations for the same. It also addressed several issues relating to administration, tourism and research pertaining to more effective management of the elephant population and its habitat.

References: Paras1-6 & 9-16, and Chapters 4, 5 & 6.

Executive Summary and Key Recommendations

Elephants and people have enjoyed a close cultural association in Karnataka since historical times. The presence of the wild animal in this state is mentioned in ancient texts and the captive animal depicted in temple sculpture and art. The challenge in Karnataka is therefore to promote the conservation of wild and captive elephants in the context of this strong cultural ethos.

Karnataka presently harbours about 5,300-6,200 wild elephants over an area of 14,500 sq. km, according to the 2010 census, or about one-fifth of the elephant population of the country. This population is almost entirely concentrated in the southern part of the State, within the Mysore Elephant Reserve spread over 6,463 sq. km. As such this population fulfils the ecological conditions of a viable population for long-term conservation. There is a small population of elephants in northern Karnataka that has not been studied and its current conservation status is not clear. Smaller populations or solitary bulls, some of which have dispersed from the major habitats, are also found in the state; the population and habitat viability and the conservation potential of such groups is questionable from an ecological angle. Overall, data from past censuses from 1983 onwards and demography (birth rates and death rates) indicate either a stable or a growing population of elephants in the state. Additionally, about 159 elephants are in captive situations in forest camps, zoos, temples, circuses and private ownership in the state.

Elephants and their habitats in Karnataka mirror the overall elephant situation in the country, with an entire spectrum from a large viable population ranging over an extensive integral landscape to small, scattered groups in human-dominated areas that are in serious conflict with people. The conservation and management of elephants in Karnataka thus calls for a variety of strategies and responses, depending on the regional situation.

Elephant-human conflicts in terms of elephant depredation of cultivated crops, damage to property and loss of human lives have become a major challenge to effective conservation in several regions of the state. The ecological basis of such conflicts is rooted in a set of complex factors including loss, fragmentation and degradation of the natural habitat, regional changes in land-use pattern, attraction from the superior palatability and nutritional properties of cultivated plants as compared to the natural forage of the elephant, social organization of the elephant with adult males generally becoming more persistent raiders, and adverse climatic events such as droughts causing elephant groups to disperse from their native habitats.

The loss of human lives (averaging 25-30 people annually in recent years) and permanent disability in such conflicts is an especially serious problem for people. In addition, elephants impose significant economic losses upon tens of thousands of people across hundreds of villages across Karnataka. This conflict has triggered deep animosity towards elephants and undermines any lasting conservation effort.

Given the wide range of ecological and social settings that underlie conflict, the measures to mitigate elephant-human conflicts must necessarily be diverse. This means that management of elephant-human conflict must include varied options, ranging from

preventive measures such as the installation of physical barriers like fences and trenches, to *post-facto* measures such as payment of *ex gratia* that alleviate loss. Harsh though it may seem, in extreme situations, steps such as the removal of elephants, too, will have to be considered.

The two overarching goals of elephant conservation in Karnataka should thus be to ensure the long-term survival of viable populations of elephants living in viable habitats, as well as substantially reduce the levels of conflict between elephants and people so as to relieve human suffering and promote greater acceptance and tolerance of elephants.

The Karnataka Elephant Task Force has thus taken a **zone-based approach**, combining science and pragmatism, to making recommendations for the management of elephants in the state with a view to conserving the species in the long-term as well as substantially reducing the levels of elephant-human conflicts. It addresses these goals by outlining a framework for protection of elephants and their habitats, mitigation of elephant-human conflicts, strengthening of administrative structures and institutions, participation of local communities in planning and management, ensuring the welfare of captive elephants, and scientific monitoring of elephants and conservation schemes.

Three zones are proposed for this purpose, each with a different set of conservation objectives and goals:

Elephant Conservation Zone: This would encompass the landscape/s of the larger and more viable population/s of wild elephants, with emphasis on maintaining habitat integrity through protection of existing corridors, and mitigation of elephant-human conflicts through containment of elephants within this natural range using barriers such as high-voltage, non-lethal electric fences, elephant-proof trenches and other means. This zone could also include a certain number of human settlements within, depending on how the boundaries of the zone are drawn. The contiguous Bandipur-Nagarahole region is one most obvious example of the Conservation Zone for Karnataka, while a number of other forest areas would also qualify for this zonation.

Elephant-human Co-existence Zone: Intermediate zones between the larger, integral habitats and small, fragmented forest patches would be regions for implementing the co-existence model through negotiated sharing of space between elephants and people. While the precise areas of this zone would have to be defined through better field surveys, the forests north of the River Cauvery up to Gangavara Reserve Forest in Kodagu district as well as the forests of western Sakaleshpur *taluk* in Hassan district could be part of this zone. Future management of this zone, and its reclassification if needed, would depend on the success or otherwise in implementing the co-existence model.

Elephant Removal Zone: These would be regions where elephants would have to be captured from small, isolated patches of forests or human-dominated areas with unacceptably high levels of elephant-human conflicts, and/or the viability of the elephant groups in serious doubt. The Alur-Arkalgud *taluks* and the Savandurga region of Tumkur district clearly fall in this category at present.

Against this background, the KETF makes the following **key recommendations** after holding nine meetings and making three field visits:

1. Establish a Karnataka Elephant Expert Group, within the State Wildlife Board, with a broad mandate to plan, advise, and assist in elephant conservation and management in the state.

Suggested broad terms of reference for this Group include the following:

1.1. *Composition*: This Group must include ecologists/wildlife biologists and social scientists who can bring in sound knowledge of elephant ecology and human society needed to assist the Chief Wildlife Warden in this complex exercise.

1.2. *Planning Phase*: In the planning phase (say, two years), the Group shall undertake a rigorous effort to compile (and, where needed, generate) data on elephant ecology and behaviour, land use and land cover, and socioeconomic factors among others, and map them on to forest administrative boundary maps to propose a zonation of elephant's range across Karnataka into *Conservation*, *Coexistence* and *Removal Zones*. Further, they shall propose a Karnataka Elephant Conservation and Management Plan comprising detailed zone- and site-specific strategies, as well as crosscutting state-wide strategies to enable elephant conservation at the level of Forest Divisions. The Group should develop clear guidelines on the management of each zone (including the corrective action to be taken for measures that are not yielding the expected results), which should become the basis for the management approach to be taken by KFD. In doing this, we urge the Group to also take into account the action plan and recommendations of the first Task Force set up in 1990 by Government of India to prepare the blueprint for Project Elephant at the national level, as well as the Elephant Task Force in its 2010 report, *Gajah*. The Group must also make recommendations on relevant legal and financial mechanisms needed at the State level to implement the Plan.

1.3. *Implementation Phase*: After the planning phase, we recommend that the State Government create the necessary mechanisms and allocate financial resources to support the implementation of this Plan. In the first phase of implementation (say, three years following the planning phase), the Group shall itself provide guidance and, where necessary, also help the process of implementing the Plan.

1.4. *Review and Course Corrections*: We recommend that detailed annual reviews of implementation are held at the field- and state-level. Further, the Plan itself must be subject to five-yearly technical reviews, and revised as appropriate. The entire planning and implementation must involve public processes, and at the end of the fifth year, be subject to both open expert reviews, as well as public audits of process and outcome.

2. Loss and fragmentation of elephant habitats due to ill-planned commercial infrastructure projects and natural resource extraction

In the course of its field visits, the KETF encountered many instances of mini-hydel projects at various stages of creation and operation such as in Sakaleshpur and Malavalli *taluks*, as well as quarrying operations in and around key elephant habitats. In our considered view, if the location of such projects is ill-advised, and the highest diligence is not exercised in ensuring their compliance with existing laws and regulatory processes, they can pose serious threats to elephants and the integrity of their habitats. In view of this, we recommend that:

2.1. An immediate, time-bound review of clearances granted or pending in areas lying within the distribution range of the elephant in Karnataka be undertaken. Where such clearances are found to be granted *prima facie* without full compliance with the letter and spirit of all applicable laws, statutes and court rulings, they must be withdrawn immediately and such projects cancelled forthwith. The State Government may be directed to file a report on the action taken in this regard to the Honourable High Court within a stipulated time.

2.2. The State Government be directed to prosecute officials who have *prima facie* misrepresented facts about presence of elephants and other wildlife while recommending project proposals, thereby undermining laws and regulatory processes established to ensure ecologically-responsible development.

2.3. The Honourable High Court direct the State and Union Governments that, with immediate effect, all proposals for diversion of forest lands (as defined under WP (Civil) No. 202 of 1995 of the Supreme Court) in the elephant's range in Karnataka be compulsorily referred to the State's Chief Wildlife Warden for assessment of potential impact, if any, on elephants and other wildlife. This is currently not the practice.

3. Legal consolidation of elephant habitats

3.1. A process of reconciling land records of the Forest and Revenue Department is long overdue in the State. In the absence of this large and very important measure, it is neither possible to effectively enforce conservation laws, especially against encroachments, for the benefit of elephants or other wildlife, nor is it possible to pursue development programmes for people without impediments at every stage. We therefore recommend that a high-level effort be taken up by the State Government in this direction.

3.2. Meanwhile, where existing parts of the elephant range currently extend outside notified forest areas, we recommend that a process of elevating the legal status of such lands that qualify as 'deemed forests' should be taken up in a manner that is consistent with law and reason. Currently available options include the notification of such areas as Reserved, Protected or Village Forest under the Karnataka

Forest Act, 1963. While it may be prudent to first consider Village Forest status, which provides for local management under the regulation of the KFD for areas that may be under fairly intensive use by local communities, areas without such intensive resource use may be notified as Protected or Reserved Forests as appropriate to a given situation.

3.3. Further, the KETF has noted that there are continuing leases and other concessions on forest land within key elephant habitats, including protected areas such as Cauvery Wildlife Sanctuary and BRT Tiger Reserve. For instance, we were made aware of the existence of leases for coffee estates and a tourism facility within the recently-notified BRT Tiger Reserve, tourism leases inside Cauvery WLS, as well as rubber plantations in Kodagu district. We recommend that the Honourable High Court direct the State to prepare, on a time-bound basis, an inventory of all such concessions and leases within designated forests in the elephant range and initiate necessary process, also in a time-bound manner, to restore as much of these lands as elephant habitats as necessary and possible.

3.4. In certain key areas within the elephant range in Karnataka (e.g., BRT Tiger Reserve), we note that *adivasis* have been conferred individual and community forest rights (including the right to conserve) under the Forest Rights Act, 2006. The conferring of these rights currently results in a regime of overlapping rights and authority between the *adivasis* and the Karnataka Forest Department. Currently, there is no clarity on how this overlap and potential conflicts arising from it would be addressed. We are inclined to see this overlap as a potential opportunity for new models of conservation rather than as a threat. Hence, we recommend that, in the present circumstances, the State and the *adivasis* jointly draw up management plans compatible with the goals of conservation, in consultation with experts, clarifying their respective rights, roles and responsibilities to further conservation through a democratic process, and to hold each other accountable to that commitment.

4. Improving connectivity between elephant habitats

4.1. Currently, a listing of the major elephant corridors of the Mysore Elephant Reserve of Karnataka, as recorded before 2005, is available in the publication *Right of Passage: Elephant Corridors of India.* The KETF recommends that the Karnataka Elephant Expert Group, with the help of scientific institutions as necessary, be entrusted the task of preparing more comprehensive documentation and plans for management of critical corridor lands across the state that may need to be protected, or even purchased, under the due process of law for the purposes of maintaining/enhancing connectivity between key elephant habitats.

4.2. Further, we recommend that such lands that provide connectivity between key habitats be given greater legal cover. Where they lie entirely within Reserved Forests, the State may consider bringing them under the Wild Life (Protection) Act, 1972, whereas, if such lands lie outside legally-designated forests, they could

be notified as Ecologically Sensitive Areas under the Environment Protection Act, 1986, in accordance with recommendations made in the National Wildlife Action Plan and Strategy 2002-2016, as well as keeping in mind directions from the Government of India's Project Elephant Directorate.

5. Managing land use in non-forest areas adjoining designated forests

5.1. To draw a delicate balance between two key priorities at the State level—of conserving a wide-ranging and large-bodied animal such as the elephant on the one hand, and meeting the genuine developmental needs of people on the other—the KETF believes that it is necessary to foster ecologically-responsible land-use in privately-owned lands in the immediate neighbourhood of the elephant's current distribution range. Therefore, we recommend that a socially-inclusive process be initiated at the scale of protected areas/forest divisions at the fringe of the elephant's distribution to evolve land-use practices that best reconcile local land-use goals with long-term ecological concerns. Such reconciliation must also be managed under a broad-based institution that represents both ecological and societal concerns.

5.2. In particular, the KETF was pleased to note a recent exercise to establish and notify one such *Ecologically Sensitive Area* (ESA, under the Environment Protection Act, 1986) around Bandipur Tiger Reserve. This exercise, undertaken with the participation of local elected representatives, forest and revenue officials, and non-governmental organisations, identified a range of land-uses to be regulated by a broad-based ESA Monitoring Committee in the long-term interest of both ecology and society. We therefore recommend that this may be followed as a model for the notification of other ESAs in the State.

5.3. In particular, we also note with concern that despite the existence of clear provisions under Section 41(2) of the Karnataka Forest Rules, 1969, against the grant of land for occupancy by the Deputy Commissioner within 100 metres of reserved and protected forests, there are multiple examples of such grants being made, in many instances for stone quarries, in recent years, especially adjacent to elephant habitats in Kollegal and Ramanagara Forest Divisions. We recommend that the State seriously review and cancel diversions that are not in keeping with the law.

6. Reducing pressures on elephant habitat from large-scale human resource-use

6.1. Reducing the footprint of large numbers of rural poor on the elephant's habitat is a critically important but complex issue. Hitherto, it has been addressed as an issue of law enforcement that has simply not worked. On the other hand, newer models of social enterprise built on a better understanding of the socioeconomic realities of rural landscapes have offered greater hope in addressing these complex problems. A Non-Government Organization called Namma Sangha outside Bandipur (also supported by the State and Central governments) has, over the

last 8 years, helped move over 30,000 villagers off forest-based firewood to cooking gas, and greatly reduced their impact on the elephant habitats of Bandipur. We recommend that the State and Central governments create seed funding for such social enterprise approaches founded on solid socio-ecological understanding, to reduce the pressures of large-scale human use of elephant habitats by the rural poor. At the same time, the best practises in other efforts by KFD such as social forestry and Joint Forest Management may also be incorporated into these schemes.

7. Mitigating and managing elephant-human conflicts

7.1. While the recommendations (Paras 2–6, above) may be seen as long-term measures to address some key drivers of elephant-human conflict, more proximate measures of managing conflicts on day-to-day and local scales are also essential. In this regard, physical barriers remain one of the main strategies to minimise elephant-human conflict. We note that a systematic effort to create effective barriers in the past 1-2 years at Bandipur Tiger Reserve have helped demonstrably in reducing crop losses. Where unbroken interfaces exist between farming and elephant habitats, as along Bandipur's northern fringe, we recommend that the KFD be supported more actively in the creation of such barriers.

7.2. However, in situations where the farm-forest fringe is more dissected/broken (e.g., Kodagu and Sakaleshpur), the creation of physical barriers without first understanding patterns of elephant movement may aggravate conflicts as these barriers could impede elephant movement and temporarily restrict them within cultivated areas. We recommend therefore that a more comprehensive site-specific strategy on physical barriers in such complex landscapes be a high-priority focus of the Karnataka Elephant Expert Group.

7.3. The KETF emphasises that while the State and Centre have, in general, made allocations for the creation of barriers, there has been meagre resources available with the KFD to maintain these barriers. We therefore strongly recommend that additional funds be made available to the KFD under a separate budget head for the regular maintenance of these barriers. Together with this, the KFD may be asked to set up a system of auditing the effectiveness of these maintenance measures.

7.4. We also note that physical barriers installed to reduce conflict are only as effective as the local communities want them to be. Local people, who seek protection for their crops from elephants, themselves routinely undermine these barriers by breaking fences or filling trenches to access forests for firewood and grazing. Therefore, involving local communities in the creation and maintenance of these barriers is often vital in ensuring its effectiveness and durability. We recommend that, wherever possible, the KFD partner with local eco-development committees (EDCs), or even *panchayat raj* institutions to secure farm landscapes from elephants. This would also inject funds into local communities, ensuring greater

sense of ownership of such barriers and participation in their maintenance. Such initiatives to empower local institutions must also go hand-in-hand with reviews/audits that expect a greater accountability from them as well.

7.5. Toll free helpline telephones may be set up at the level of Forest Ranges to provide timely assistance to people who may be injured by elephant attacks, or send the anti-depredation squads to areas where elephants may have entered for depredation of crops.

7.6. The payment of *ex-gratia* relief has been an important *post-facto* means of alleviating the impact of crop loss to people. Yet, there are many problems with both its premises and practice at multiple levels. While recommending that this approach be carefully and critically reviewed, we do emphasise that, in the interim, the State may be directed to streamline/speed up their disbursal in order to provide timely relief to people.

7.7. The budget head in the office of the Chief Wildlife Warden for payment of *ex-gratia* should be managed on the lines of the Calamity Relief Fund (as is being managed in the office of the Deputy Commissioner of the district) and availability of funds in this budget head should be always ensured in order to make quick payments to people for incidents involving injury or loss to human lives in encounters with elephants.

7.8. We note that certain extreme situations of intense human-elephant conflict may warrant extreme mitigatory measures such as the removal elephants from a given landscape. As with any extreme measure, this option needs to be deployed with great judgment, care and consideration. We leave it to the Karnataka Elephant Expert Group to identify the actual areas to be designated as Removal Zones, but in the interim, we recommend this option only for the elephants of Alur-Arkalgud *taluks* and the Savandurga region of Tumkur.

7.9. Once elephants are removed from an area, the next question would be whether to retain them in captivity or release them in the natural habitat at another location. This is not easy to answer as it depends on the specific conflict situation and its history. If dispersing elephants have remained for several years outside their native habitat, it may be best to capture and retain these elephants in captivity. KETF also carefully considered the option of translocation of captured elephants to other suitable natural habitat as one option to mitigate conflicts. However, the KETF cautions that this management action does not guarantee that the elephants would successfully settle down in the alternative habitat. The experience with translocating adult male elephants in Karnataka since the mid-1980s has generally been a failure, with the elephants usually going back to the original place of capture. Translocation of entire family groups has not been attempted so far in the state or, indeed, in the country, but the limited experience in Sri Lanka suggests that such elephants also tend to either go back to the place from where they have been driven or captured, come into conflict with people at the place of release, or even starve to death when confined by barriers such as electric fences

along protected area boundaries because of competition from and social exclusion by the local elephant groups. KETF does not recommend translocation of elephants as an option to address elephant-human conflict in Alur-Arkalgud (see Para 8 below), but underlines that it must remain an option for elephant management in the State. Given the risks involved, if attempted, translocation must be seen as an experimental management tool, and should invariably be accompanied by close monitoring through radio- and GPS-collaring of at least one individual per group to observe its behaviour and movement so that corrective action such as removal into captivity could be taken in the case of continued conflicts.

8. Site Level Recommendation: Elephant-human conflicts in the Alur-Arkalgud region of Hassan District

8.1. The Task Force undertook site visits, studied available information on elephants and people in this region, and duly considered options for in-situ conservation of elephants as well as the scope for more effective mitigation of existing conflict in this region. After deliberating in detail upon this issue, the majority of KETF members concluded that the conflict in this region is not only of an extreme nature, but also causes chronic suffering and extreme fear psychosis among people and, therefore, merits the decisive application of extreme measures. Thus, we recommend that:

8.1.1. All elephants in this region, currently estimated to number 25, be removed as soon as possible through capture, taking all due precautions and care to minimise trauma to animals during capture and subsequent training.

8.1.2. The captured animals be retained in captivity, and not returned to the wild, and recommend steps to strengthen welfare of captive elephants (Chapter 6).

8.1.3. Concurrently with the capture of these elephants, the KFD, in consultation with experts, install suitable barriers along the boundary of a *Conservation* or *Co-existence* zone here as the case may be, to ensure that there is no further dispersal of elephants into the Alur-Arkalgud region.

9. Site Level Recommendation: Acquisition of private lands in Sakaleshpur for the purpose of creating an 'elephant corridor'

9.1. Following site visits, consultations with local communities, examination of forest and revenue land records, and all available information on elephants and their habitats, we strongly recommend against spending public money on this proposal, as it will have little positive impact on elephant conservation, reduce elephant-human conflicts very marginally, benefit a small number of people, and come at a very high cost to the treasury, all for a small population of elephants which is, in any case, disturbed by other factors such as developmental projects.

10. Minimising unnatural mortality of elephants

10.1. We note that, over time, the Karnataka Forest Department has worked commendably to reduce threats of ivory poaching to the State's wild elephants. Nevertheless, we appreciate that this threat will remain, and perhaps even intensify, as the demand for and value of ivory rise in illegal markets both regionally and internationally. Therefore, we recommend that the highest level of support be continued to anti-poaching vigil, support to frontline forest staff to avert poaching, as well as by building greater capacity to swiftly investigate and effectively prosecute offenders.

10.2. We also note that, in recent times, elephants continue to perish in incidents of retaliation against crop losses. Most often, such retaliation involves the misuse of electricity from live wires (11 K.V. or 220 volts domestic supply) to electrify the boundaries of farms, and in some cases, also involves the shooting or possible poisoning of elephants that raid crops or perceived as being a threat to human lives. While prosecution may indeed be necessary in such cases, we emphasize that these extreme measures are usually symptomatic of a deep resentment among farmers against the persistent inability of the State to effectively address the debilitating losses they face. Therefore, we emphasize that decisive affirmative action to reduce losses to farmers (discussed under Para 7) must go hand-in-hand with such prosecutions.

10.3. During field visits, we also noted many instances of elephant electrocution from low-hanging electricity transmission lines. Electricity companies appear to have repeatedly ignored requests by some coffee plantations and the KFD to raise the minimum height of power transmission pylons in elephant habitats to over 20 feet. We recommend that the Honourable High Court issue directions to the defaulting power companies to rectify this situation, in accordance with the guidelines on roads and power-lines in natural areas being developed by the National Board for Wildlife, and report on action taken, within a stipulated period of time.

10.4. In all cases of elephant mortality, we recommend that, as is being done now by the National Tiger Conservation Authority, all post mortem examinations be held with external observers, and the KFD create a separate section on its website on which to record and display post-mortem reports. Further, a more scientific process of carrying out and recording post mortems, such as maintaining photographic evidence of the carcass, GPS location, and collection and preservation of tissue samples for diagnosis of cause of death would enhance the quality of elephant mortality records and, ultimately, help in management decisions.

11. Managing habitat in designated forests

11.1. Several activities have been traditionally undertaken for 'improving' the quality of habitats for elephants and other wildlife. Examples of this include the seeding of bamboo, removal of invasive plants such as *Lantana camara* in order to restore natural vegetation, and the creation/maintenance of artificial water sources. As

some of these measures, especially artificial water provisioning, may have unintended long-term consequences for elephants and their habitats (including local overabundance of elephants and increased pressure on natural vegetation), these are best done after careful scientific discussion and endorsement. We recommend that the KFD create such a scientific oversight mechanism under which to pursue such habitat 'improvement' activities.

11.2. In the course of the field visits, it emerged that large scale replacement of natural forest with monoculture plantations of teak (*Tectona grandis*), with virtually barren undergrowth, may also have contributed to the degradation of natural habitat and lack of fodder for elephants. Based on past experience of KFD in silvicultural treatment of teak plantations to promote the growth of native trees, the Karnataka Elephant Expert Group, in consultation with reputed scientific institutions, should advise on restoration of mixed natural forest within teak plantations, with a view to genuinely improving the habitat for elephants.

12. Strengthening and streamlining administration for elephant conservation

12.1. While we feel that it would be ideal to manage the key elephant habitats of Mysore Elephant Reserve under a coherent set of management priorities under uniform legal provisions, we recognise that, in some situations it may not be possible to implement such measures immediately. In the interim, we recommend that such territorial divisions/ranges be administratively attached to wildlife circles/divisions/ranges. Such measures, already implemented in the case of Gundlupet Range, which was transferred from Kollegal Territorial Division to Bandipur Project Tiger Division, would help further a more coherent management of key elephant habitats.

12.2. In the course of consultations with the KFD, we noted many examples of administrative streamlining that would assist in conservation and better management of elephants and their habitats. Taking these into account, we recommend that:

12.2.1. Additional posts of forest watchers and guards are sanctioned for areas of high elephant-human conflict.

12.2.2. The State's PCCF (Head of Forest Force) is empowered to post Range Forest Officers to vacant positions, especially in Forest Ranges where elephant-human conflict is a serious concern.

12.2.3. Incentives are provided to staff who serve 5 years in high conflict Ranges. This may be done by strictly implementing an already available government order that permits such staff to provide options for a posting of their choice upon completion of 5 years.

12.2.4. The available government order for making timely payments of salary as well as extra allowances to all staff, including temporary watchers, into bank accounts is fully utilised and implemented in all Ranges.

12.3. We note that many of the steps recommended by the KETF are not possible to implement with existing financial outlays. Hence, we recommend that the Honourable Court direct the State to create the additional financial outlays needed to implement key recommendations.

13. Tourism in elephant areas

In the last decade, the State has witnessed a huge expansion of tourism as disposable incomes have increased, especially among its growing middle class. As a result, there has been intensification in recreational tourism to wildlife areas. This growth in tourism has also led to a spiralling market participation in this sector, especially in terms of growth of new hotels, resorts and home-stay facilities in and around natural areas. The KETF recognises the value of providing better opportunities for citizens to experience nature and the outdoors, but also strongly underlines the importance of thoughtful and effective regulation of tourism so that its potentially adverse impacts on wildlife and their habitats are minimised.

13.1. We note with concern that in many areas, ill-planned and large tourism infrastructure has the potential to sever habitat connectivity and create serious disturbances to elephants and other wildlife. Therefore, we first recommend that measures are initiated to ensure that commercial tourism infrastructure is located only in designated areas. One measure that we strongly recommend here is that the State make the fullest use of land-use regulation provisions of the Environment Protection Act, 1986 by notification of Ecologically Sensitive Areas (also see Para 4.2) around key wildlife habitats so that threats posed by ill-planned tourism infrastructure are minimised.

13.2. We also recognise that the activity of tourism within wildlife areas can itself grow to an extent where it may cause direct disturbance to wildlife, as well as pose challenges to management. By and large, KFD has regulated tourism in most of its protected areas very sensibly. However, problems still remain in certain areas such as in Cauvery Wildlife Sanctuary and adjoining areas of Mandya and Kollegal Forest Divisions where unregulated influx of tourists along certain sections of the road skirting River Cauvery causes direct disturbance to elephants, impedes their access to the river, and creates a severe problem of solid-waste disposal, especially in places like Muthathi. In such situations, we recommend the creation of designated areas outside the sanctuary, especially along the banks of the Cauvery, where tourists are provided required facilities and better nature interpretation, and alongside, there is a stricter regulation of tourist entry into areas located within key wildlife habitats.

13.3. In addition, we also recommend that measures to regulate tourism are in consonance with evolving Central Government policy on ecotourism in wildlife areas,

especially in terms of ensuring that the benefits of tourism are more equitably shared with marginal local stakeholders such that this important activity is carried out with greater ecological and social responsibility.

14. Inter-state cooperation and coordination

14.1. We note that key elephant habitats of the State currently abut similar, high-value elephant habitats of Kerala and Tamil Nadu. Greater coordination between the states can go a long way in controlling poaching, managing conflict, as well as in the maintenance/enhancement of habitat connectivity. We suggest that a coordinating mechanism be set up to ensure that cohesive landscape-level management plans are developed and effective inter-state coordination in elephant management and conservation achieved at the scale of each Project Elephant Landscape as recommended by the Ministry of Environment and Forests, Government of India.

15. Research and monitoring for elephant conservation and management

15.1. We note that a solid understanding of elephant ecology and behaviour is the bedrock of knowledge-based management and conservation of this species. We therefore recommend that the State take active measures to foster research about this species, and ensure that its management utilises the highest standards of science. We also suggest the following priority areas of research: elephant population estimation, monitoring elephant demography, regular monitoring of the status of elephant habitats, social behaviour and ranging patterns, foraging ecology and impacts of elephants on habitats, understanding elephant-human conflicts and evaluating mitigation measures, studying the impact of management practices on the species, as well as long-term research into key populations.

15.2. Systematic record keeping for efficient information retrieval is a key pre-requisite to making informed management decisions. Current systems of recording information on a range of issues, including human-elephant conflicts, creation and maintenance of barriers, proposals for habitat diversion in key elephant habitats are highly fragmented. We therefore strongly recommend that the KFD develop capacity, in partnership with non-governmental agencies if needed, to centralise the recording of such information that will help management at both the state- and the field-level.

16. Welfare and management of captive elephants

16.1. Given the inevitability of some wild elephants coming into captivity because of serious conflicts with people, it is essential that we pay adequate attention to the use and welfare of elephants in captivity. This would require a suite of measures including strengthening the captive elephant establishment, maintenance of service registers for individual elephants, building a cadre of veterinarians with ex-

pertise in captive elephant biology and treatment of ailments and diseases, preserving some of the traditional skills in capture of elephants, and introducing the art of humane training and management.

16.2. Elephants in captivity should undergo regular health screening, not only for body condition, parasites and general diseases, but in particular, for tuberculosis.

16.3. The welfare of captive elephants is closely tied to the health and well-being of elephant *mahouts* and *kavadis* whose dignity and service conditions must be ensured. *Mahouts* and *kavadis* should also be provided regular health screening, especially for tuberculosis.

16.4. The management of forest camp elephants is presently regulated under Rules 88-111 of Chapter II of the Karnataka Forest Code, 1976. Based on the present requirement of captive elephant management, the provisions of the above code have to be revised by a team of experts on captive elephants. Indeed, there is urgent need for rules to be drafted for the maintenance of all captive elephants, including those in temples, zoos, circuses and private ownership, and their compliance monitored.

16.5. Captive elephants should be used only by the department for purposes such as patrolling forests, tourist rides, biological research, elephant-human conflict management or exchanged with other state forest departments for similar use. Newly captured elephants should not be given to temples, circuses or other commercial use.

16.6. The welfare of captive elephants in the state should be regularly monitored by the Chief Wildlife Warden with the assistance of a group of experts and officials specifically constituted for this purpose.

16.7. Micro-chipping of all captive elephants should be made mandatory in order to ensure that illegal trade in such captive animals is curtailed.

16.8. KETF notes that the Dasara festival involving the display of elephants at Mysore is a grand expression of Karnataka's rich cultural heritage that merits preservation. Nevertheless, as a demonstration of the State's commitment to addressing issues in the conservation of its wild elephants, as well as the welfare of its captive elephants, we suggest that the heavy 750 kg golden howdah carried by the lead elephant in the Mysore Dasara procession be replaced with a much lighter replica or carried in a chariot drawn by the elephant. Such a symbolic gesture, especially as something that crowns a series of measures to further elephant-human coexistence in Karnataka, could make the state a national and international leader in elephant conservation.

Chapter 1

Setting the context for the Karnataka Elephant Task Force's work

1.1 Background

Karnataka possibly has the distinction of harbouring the largest population of the Asian elephant (*Elephas maximus*) in India. About one-fifth of the country's estimated population of 28,000 wild elephants is found in Karnataka[2], mainly in protected and reserve forests in the southern part of the state. As such the elephant population of Karnataka is sufficiently large and does not warrant serious concern about the future prospects for its survival. The cultural association of the elephant with people is also ancient in the state, as seen from its prolific depiction in temple art from the Hoysala dynasty of the 12th and 13thcentury, through the ruins of the 14-16th century Vijayanagara kingdom at Hampi and the murals of the 18th century Dariya Daulat, to the modern-day Dasara festival at Mysore Palace. The elephant is thus an iconic species for the conservation of biological diversity and the cultural heritage of the state.

Nevertheless, Karnataka also typifies many of the problems that the elephant faces across the country. Although most of the elephants in the state are presently distributed across a single, contiguous landscape in the south and southwest (named as the Mysore Elephant Reserve), along with adjoining elephant habitats in the states of Tamil Nadu and Kerala, there are still threats to the integrity of this landscape through fragmentation. There are at least two completely isolated populations in the state, a small population in north-western Karnataka and a medium-sized one in the Malenad plateau. We lack clarity on the status and viability of a number of small, scattered elephant groups ranging over the Western Ghats. Karnataka also faces a serious problem of elephant-human conflicts, not only in the form of chronic crop raiding and occasional human deaths along the forest-agriculture interface of the major elephant habitats, but also a more severe manifestation of such conflict from dispersing groups of elephants or solitary bulls that range over a predominantly human-use landscape such as the Alur/Arkalgud *taluks* in Hassan district or the Savandurga region of Tumkur district. Some of these problems of habitat fragmentation and elephant-human conflicts stem from the historical patterns of land-use in the state, exacerbated in recent times by developmental pressures of a rapidly growing economy.

The Government of India initiated Project Elephant during 1992-93 with these broad primary objectives:

1. Conserving and protecting the viable populations of wild elephants and ensuring the quality and integrity of the larger landscapes across the country of which they are a part.
2. Mitigating elephant-human conflicts through a number of measures including compensatory payments for crop losses, *ex gratia* payments for loss of human lives, barri-

[2]Project Elephant Directorate, Government of India.

ers to prevent elephants from entering agricultural land, as well as capture and translocation of elephants where necessary and feasible.

3. Promoting ecologically sustainable development among local communities dependent upon forest resources to reduce pressures on the natural habitat.
4. Controlling the illegal killing of elephant especially the poaching of male elephants for ivory (that had become a scourge in southern India during the 1980s).
5. Ensuring the welfare of elephants in captivity.

These strategic objectives are still very much valid in the present-day context of elephant conservation, and we must keep this framework in mind when planning for conservation and management of elephants in Karnataka.

Presently, the management of elephants in the highly fragmented areas, isolated forest patches, or the human-dominated landscapes in the country consumes a disproportionate amount of financial and human resources, often at great cost to human life, property and agriculture, and with questionable returns in terms of conservation gains. As compared to its neighbouring elephant-bearing states of Tamil Nadu and Kerala, whose elephant populations are largely concentrated within or confined to well-defined tracts of forests, Karnataka faces the problem of a small fraction of its elephant population being highly scattered over expansive forested and non-forested landscapes. Consequently, Karnataka faces a more serious problem of elephant-human conflicts, relatively speaking, and thus greater challenges in formulating and executing an appropriate conservation paradigm.

The conservation of elephants must be based on these two overarching goals:

1. Ensure the long-term survival of viable (demographically and genetically) populations of elephants through land-use planning, regulation and consolidation in the larger natural landscapes of the state on the basis of sound scientific theory and social principles.
2. Substantially reduce the levels of elephant-human conflicts to relieve human suffering from loss of crops, property and life, in a manner that would promote greater tolerance and acceptance of elephants in the larger landscape by local communities, protect their livelihoods, and ensure their effective participation in conservation.

If the above two goals are kept in mind, conservation could become a win-win strategy—for elephants that would now be able to move within secure habitats and have lower chances of being injured or killed in conflicts with people, and for people whose lives and livelihoods would be more secure against the depredations of elephants.

1.2 Our approach

The Karnataka Elephant Task Force has thus taken a **zone-based approach** to make recommendations for the management of elephants in the state through conservation of habitat, protection of elephants, mitigation of conflict, strengthening of administrative structures and institutions, participation of local communities in this broader scheme, and scientific monitoring. It recognizes that conservation of elephants comes at a cost,

often a great one borne largely by marginalized communities of farmers and other rural people. This is neither a sustainable model of conservation nor desirable from the viewpoint of equity and social justice. KETF thus advocates a scientifically sound yet pragmatic scheme for the long-term conservation of elephants in the state. This approach, briefly outlined below, is elaborated in the subsequent chapter of this report.

1. **Elephant Conservation Zone:** This would encompass the larger and more-intact forested habitats that hold a large elephant population comprising a substantial proportion of the elephant population of the state. The emphasis within this zone would be maintaining habitat integrity at the landscape scale through protecting and strengthening corridors, preventing elephants from moving into agricultural land and settlements both along the periphery and within enclaves, and affording maximum protection to elephants against illegal killing.
2. **Elephant-human Coexistence Zone:** Elephant populations numbering in the several tens or perhaps over a hundred, either isolated or connected to the major conservation zone, but ranging over a restricted or a fragmented habitat in which conflicts are high, would qualify for experimenting with the a model of coexistence with people.
3. **Elephant Removal Zone:** The elephant-removal zone would include places where small or isolated groups of elephants, with questionable viability, or solitary bulls range over a predominantly human-settled landscape, and the social and economic costs to maintaining the elephants here are unacceptably high.

In the course of implementing such a conservation plan, it would be inevitable that some elephants would come into captivity without compromising the continued survival and viability of the wild populations of the state. KETF thus also addresses basic issues relating to the welfare and use of captive elephants. It also recommends the setting up of a **Karnataka Elephant Expert Group**, within the State Board for Wildlife, to assist the Chief Wildlife Warden in detailed technical planning and implementation of elephant conservation in the state.

Photos (clockwise): K. Murthy, K. Murthy, MD Madhusudan & MD Madhusudan

Few species integrate ecological function and cultural symbolism as impressively as the Asian elephant does. Karnataka is believed to hold India's largest populations of this iconic species. By securing the elephant's habitats, by reducing its conflicts with farmers over crops and by protecting the species against poaching and retaliatory killing, Karnataka has the opportunity to lead India's efforts in conserving this stately animal.

Chapter 2

Elephant distribution, abundance and ecological considerations

2.1 Distribution and abundance of elephants in Karnataka

The elephant is distributed over the Eastern and the Western Ghats with the southern region of the state of Karnataka holding the maximum numbers at relatively high density. Presently, elephants are found in at least three disjunct populations, a small one (about 50+) in the north of the state distributed thinly in the Belgaum and Uttara Kannada districts and other forests adjoining Goa and Maharashtra, a population of about 300 elephants in the Malenad plateau (primarily Bhadra WLS and adjoining areas) in Shimoga district, and a larger one (numbering several thousand) across Chikmagalur–Kodagu–Mysore plateaus eastward through the Eastern Ghats up to Bannerghatta National Park near Bengaluru city.

Wild elephants are found in 24 forest divisions of Karnataka and the total area of distribution is approximately 14,500 km^2, though the regular presence of elephants covers only about 10,000 km^2 (this excludes northern Karnataka where a small elephant population ranges over a large, diffuse area). Seven forest divisions shown as non-distribution area of elephants –Karwar, Honnavar, Sirsi, Haveri, Sagar, Kundapur, and Shimoga –are occasionally used by elephants, mainly solitary bulls. Karnataka state has presently one notified Project Elephant Reserve, spread over 6463 km^2, termed as Mysore Elephant Reserve (MER) that comprises 15 Forest Divisions from Bhadra in the Malenad plateau to Bandipur in the south, and from Chamarajanagar to Bannerghatta along the Eastern Ghats. The MER holds over 98% of the wild elephant population of the state. There are four elephant-bearing forest divisions on the south of Bhadra (Koppa, Kudremukha, Chikmagalur and Mangalore) along the Western Ghats that are not part of the MER.

The population estimate of elephants based on sample block count (with about 50% sampling of the 10,000 km^2 of elephant habitat in the state) during 15-17 May 2010 gave an average population of 5740 elephants (range = 5301–6179) across the 19 forest divisions (Figure 1 & Table 1). To this may be added about 50+ elephants for northern Karnataka that was not covered by the enumeration. Similarly, mean population size arrived at for the state by summing up the estimates of elephant numbers for individual forest divisions showed a comparable figure of 5616 elephants. Population estimate by line transect dung count gave an average elephant density of 0.7 elephant/km^2 that translates to a mean population of 6299 elephants. As opposed to the direct block count that estimates the number of elephants on a given day, the indirect dung count method provides an average estimate of elephant density and numbers over a 3-4 month period prior to the date of sampling.

The elephant populations of the Mysore Elephant Reserve of Karnataka form part of a larger elephant population that ranges into the adjoining states of Kerala and Tamil Nadu. Therefore, difference in the total number of elephants between years could be a function of climate-related spatiotemporal variation in distribution pattern or movement of elephants within the population's range (landscape) that spreads into the adjoining states.

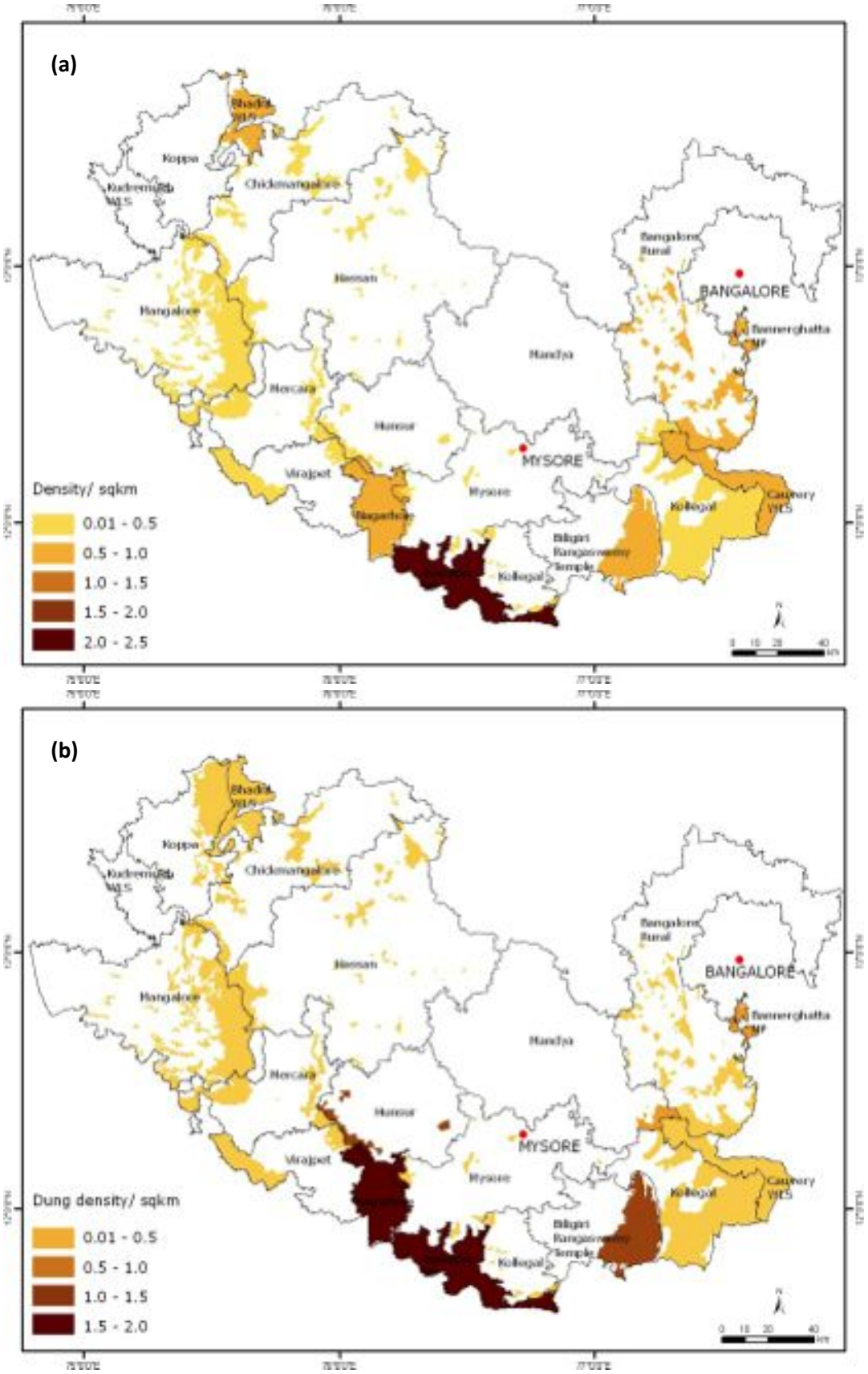

Figure 1: Map showing elephant density by (a) block count and (b) dung count method in 19 forest divisions of the Mysore Elephant Reserve during 2010 synchronized elephant census (from Baskaran and Sukumar 2010, ANCF Report to Karnataka Forest Department)

Table 1: Elephant population estimated by sample block count method in different forest divisions of Karnataka during Synchronized Elephant Census 2010

Forest division	Elephant habitat (km^2)	Density ($/km^2$)	Mean	95% Lower Confidence Limit	95% Upper Confidence Limit
1. Bandipur TR	906	2.4	2,130	1,727	2,534
2. Bannerghatta NP	104	0.7	76	36	117
3. Bhadra WLS	492	0.7	325	198	497
4. Cauvery WLS	519	1.0	535	361	704
5. Chamarajanagar WL (BRT)	540	0.8	443	320	563
6. Chikmagalur	139	0.1	11	5	17
7. Hassan	250	0.3	67	27	107
8. Hunsur	71	0.4	31	13	50
9. Hunsur WL (Nagarahole)	643	1.0	617	443	792
10. Kollegal	1,222	0.5	589	457	720
11. Koppa	1151	0.0	0	0	0
12. Kudremukha NP	600	0.0	0	0	0
13. Madikeri*	892	0.1	50	36	64
14. Madikeri WL	379	0.5	180	114	245
15. Mandya	97	0.2	15	3	26
16. Mangalore	1,128	0.1	56	42	69
17. Mysore	177	0.4	66	21	110
18. Ramanagara	353	0.7	251	150	351
19. Virajpet	337	0.5	175	88	260
Overall (Sum of divisions)	**10,001**		**5,616**	**4,041**	**7,226**
Overall (Analysis of pooled data)	**10,001**	**0.6**	**5,740**	**5,301**	**6,179**

* Area sampled by sample block count method exceeds the elephant habitat available within the division (as private forest under coffee estates were sampled), thus the total area of sampling by block count method is taken as elephant habitat.

It is worth giving a brief consideration to the dynamics of the overall elephant population in the state. A crude birth rate of 0.3 calves/adult female/year (based on a sample of 500 calves and 1655 adult females) was recorded during the 2010 elephant census; such a high rate would not be sustained from one year to another. An average birth rate of 0.2 calves/adult female/year (inter-calving interval of 5 years) is a more reasonable longer term estimate based on research studies. Annual mortality (crude estimate) based on 126 mean annual elephant deaths (from 2009–2011) out of 5616 elephants estimated in 2010 works out to 2.2%, with the male segment experiencing higher mortality (2.9%) compared to the female segment (1.8%).

Data available on past censuses (Table 2) have to be interpreted with caution because of methodological differences between 1983-1993 ("total counts") and 2002-2010 ("sample block counts") censuses as well as seasonal movement of elephants across adjoining states during different years. Overall, the available population figures, observed birth rates and mortality rates indicate that the elephant population of Karnataka is unlikely to be decreasing, and most likely to be either stable or growing. Thus, there needs

to be no cause for concern on account of a declining wild elephant population, but rather the need to plan for appropriate management of dispersing elephant groups in the state.

Table 2: Elephant population of Karnataka recorded in various censuses using the block count method during 1983-2010. Total counts were done during 1983-1993 while sample counts were done subsequently. The 95% confidence intervals are given in brackets for the 2007 and 2010 censuses

Year of Estimation	Estimated Elephant Population
1983	3,579
1989	4,420
1993	5,980
2002	5,848
2005	4,347
2007	4,205 (3,800 – 4,610)
2010	5,790 (5,350 – 6,230)

2.2 Biology of the Asian elephant

The Asian elephant (*Elephas maximus*) is one of three surviving species of the Family Elephantidae of the Order Proboscidea. This species is believed to have evolved in the Indian subcontinent about 250,000 years ago. Elephants are highly social animals with a matriarchal family structure comprising two or more generations of female elephants and sub-adult males. The male however disperses from the family and establishes its own home range at a location different from that of its natal family in order to avoid inbreeding; genetic studies also show that related male elephants often disperse together[3]. This animal possesses higher levels of intelligence and cognitive abilities, and thus is capable of exhibiting novel behavioural responses to a changing environment.

This large-bodied animal consumes about 8-10% of its body weight each day as fresh fodder, from a wide variety of plants and plant parts. Studies show that while grasses may constitute more than 50% of plant material consumed annually, about 70% of the protein is obtained from browse plants (leaves, bark, fruits, bamboos, etc.) in dry forests in southern India[4]; thus forests are important for the survival of Asian elephants. Elephants also need water not only for drinking but also bathing and wallowing, though may not necessarily need water on a daily basis. In order to meet these basic requirements, elephant move over a larger area annually. Seasonal shifts in ranging patterns also help the elephant to optimize the quality of the forage it consumes. The annual home range size of an elephant bull or a family group in India may be typically anywhere between 300 km^2 and 1000 km^2 as shown in several studies that have used radio- and GPS-telemetry to track their movement in detail[5,6]. Elephant families typically show

[3]Vidya, T.N.C. and Sukumar, R. 2005. Social organization of the Asian elephant (*Elephas maximus*) inferred from microsatellite DNA. *Journal of Ethology* 23: 2-5-210.

[4]Sukumar, R. and Ramesh, R. 1992. Stable carbon isotope ratios in Asian elephant collagen: implications for dietary studies. *Oecologia* 91: 536-539.

[5]Baskaran, N., Balasubramanian, M., Swaminathan, S. and Desai, A.A. 1995. Home range of elephants in Nilgiri Biosphere Reserve. In: JC Daniel and HS Datye (eds.) *A Week with Elephants*. Oxford University Press, New Delhi.

fidelity to their home ranges in the short- to medium-term[7], though changes or extension of such home ranges are also known to occur.

The elephant's penchant for feeding on cultivated crops brings it into direct conflict with people. The phenomenon of crop raiding by elephants has been extensively studied in Asia[8,9,10,11,12]and Africa[13,14] in recent decades. The most obvious patterns and reasons of crop raiding supported by the scientific studies are the following:

a) The rapid loss of natural habitat through conversion to agriculture would result in escalated conflict as elephants continue to treat the converted land as part of their traditional home range. Habitat loss directly impacts only those clans or males within whose home ranges the changes have taken place. There can also be indirect impacts on unaffected clans due to population compression resulting in increased competition and habitat degradation due to increased elephant population in some cases

b) The fragmentation of habitat increase the chances of this long-ranging species to make contact with cultivated land and indulge in crop raiding. Most studies show that habitat fragmentation is the most consistent proximate driver of chronic conflict.

c) The high concentration, palatability and nutritive content of cultivated plants are irresistible attractions to herbivores such as the elephant that has enormous forage requirements. Thus, some elephants having tasted crops would continue to prefer this source of food, irrespective of the availability of natural forage in their habitat.

d) As a consequence of elephant social structure, sub-adult and adult male elephants typically have a higher propensity as compared to female-led groups to raid crops and are usually the first to move out from their native range into isolated patches of forest specifically for the purposes of raiding.

e) Elephants may disperse from their native range as a consequence of local habitat pressures, significant reduction in forage through proliferation of unpalatable weeds or large-scale fire, overabundance in relation to carrying capacity, or adverse climatic

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[6]Sukumar, R. 2003. *The Living Elephants*: *Evolutionary Ecology, Behavior and Conservation*. Oxford University Press, New York.

[7]Baskaran, N., Balasubramanian, M., Swaminathan, S. and Desai, A.A. 1995.Home range of elephants in Nilgiri Biosphere Reserve. In: JC Daniel and HS Datye (eds.) *A Week with Elephants*. Oxford University Press, New Delhi.

[8]Sukumar, R and Gadgil, M. 1988. Male-female differences in foraging on crops by Asian elephants. *Animal Behaviour* 36:1233-1235.

[9]Sukumar, R. 1989.*The Asian Elephant*: *Ecology and Management*. Cambridge University Press, Cambridge, U.K.

[10]Balasubramanian, M., Baskaran, N., Swaminathan, S., and Desai, A.A., 1995.Crop raiding by Asian elephant (*Elephas maximus*) in the Nilgiri Reserve, South India. In: JC Daniel and HS Datye (eds.) *A Week with Elephants*. Oxford University Press, New Delhi.

[11]Williams, A.C., Johnsingh, A.J.T., and Krausman, P.R., 2001. Elephant-human conflicts in Rajaji National Park, north-western India. *Wildlife Society Bulletin* 29, 1097–1104.

[12]Gubbi, S., 2012. Patterns and correlates of human–elephant conflict around a south Indian reserve. *Biological Conservation* 148, 88–95.

[13]Hoare, R.E., 1999. Determinants of human-elephant conflict in a land-use mosaic. *Journal of Applied Ecology* 36, 689–700.

[14] Barnes, R.F.W., 1996. The conflict between humans and elephants in the central African forests. *Mammal Review* 26, 67–80.

events such as a serious drought. Female-led clans have defined space use within the natural landscape. It is therefore very difficult for family groups to adjust to habitat loss, fragmentation and degradation they suffer. Adverse habitat factors may cause them to disperse in an attempt to find better habitat outside their present range.

f) Due to strong inter-clan hierarchies they are unable to move into good areas within the existing elephant range and, hence, tend to disperse into unoccupied areas which are generally human use areas.

A proper understanding and appreciation of one or more of these reasons in a given context is important in order to take the most appropriate management steps to mitigate conflict. As elephant-human conflict has become central to various considerations in the conservation of elephants in the country and Karnataka in particular, we provide a detailed write-up on this aspect.

BOX: Understanding and managing elephant human conflict

Past management of elephant-human conflict

Elephant-human conflict is not new to Karnataka, having been recorded as a serious problem nearly two hundred years ago in Kodagu district. "In 1822, the *ryots* complained to the then Rajah about the great destruction of their crop fields and houses caused by numerous herds of elephants. The Rajah took a decision to resolve this problem by destroying elephants. There were 233 elephants killed with his own hand within 38 days whereas his soldiers caught 181 alive"[15]. Apart from elimination of elephants, captures of elephants for captive use (for work and war), too, was a major source of minimizing conflict and the impact of captures on wild elephant populations can be very significant. In the past tens of thousands of elephants have been caught for use in work, pageantry and war[16]. By and large, elephants were largely eliminated, by killing or by bringing into captivity whenever they came into conflict with people especially when new areas were cleared for human use. The fact that elephants were protected species both in southern India and Sri Lanka is the 1800s is also a pointer to the excessive removal of elephants for captive use or their elimination through killing, although the law was introduced by the British in order to ensure a steady supply of elephants for their needs such as logging.

Current management of elephant-human conflict

In the post-independence period, legal protection (e.g. Wildlife Protection Act, 1972) ensured that elephants and their conflicts with people could not be managed by eliminating elephants. The absence of similar protection to a part of the elephants' habitat, however, ensured that habitat continued to deteriorate due to loss, fragmentation and degradation, while elephant populations continued to grow due to protection. This approach of completely protecting the elephant but not its habitat resulted in paving the way for

[15]Richter, G. 1870. *Gazetter of Coorg*.

[16]Sukumar, R. 2011.*The Story of Asia's Elephants*. The Marg Foundation, Mumbai.

escalated conflict and was the basis for management taking an approach that focuses only on symptomatic treatment of elephant-human conflict that focuses on alleviating the burden on people through various means such as use of barriers, rather than addressing the causative factors relating to habitat change.

However, we have to be realistic as human requirements for space also need to be taken into account and we cannot completely undo habitat loss that has occurred in the past. Reversal of past changes can be achieved in a few cases where it is crucial; but this can be done only on smaller scales (i.e. restoration of critical corridors or habitat in some areas). But by and large, past changes in land use cannot be undone on a large scale. So we need to focus on managing elephant conservation within elephant habitat where conservation is practical and secures viable populations.

Types of crop raiding based on elephant behaviour and ranging

At the basic level there are two main types of crop raiding although there could be several variations of these basic causes.

Opportunistic crop raiding

Given the opportunity (unprotected crops or poorly protected crops), elephants will raid crops when they encounter them as they see cultivated crops as a concentrated source of food. However, some opportunistic raiders can become habitual crop raiders if allowed constant and easy access to crops. Habitual crop raiders need to be viewed and addressed separately. They are animals which have lost most or a significant part of their fear for humans and their normal crop protection methods. They are also animals that have learned to negotiate barriers. They also recognize that crops are a good source of nutrition and are available in bulk for easy access. As such these elephants are as persistent and problematic as obligatory crop raiders.

Obligatory crop raiding

When habitat within the elephant's home range has been severely reduced or degraded (due to loss, fragmentation and degradation) then the affected elephants will raid crops out of necessity as they do not have enough food in their home range. The severity of crop raiding will depend on the extent of habitat that has been lost or degraded.

Elephant-human conflict mitigation measures

Basically we need to address two aspects of elephant-human conflicts if we want to minimise the problem on a lasting basis. First, we have to address the causative factors for conflicts. Ideally we should stop such causes and in a practical manner try to reverse the causes in areas considered critical. In areas where it is not possible to stop some activity an attempt should be made to moderate it so as to minimize the problem. This would have two direct and immediate impacts on conflict. It would stop the creation of new conflict situations or the escalation of existing situations, and it would help reduce conflicts by reversing some of the adverse situations that are a consequence of past actions. While implementing this agenda of targeting the causative factors we must also take into account that we will continue to live in conflict with elephants as past and current land use changes cannot be reversed entirely (only marginal changes are possible). As such

there is then a need to address these long-term problems in a systematic and sustained manner. Conflict mitigation has to be a 3-step process as indicated below

1. Stopping the causative factors.

2. Reversing some of past land use changes that are the cause for severe conflict today.

3. Containing whatever residual conflict that remains after the first two steps.

This approach has to be pragmatic if it is to succeed, at the onset it will be clear that steps one and three will be the primary targets for major management action. These two steps will show fast results and need to be implemented simultaneously. Step two will take time to show results, it also requires proper assessment of target areas, it will require fairly large resource inputs, it may also require some out of the box thinking and a flexible and pragmatic approach in terms of policy by the government.

Reversing some of the past causes for elephant-human conflicts

As already mentioned there is a need to be very pragmatic about this so that tangible results can be obtained in the field.

***Habitat loss*:** Large scale restoration of habitat is socially and economically not feasible and, therefore, only critical and extremely essential areas should be targeted for restoration. For this there is need for clear assessments to justify reasons for purchasing such areas.

a. One important means of restoring habitat is through recovery of encroached forest land within elephant habitat. Special efforts should also be made to identify such encroached lands that adjoin intact elephant habitats, as well as all other misuses of Reserve Forest land in order to take appropriate action.

b. Critical areas, for example swamps (*hadlus* or *vayals*) in forested areas with few households cultivating them can be prioritised for resettlement if considered necessary and important.

c. There will be a need to improve the boundary between human use areas and elephant habitat. Reducing of perimeter length, improving the shape of the elephant habitat at the perimeter, restoring corridors, etc. can be done if there are land swaps made to rationalize the boundary. In most cases the local area may not have suitable area for agriculture so land elsewhere such as isolated forest patches can be given in such land swaps and the recovered land would need to be developed as elephant habitat. This again requires clear planning and prioritising as it may not be possible in all areas.

***Habitat fragmentation*:** Fragmentation causes far more harm that the actual physical areas used by a development project or the other causes for fragmentation and, therefore, special attention needs to be given to this aspect.

1. Fragmentation caused by linear development can sometime be reversed not by removal of the development but by developing passages across the area. This is particularly true with roads, railway lines canals, and penstock pipes. However, two im-

portant points need to be taken into consideration. First, such interventions offer relief to only a small sub-set of the affected population as not all elephant clans will use the same paths. Elephants using other paths would have come into conflict elsewhere and are unlikely to come back to check if the passage is still open. Second, such interventions are likely to be very expensive in many cases. So inputs need to be prioritized and should be based on good data and analysis of the need.

2. Within the major landscapes that harbour viable populations of elephants, efforts can be made to restore more recently fragmented corridors that are still being used by elephants. However, corridors to address the needs of dispersing animals or those living in high conflict areas, which do not have much potential for long-term conservation, should not be attempted without a detailed study.

Containing residual elephant-human conflict

Despite all these efforts elephant-human conflicts will still persist at the interface of forests and human use areas, and this can only be done by stopping elephants from entering such areas or, where that fails, by compensating people for the loss.

1. Conservation and Coexistence Zones (see Table 3 on page 46)

1.1 ***Guarding***: This method is the primary factor reducing conflicts and as such there is a need to improve it as it is largely implemented by farmers. It is suitable for low conflict areas and is the best way of stopping opportunistic crop raiding. It is not effective against obligatory crop raiding elephants.

a. Need to identify all methods used and assess them to find out the most effective and innovative approaches. These methods can then be taught to others.

b. Capacity building of communities is critical so that they are aware of their options and the most effective methods. They also have to be trained in organizing community-based protection and planning.

c. Facilitating guarding (everything should be done through Eco-development Committees, Joint Forest Management committees or similar institutions).

d. Organizing community guarding is important as it allows individual farmers rest as the work load per individual in community guarding is far less than when done independently.

e. Developing anti-depredation squads where conflict is higher. Such drives should only focus on driving the elephants away from the village and its agricultural field and should not extend the drive by more than 500 meters into the forest.

f. This would involve development of community based anti-depredation squads that can function independently. Such squads should be supported by training them in elephant driving techniques.

g. Anti-depredation squads to deal with elephants that are more problematic should also be developed. They would be largely deployed in areas, which do not have

barriers, and also in areas with barriers where they would guard the fence and that would make it more effective. They too would need to drive the elephants only for a certain distance into the forest. A long drive may result in un-necessary disturbance to other elephants and it may also send these elephants to the next village. They would need the following support in the form of vehicles to cover large areas, noise-making devices, training in driving tactics and safety measures when dealing with elephants, and knowledge of map reading and using tools like GPS

1.2 ***Barriers***: Primarily barriers involve Electric Fences (EF) and Elephant Proof Trenches (EPT). These are needed where elephant-human conflict is severe and obligatory. In areas with very serious conflicts only EPT will work in a meaningful way. Electric fences are powered by energizers and they give out electricity in very short pulses (milliseconds) and are hence not a danger to animals or people. Both Electric Fences and EPTs have failed in many areas primarily because of faulty implementation and monitoring. So these need to be rectified. Community participation is critical from design stage to monitoring, rather than entrust this to profit-making companies.

1.3*Compensation:* When all else fails and elephants do get through and cause damage compensation has to be paid.

a. Adequate compensation needs to be given but this cannot be a direct value of the loss as it would then remove all motivation to protect crops or to participate in any protection activity.

b. Timely disbursal of compensation with minimum paper work for the claimant and without repeated visits to the government offices is needed.

1.4 ***Dealing with elephants that disperse out of the normal elephant ranges:*** These elephants wander off into areas where people are not aware of elephants and generally where no habitat exists. What is seen from several such dispersals is that the cost in terms of loss of human lives and elephant deaths is very high. In the absence of a policy on such problems an ad hoc approach is taken where little or nothing tangible is done other than chase the elephants around. There is a clear need to develop a clear policy on such dispersals and the policy needs to address the following:

a. Should such dispersals be allowed? These generally happen when habitat conditions in their original range are degraded to a point where they cannot get enough sustenance to survive or where local over abundance has driven them out. The policy can be a yes or no or it can be neutral and allow decision making based on the availability of habitat in the new areas and the potential to ensure that severe conflict does not take place.

b. If they are to be retained in the new area then resources needed to manage them would have to be made available as soon as the problem starts. Capacity building of local staff and awareness campaigns in the newly affected areas would have to be started immediately if high human casualties are to be stopped.

c. Support staff from areas with elephants would have to be deputed to take charge

of the situation

d. Plans for containing them is some suitable area would also have to be made and implemented

e. If however dispersal is not to be allowed these elephants would have to be either translocated back to their native habitat and barriers built to ensure that they do not break out again. They would also need to be radio-collared to monitor if they break out elsewhere and also to understand what factor drove them out of their original home range.

2. Removal Zones

Elephants living in non-viable areas (see Table 3 on page 46), outside their normal range, need to removed as they take the bulk of conservation funds and do not provide any conservation gains. The only option is such cases where there is no elephant habitat and little potential for long-term conservation is removal. This can be done in the following ways

a. ***Bringing into captivity:*** These elephants can be captured and brought into captivity and kept in captivity for the rest of their lives. There are no direct conservation gains as these elephants are lost to the wild. The gene pool of these elephants is however preserved. Indirect gains may also accrue from the use of these elephants to patrol forests for protection or use them in management of conflicts. Humane management of such elephants is critical so all such camps would need to have quality maintenance standards and these would need to be effectively monitored. Adequate resources would need to be dedicated for their maintenance.

b. ***Translocation:*** These elephants can be translocated to their native habitat but only when their habitat has been fully covered with barriers so that they do not wander out again. They can also be translocated to other good habitats far away so that they cannot return. This also brings the risk of transferring the conflict problem to another area. In such cases (absence of barriers) there would be a need to have monitoring teams and intervention teams to ensure that they do not come out of their new range and cause problems or try to return. Translocation may offer some conservation gain as these elephants continue to live in the wild in viable areas.

c. ***Fertility control:*** *In situ* fertility control using immuno-contraceptives is a possible option, but requires more research as well as considerable difficulties in field implementation. Further, this method would take time scales of several decades to reduce elephant population size, with the result that conflicts would continue in the meantime.

d. ***Culling:*** From the ethical, socio-cultural and legal perspectives the option of killing entire family groups is not available. An individual elephant that has become dangerous to people may be proscribed by the Chief Wildlife Warden under Chapter 11 of Wild Life Protection Act, 1972.

2.3 Population and habitat viability for elephant conservation

Although a slow breeder, with adult females producing a calf every 4-5 years on average, the death rates in elephants are also extremely low with adults typically experiencing 1-3% mortality each year. Asian elephant populations are capable on increasing in the medium-term at a rate of not more than about 2% per year[9]. Typically, when an animal population reaches the "carrying capacity" of the habitat in which it is found, the population growth rate slows down because of lowered birth rate or increased death rate or both, a process known as "density-dependent" regulation of the population. On the other hand, a population that has reached or exceeded the carrying capacity may also show "range expansion" or "disperse" to newer habitats and successfully colonize them. When sufficient natural habitat is not available for them to disperse to, such attempts at dispersal usually fail as the elephants may come into serious conflict with people and be eliminated eventually. Dispersal of elephants may also be associated with adverse climatic events such as a serious drought[17].

The conservation of elephants has to take into consideration, not only the above ecological processes, but also the viability of a population in demographic and genetic terms[18,19]as well as the viability of its habitat. Population and habitat viability analysis (PHVA) has been extensively used for various species in order to determine the risk that a population faces from stochastic (chance) extinction (Conservation Breeding Specialist Group of IUCN/SSC).In general, the smaller the size of an animal population the greater the risk it faces from chance extinction, and a similar argument can be made with respect to habitat area available for a population. With regard to Asian elephants, models have shown that a population of 100-300 elephants depending on structure, sex ratio, demography and ecological pressures would be needed to ensure high probability of survival over a 100-year period with minimum genetic erosion, and a much larger number, perhaps 10-fold, for long-term conservation[6]. The minimum habitat area required to achieve these conservation targets for elephants would be of the order of 200-600 km^2 in the short term and 2000-6000 km^2 in the long term depending on habitat type, quality and carrying capacity[5,20].

An examination of Karnataka's elephant areas shows that the isolated and relatively small population in northern Karnataka has sufficient habitat but perhaps insufficient numbers, the isolated Bhadra Tiger Reserve meets the requirement of both viable population size and viable habitat in the short-term, while the larger Mysore Elephant Reserve certainly meets both these requirements for long-term conservation of the elephant. The viability of other areas, either in terms of population size or in terms of natural habitat available, is questionable.

[17] Sukumar, R. 1995. Minimum viable populations for elephant conservation. In: JC Daniel and HS Datye (eds.) *A Week with Elephants*. Oxford University Press, New Delhi.

[18] Shaffer, M. 1981. Minimum viable populations for species conservation. *BioScience* 31: 131-134.

[19] Boyce, M. 1992. Population viability analysis. *Annual Review of Ecology and Systematics* 23: 481-506.

[20] Ambruster, P. and Lande, R. 1993. A population viability analysis for African elephant (*Loxodonta africana*): How big should reserves be? *Conservation Biology* 7: 602-610.

Picture courtesy: Google Earth

Elephant
Conservation Zone

Elephant
Coexistence Zone

Elephant
Removal Zone

Chapter 3

Managing wild elephants in Karnataka: a zone-based prioritisation approach

3.1 Introduction

Conservation policy in India currently adopts approaches that are both land-based and species-based. On the one hand, we have designated lands—our protected areas (PAs)—where wildlife conservation is accorded highest priority. On the other hand, we have also legislated that certain species must be protected regardless of where they occur. These two approaches coincide easily when a protected species generally stays within the confines of a PA. But when a large and potentially dangerous animal like the elephant occurs in or moves beyond PA boundaries into areas that include not only forests, but also agricultural lands and settlements, then the land-based approach falls short and the species-based approaches comes into conflict with human lives and livelihoods. This has been at the core of the elephant-human conflict issue in Karnataka and elsewhere.

While we can, and indeed must, prioritise the conservation of elephant within designated PAs, can we accord the species the same privilege where they occur far from PAs or Elephant Reserves, often in the heart of human dwelling and production areas? The wide-ranging nature of elephants brings this problem sharply into focus, and requires strategies that extend outside PAs into broader conservation landscapes and beyond, but in a graduated manner. Unless distinct and unambiguous management priorities are provided to the Forest Department for distinct regions, elephant conservation and human well-being will remain riddled with confusion and contradictions.

We begin by reiterating the broad goals of elephant conservation laid down in Chapter 1: to ensure the long-term survival of viable populations of elephants living in viable habitats, as well as reducing conflict levels between elephants and people so as to relieve human suffering, promote greater acceptance and tolerance of elephants. This needs to be done in a way that is inclusive, and both financially and technically feasible.

There will inevitably be some trade-offs between these multiple goals, and the extent of the trade-offs will vary by location: in some areas, prioritizing elephant conservation could impose a major cost of people's livelihoods, while in others current livelihood and development strategies would impose high conservation costs. To strike a reasonable balance, we propose a ***zone-based prioritisation*** of management goals, which, at the scale of the entire state are intended to promote long-term coexistence between elephants and people, but at local scales may prioritise one over the other.

In this chapter, we outline a rationale and the specific criteria for the zonation strategy we propose for Karnataka (sections 3.2 and 3.3). We then suggest the main management strategies for each of these zones (section 3.4), including zone-specific and cross-cutting strategies. We then illustrate the assignment of zones and the application of management strategies to particular sites, using case studies (sections 3.5.1, 3.5.2, and 3.5.4). These also relate to certain specific issues referred to us by the Honourable High Court. More detailed discussion of some of the key strategies then follows in Chapter 4 (corridor protection), Chapter 5 (cross-cutting issues) and Chapter 6 (captive elephant welfare).

3.2 Elephant management zones in Karnataka: the rationale

The habitats currently inhabited by elephants in Karnataka (Figure 2) encompass a diverse ecological and socioeconomic milieu. While some PAs in the north have little

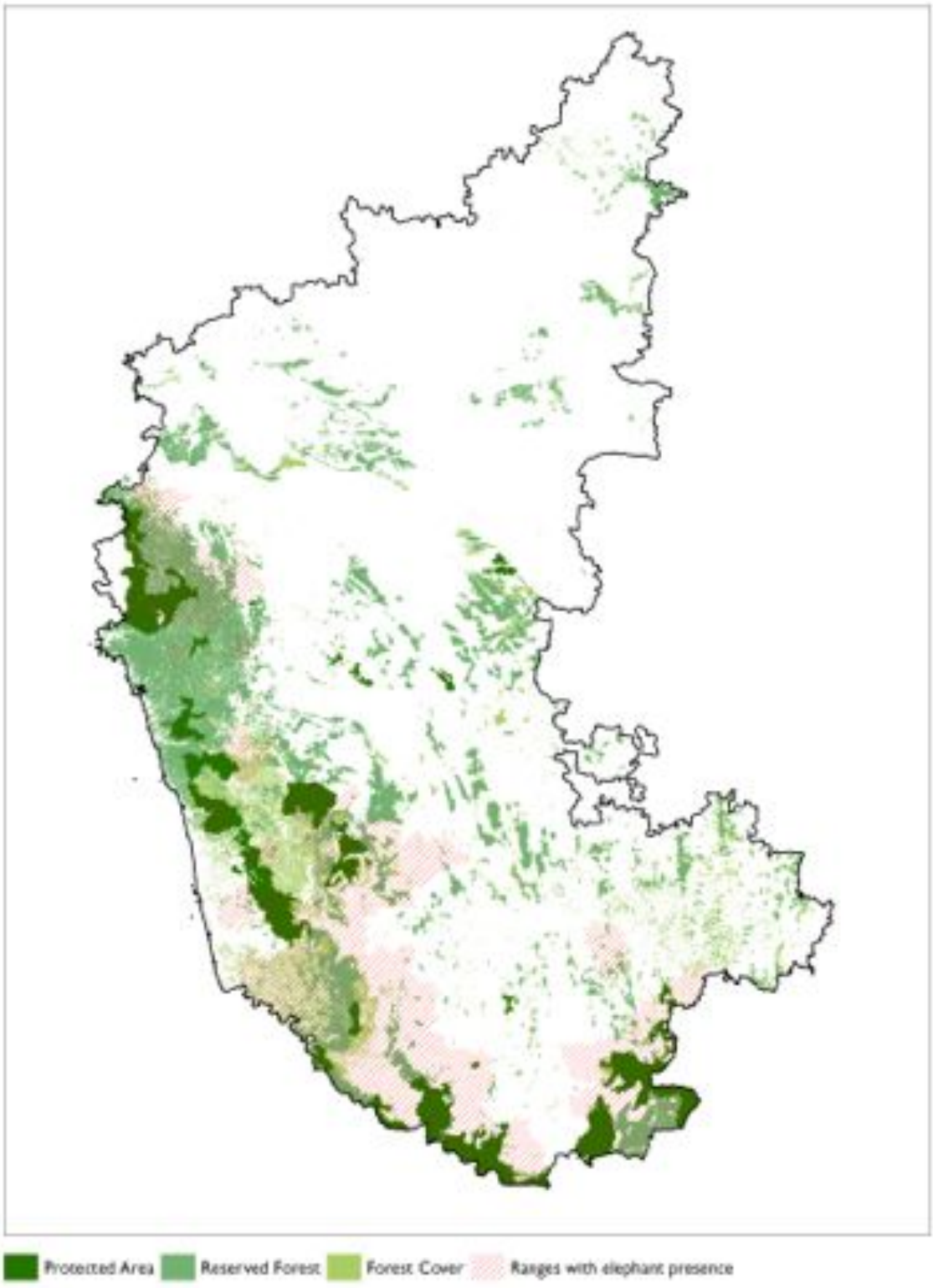

Figure 2: Distribution of elephants in Karnataka state in relation to its forest cover.

elephant presence, elephants occur frequently outside non-PA forests as well as in non-forested landscapes. On the whole, it appears that three types of situations occur commonly. Some areas are characterized by large, unbroken tracts of natural habitat with relatively low levels of human presence and activity, and year-round supply of forage and water under which large elephant populations can flourish over the long-term. Nagarahole and Bandipur National Parks are good examples of this situation. At the other extreme, there are areas such as Alur *taluk* of Hassan district where relatively small elephant populations have taken permanent residence in the heart of agricultural landscapes dotted with hundreds of human settlements, resulting in protracted and intense conflict. A third type of situation is where the natural habitats of a moderately large population of elephants are juxtaposed with human production landscapes over a substantial region in such complex ways that there are virtually no practical options of permanently separating elephants and people. Parts of the coffee-growing region of Kodagu district represent such a situation.

Given this typology of situations, we propose that, for the state of Karnataka, every forest administrative unit (at the level of Forest Range, Section, or Beat/Compartment, as may be appropriate) in the elephant's distributional range be officially designated under one of three broad management zones:

1. ***Elephant Conservation Zones***, where primarily elephant conservation takes priority over competing livelihood goals;
2. ***Elephant-Human Coexistence Zones***, where both elephant conservation and human livelihoods have to be balanced and reconciled; and
3. ***Elephant Removal Zones***, where concerns of human safety and livelihood take precedence over competing conservation concerns about elephants.

It should be noted that, in all cases, 'giving priority' to one goal does not mean to the complete exclusion of other goals. For instance, in the Elephant Conservation zone, some human settlements are likely to be present and will likely continue to exist. The existing framework provided by various laws governing conservation, forests, animal welfare, and land rights, as well as various Supreme Court judgements must, of course, be followed. The zoning proposed here is a management framework, to be used for defining priorities and strategies within the legal framework.

3.3 Criteria for zonation

What should be the basis for such a zonation? Below, in Table 3, we list a preliminary set of criteria that can be used to determine which zone an administrative unit would belong to.

In addition to elephant presence and human populations, area of wild elephant habitat, area of human production activities, and connectivity are criteria that should be used to determine the zonation. Thus, if a given area is part of a large tract of contiguous natural habitat supporting high densities of elephants, with minimal human-use areas, low interface between forest and human use areas, low human densities, and high levels of connectivity to similar habitats, it would qualify as an Elephant Conservation Zone.

Table 3: A preliminary set of ecological and social criteria proposed for designating forest ranges / sections into the three elephant management zones.

Range-wise criteria for zonation		Criterion Value		
A	Area of potential forest habitat available	High	Intermediate	Low
B	Area under human-dominated use	Low	Intermediate	High
C	Degree of interface between potential forest habitats and human-dominated areas	Low	Intermediate	High
D	Human population density within the range	Low	Intermediate	High
E	Measure of elephant abundance (e.g., dung encounter rate)	High	Intermediate	Low
F	Connectivity value of range in a landscape context	High	Intermediate	Low
Suggested management priority > > >		**CONSERVATION**	**COEXISTENCE**	**REMOVAL**

Contiguous forested tracts in Mysore, Chamarajanagara and Kodagu districts are prime candidates for inclusion in this Zone. Note that although conservation will be prioritized in this zone, a small number of human settlements would continue to exist within the zone.

Where elephant habitats is of intermediate extent, elephant and human populations are moderate, and the boundary between elephant habitat and agricultural areas is lengthy and convoluted, it is necessary to focus on re-conciliation between livelihoods and conservation through conflict mitigation measures. Prime candidates for such a zone would be in the forest areas north of the Cauvery River up to Gangavara Reserve Forest in Kodagu district as well as the forests of western side of Sakaleshpur *taluk* in Hassan district (see section 3.6 below).

Finally, areas with small numbers of itinerant or isolated elephant populations in the midst of farming and human-dwelling areas would have to be considered as livelihood priority such as the *taluks* of Alur, Arkalgud, and parts of the elephant range northwest of Bannerghatta, that extend into the districts of Ramanagara, Tumkur, and even Chikmagalur plains would fall into an Elephant Removal Zone.

Although we give examples above, we emphasize that actual zonation requires a dedicated effort that brings together data on elephant censuses, land-cover, human population, etc., and maps them onto forest administrative boundary maps. We also emphasize that the zonation should give far more emphasis on and priority to ecological patterns and boundaries rather than to forest and political administrative boundaries (such as Forest Range/Division or *taluks*/District). In other words, an entire Forest Division or Range need not be classified under a single elephant management zone, but can be subdivided based on the ground situation and ecological considerations. We recommend that this process of zonation as well as that of guiding elephant management in all the zones be carried out by a Karnataka Elephant Expert Group to be set up for this purpose.

3.4 Management strategies within and across zones

Each zone will require different management strategies. We spell out these zone-specific strategies below (sections 3.4.1, 3.4.2, 3.4.3) followed by an outline of other strategies that would be common to all zones (section 3.4.4). It must be noted that some of these strategies are already in use. In those cases, we focus on improvements that may be required.

3.4.1 Management strategies in the Elephant Conservation Zone

Given that elephant conservation has to be the priority in this zone, we suggest the following management strategies.

1. **Keeping elephants 'in'**: One major strategy already in place is the use of barriers (elephant-proof trenches, electric fences, concrete or other means) to keep elephants in. The quality of current efforts is reviewed separately (Appendix C). This can be effective where long stretches of relatively straight boundaries and easy terrain exist.
2. **Preventing poaching**: Ivory will always remain a high-value item in illegal ivory markets, and hence it will always be necessary to sustain a high level of vigilance to prevent poaching of bull elephants. While anti-poaching measures are substantially in place, improvements are required in the prosecution of offences.
3. **Managing PAs with elephants in mind**: A major portion of the Elephant Conservation zone will be PAs. Several activities have been traditionally undertaken in PAs for 'improving' the quality of habitats for elephants and other wildlife. Examples of this include the seeding of bamboo, removal of invasive plants such as *Lantana camara* in order to restore natural vegetation, and the creation/maintenance of artificial water sources. As some of these measures, especially artificial water provisioning, may have unintended long-term consequences for elephants and their habitats (including local overabundance of elephants and increased pressure on natural vegetation), these are best done after careful scientific discussion and endorsement.
4. **Managing other designated forests with elephants in mind**: The Elephant Conservation Zone will also contain significant non-PA forests. In most cases in Karnataka, these will be already notified RFs. Here, the management is currently in the hands of the territorial wing and is generally focused on plantation activity or revenue generation. Once an RF has been designated as falling within the Elephant Conservation zone, the management of these RFs must give significant priority to elephant conservation. For instance, in the course of the field visits, it emerged that large scale replacement of natural forest with monoculture plantations of teak (*Tectona grandis*), with virtually barren undergrowth, may also have contributed to the degradation of natural habitat and lack of fodder for elephants. Based on past experience of KFD in silvicultural treatment of teak plantations to promote the growth of native trees, the Karnataka Elephant Expert Group, in consultation with reputed scientific institutions, should advise on restoration of mixed natural forest within teak plantations, with a view to genuinely improving the habitat for elephants.
5. **Managing non-notified forest lands for elephants:** In the rare cases where a forest is classified as under the Elephant Conservation zone, but happens to lie outside notified RF boundaries, steps for better regulation of such 'deemed forest lands' will be required. This will involve a) clear identification of such lands and clarification of their legal status, b) where such lands are government-owned, with rights/privileges for local use, exploring possibilities of notifying them as either Protected Forest or Village Forest under the KFA, after full consultation with local communities, c) maintaining communication with the local Tahsildar and Deputy Commissioner to ensure that permission for the conversion of any of these deemed forest lands to non-forest

uses (such as quarrying or mini-hydel generation) will be routed through the Chief Wildlife Warden.

6. **Regulating development in or around elephant habitat**: Despite protection offered to elephant habitats in the Conservation Zone under the WLPA and the FCA, a whole range of commercial and developmental projects are currently proposed on private lands within this zone or along the periphery that could threaten the integrity of elephant habitats or cause serious disturbance. Better implementation of existing WLPA and FCA provisions, as well as recent Supreme Court rulings is required in this case. The declaration of surrounding areas as Ecologically Sensitive Areas under the Environmental Protection Act 1980 should be the preferred strategy to regulate land use, which is illustrated in the Bandipur case study below. Stricter regulation of commercial activities such as quarrying and mining is required within a 100m buffer along forest boundaries; this is discussed in chapter 5.
7. **Corridors**: In exceptional cases, where small parcels of private lands are crucial for elephant movement within the Elephant Conservation zone, proposals for purchasing land that is critical for such corridors may be considered. This is discussed in detail in Chapter 4.
8. **Managing local dependence on biomass from elephant habitats**: Despite most of the areas within the Conservation Zone being designated as PAs and RFs, which do impose certain restrictions on use of biomass resources by local people, it may safely be said that current dependence and use (such as for firewood and grazing) is in many cases higher than what would be harmonious with elephant conservation objectives. Yet, given the immense human livelihood significance of many of these activities, forced curtailment is not possible, as past experience has shown. A strategy based on dissemination of dependence-reducing technologies, such as LPG for cooking, is required. This is illustrated below with the case of Bandipur National Park.
9. **Collaborative Governance:** The Conservation Zone will by definition have low human presence. Nevertheless, human settlements, particularly those of Scheduled Tribes, are present in the interiors of several of Karnataka's PAs. Moreover, there is substantial dependence of communities on the fringes of the PAs on the forests. Finally, under the FRA, these communities not only have the right to use the forests, but also to conserve and manage them for biodiversity and resource sustainability. For instance, a large part of the Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary (now a Tiger Reserve) would clearly be part of the Elephant Conservation Zone. This WLS contains more than 4,000 *Soliga* (an ST community) inside and on its fringes. Twenty-five *Soliga* settlements in the WLS have been given Community Forest Rights under the FRA that together cover virtually the entire WLS area. The conferring of these rights currently results in a regime of overlapping rights and authority between the *adivasis* and the Karnataka Forest Department. Currently, there is no clarity on how this overlap and potential conflicts arising from it would be addressed. We are inclined to see this overlap as a potential opportunity for new models of conservation rather than as a threat. Hence, in such situations, we recommend that:

a. The State and the *adivasis*, in consultation with experts, jointly draw up management plans compatible with the goals of conservation, including elephant conservation, clarifying their respective rights, roles and responsibilities to further conservation through a democratic process, and to hold each other accountable to that commitment.

b. **Where FRA does not apply, setting up Elephant Conservation Committees** at the Range level, consisting of local elected representatives (*Zilla Panchayat* or *Taluk Panchayat*), forest officials and NGOs, to enable better liaison with local communities, hearing grievances regarding problems in receiving compensation, and tabling suggestions for areas to be fenced. Furthermore, devolution of tasks related to maintenance of barriers such as electric fences and elephant-proof trenched to village-level committees should be the preferred model of conflict mitigation.

3.4.2 Management in the Elephant-human Coexistence Zone

Within Coexistence Zones, the focus will be on limiting conflict through much more active management and local involvement. Based on the experience with co-existence, we should have an open mind to either move such areas into the Elephant Removal Zone or Conservation Zone as necessary in future. The following strategies will be important:

1. **Keeping elephants out:** Lengthy stretches of barriers being precluded, the use of EPTs and/or non-lethal electric fences around common agricultural land and settlements is essential. While FD may install such barriers to begin with (with community consultation), maintenance of the barriers should be handed over to the *Gram Panchayat*s along with maintenance funds and accountability on their part.
2. **Better understanding of elephant movements:** While elephant movements in Conservation Zone are expected to be largely within natural habitat, the Coexistence Zone will be characterised by movement in and out of its natural habitat. Information on elephant movements in such areas is crucial, but often scanty. A concerted effort to monitor and map movements in such areas will be required.
3. **Managing notified forests for co-existence:** It is expected that significant portions of forested areas in this zone will not be PAs, and may not even be notified forests. The notified forests are being managed by the territorial wing. Both areas need to be listed as elephant habitat areas by the Project Elephant authorities. Specifically:
    a. No plantations of exotics should be taken up in forest lands, and choice of species must keep both livelihood and elephant needs in mind.
    b. All proposals for forest diversion under FCA in such areas must be routed through the Chief Wildlife Warden.
4. **Managing non-notified forests for co-existence:** The Co-existence Zone may contain significant pockets of community-use areas not notified as forests but constituting significant elephant habitat. For instance, many of the *baanes* and *paisaris* of Kodagu and the *gomaal* lands or other revenue lands of Chikmagalur and Hassan districts are thickly forested (and are termed 'deemed forest' for the purposes of the FCA, as per the 1996 Supreme Court order). Their management must focus on preventing further

encroachment and also regulating conversion to other uses, without denying legitimate usufruct rights. Notifying them as a legal forest category appropriate for this situation, such as Village Forests or Protected Forests under the KFA, or Community Forest Resources under the FRA, can be the strategy for better management.

5. **Managing elephants in private lands:** Significant areas of the co-existence zone may contain coffee or other plantations that provide a semi-natural habitat for elephants (at least to inhabit during the day). Strategies for these lands that may be explored include:

    a. Creating fence-free corridors: It would be necessary to plantation owners and other farmers to avoid erection of fences at key corridor points in order to allow movement of elephants from one forest patch to another. The precise land areas for such "corridors" will have to be determined through detailed ground surveys in the Co-existence Zone. It must be emphasized there that allowing such movement of elephants would result in plantation owners and farmers paying a high cost in terms of damage to crops and, possibly, also the occasional loss of human lives. Thus, a different and more generous incentive/compensatory regime would have to be worked out for such lands.

    b. Purchase of highly conflict-ridden areas: Small parcels of lands that (after long-term monitoring) are proven to be sites of continuous elephant movement and conflict/danger to human beings, may also be considered for purchase. These would be lands on the path between two forested areas. This idea of corridor protection is discussed at length in Chapter 4.

6. **Reducing other causes of disturbance or barriers to elephant movement**: Often, the cause of conflict or elephant distress may not be agriculture but the creation of other barriers to movement or sources of disturbance, such as roads, pipelines, railway lines. The abovementioned monitoring process will identify such barriers and disturbance points. Activities in violation of WLPA, FCA and related court orders must be immediately shut down. Other barriers created with due process (but possibly at a time when data were inadequate) need to be circumvented through innovative means, such as bridges for elephant movement.

7. **Collaborative management**: Areas where human presence, forest use, and production activities will continue require a much more collaborative approach. Committees can be set up at the Range level, involving *Gram Panchayat* members, civil society groups, and foresters. These committees would be tasked with supervision of fencing location and monitoring maintenance, grievance redressal for compensation claims, installing and running early warning systems, and awareness campaigns.

3.4.3 Management in the Elephant Removal Zone

By definition, the strategy for the Removal Zone is elephant removal. However, this being an extreme step, it is necessary that the first step in a potential removal zone is rigorous examination of its zoning itself, viz., confirming that the area cannot be a co-existence area. Public consultation will be an integral part of this process. Only when it is

clear that the co-existence option is not possible should an area be declared a Removal Zone.

1. **Identifying the elephant population to be removed:** A field survey to determine the composition of the elephant population as well as a basic understanding of its movement patterns is a prerequisite to any decision to capture elephants from the Removal Zone. This information would provide a better appreciation of the logistics of the capture operation.
2. **Capture:** The capture operation itself has to be meticulously planned with the help and participation of experts including veterinarians, mahouts, wildlife biologists and experienced forest officers. Sufficient resources, both in terms of manpower and equipment, would be needed to carry out the operations. Modern methods such as drug immobilization would be the preferred choice in capture.
3. **Relocation:** The decision on relocation of the elephants to another forest area in the state would depend on a number of considerations including the behavioural patterns of the elephants, the age and sex composition, the number of years the elephants have resided in the Removal Zone, and the acceptance or otherwise of local people at the site of proposed relocation.
4. **Retention in captivity:** If relocation to another natural forest habitat is considered impractical, the elephants should be retained in captivity for use by the forest department (discussed in Chapter 6)

3.4.4 Cross-cutting strategies

In addition to the above zone-specific management strategies, many strategies would be common to all zones.

1. **Awareness building**: Many traditional forest-dwellers are well-versed in elephant behaviour and are culturally sensitive to the importance of elephants in the landscape. However, agrarian communities in general, and recent immigrants in particular, are less knowledgeable and also less sensitive. Across all zones, an awareness building campaign that increases sensitivity but also improves ability to deal with elephant presence is required.
2. **Improving the *ex gratia* mechanism**: Karnataka state has one of the most generous packages of *ex gratia* payments for crop damage and human injury/death due to elephants. However, improvements in its implementation are necessary and possible. This is discussed at length in Chapter 5.
3. **Improving monitoring**: Currently, information gathered by the department is not fully collated and available (both within and publicly) for analysis. For instance, information on the exact location of elephant death, human death or crop damage is not collected (only village names are noted where possible, no GPS reading is taken), and (more important) this information is not passed on regularly to CCF Project Elephant from across the state, nor stored centrally elsewhere. Thus, the KFD had to put in substantial efforts to collate this information for this Task Force to produce maps of human-elephant conflict sites.

4. **Research**: Specific studies are required on elephant demography, role of the exotic invasive plant *Lantana camara* in affecting elephant habitat, strategies for replacing monoculture plantations in elephant habitats, elephant ecology, and the functioning of the compensation programme, among other themes. These research needs are discussed in more detail in Chapter 7

5. **Long-term planning and adaptive management:** None of the above strategies is either formulaic or easy to implement. Moreover, the KFD staff has many other tasks on their hands, not just elephant conservation, and do not always all the necessary expertise in-house. Consequently, a designated body for **setting direction, planning, assistance, and advice in implementation** is essential for elephant conservation in Karnataka state to reach the next level of effectiveness and social sensitivity. For this purpose, we recommend, as mentioned above, the creation of a **Karnataka Elephant Expert Group** under the State Board for Wildlife, with the following terms of reference.

   Composition: This Group must include ecologists/wildlife biologists and social scientists who can bring in sound knowledge of elephant ecology and human society, along with the Chief Wildlife Warden and other relevant forest officers.

   Tasks in the Planning Phase: In the planning phase (say, two years), the Group shall undertake a rigorous effort to compile (and, where needed, generate) data on elephant ecology and behaviour, land use and land cover, and socioeconomic factors among others, and map them on to forest administrative boundary maps to propose a zonation of elephant's range across Karnataka into Conservation, Coexistence and Removal Zones. Further, they shall propose a Karnataka Elephant Conservation and Management Plan comprising detailed zone- and site-specific strategies, as well as crosscutting state-wide strategies to enable elephant conservation at the level of Forest Divisions. The Group should develop clear guidelines on the management of each zone (including the corrective action to be taken for measures that are not yielding the expected results), which should become the basis for the management approach to be taken by KFD. In doing this, we urge the Group to also take into account the action plan and recommendations of the first Task Force set up in 1990 by Government of India to prepare the blueprint for Project Elephant at the national level, as well as the Elephant Task Force in its 2010 report, Gajah[21]. In addition, in the context of consolidating elephant landscapes, we think it would also be very helpful if the Group takes into account the approach and recommendations of the Western Ghats Ecology Expert Panel on delineating ecologically sensitive areas[22]. The Group must also make recommendations on relevant legal and financial mechanisms needed at the State level to implement the Plan.

   Tasks in Implementation Phase: After the planning phase, we recommend that the State Government create the necessary mechanisms and allocate financial resources to support the implementation of this Plan. In the first phase of implementation (say, three

[21] Government of India. 2010. Gajah: securing the future for elephants in India. http://www.moef.nic.in/downloads/public-information/ETF_REPORT_FINAL.pdf

[22] Government of India. 2011. Report of the Western Ghats Ecology Expert Panel. http://moef.nic.in/downloads/public-information/wg-23052012.pdf

years following the planning phase), the Group shall itself provide guidance and, where necessary, also help the process of implementing the Plan.

Review and Course Corrections: We recommend that detailed annual reviews of implementation are held at the field- and state-level. Further, the Plan itself must be subject to five-yearly technical reviews, and revised as appropriate. The entire planning and implementation must involve public processes, and at the end of the fifth year, be subject to both open expert reviews, as well as public audits of process and outcome.

6. Implementing recommendations in the above sections has considerable financial implications. The Government of Karnataka must strengthen elephant conservation in the State by increasing its budgetary allocation (and by leveraging additional funds from the Central Government). We also recommend that the State must empower this Expert Group (Para 5 above) to monitor the effective utilization of these funds and other resources towards elephant conservation.

3.5 Case studies

Having outlined the possible strategies to be used in each zone and cross-cutting ones, we now illustrate how specific strategies may be chosen and management decisions may be made for specific sites. We undertake a detailed examination of issues at three sites—Bandipur, south-western Sakaleshpur, and Alur—falling in the Conservation, Coexistence and Removal zones, respectively. In the case of Bandipur, some innovative strategies have already been implemented, and we review and highlight their gains, and suggest improvements. The other two cases pertain to sites of significant human-elephant conflict, for which the Honourable High Court has specifically sought recommendations from this Task Force. Accordingly, we evaluate options and recommend ways forward. In addition to detailed case studies from these three sites, we also summarise an analysis of issues from Malavalli Range of Mandya along River Cauvery, pertaining to disturbances to elephant habitat, and possibly driving their dispersal from traditional ranges.

3.5.1 Bandipur: strengthening management in the Elephant Conservation Zone

Location and characteristics

Bandipur is not only a National Park and Tiger Reserve, but also a key area for elephant conservation and naturally falls into the Conservation Zone. Spread over an area of 880 km^2 in the southern Mysore plateau, this national park adjoins the Nagarahole National Park and Tiger Reserve to its north, Waynad Wildlife Sanctuary (Kerala) to its west, and Mudumalai Tiger Reserve (Tamil Nadu) to its south. To the north it abuts the cultivated plains of the Mysore plateau. With a rainfall gradient from east (low) to west (high), Bandipur includes tropical dry thorn forest, dry deciduous forest and patches of moist deciduous forest. The Nugu and Mulehole are two perennial rivers flowing through Bandipur, while the Kabini reservoir along its northern boundary also holds water throughout the year. A number of artificial waterholes and the Mangala dam in the tourism zone are also important sources of water for wildlife. Bandipur has no human settlement within its boundaries with the exception of forest-department facilities.

Controlling poaching

The park management keeps vigil against through its network of 38 anti-poaching camps and recently created Special Tiger Protection Force, which are mainly distributed across sensitive locations. As a result, poaching cases over the last 5 years, according to official figures, have been nil, whereas, in the previous 10 years, a total 27 animals had been poached.

Strengthening and maintaining barriers

Following a huge escalation of conflicts and retaliatory killing of elephants in 2008-09, Bandipur commenced a concerted effort to strengthen its inclusion barriers, mainly to the north of the park where the main interface with agriculture lies. As a result, up to 2012, a total of 218 km of electric fencing, and a total of 175 km of elephant-proof trenches were created. In order to ensure better maintenance, 102 km of service roads were constructed along the fence, and 26 sheds were constructed all along the fence perimeter to ensure maintenance. This has had a significant impact on the number of crop damage incidents, human deaths from elephants as well as on the retaliatory killing of elephants by farmers (see Table 4). One of the key aspects of this effort has also been the involvement of local Eco Development Committees drawn from local people, which have been empowered and supported to maintain these barriers. These arrangements with local communities need to be clearly documented to ensure that there is continuity and improvement in their functioning despite turnover in officials.

Table 4: Trends in conflict as indexed by crop damage claims and disbursements, and elephant and human deaths in conflict in Bandipur before and after extensive effort to strengthen barriers along its northern boundary in 2009-10. (Source: KFD data)

Year	Total crop damage claims (No.of incidents)	Total disbursements (in lakh rupees)	Electrocution of elephants (No.of elephants)	Human deaths (No. of persons)
2007 – 08	4,911	47.29	9	6
2008 – 09	8,870	93.47	10	4
2009 – 10	6,040	97.20	8	2
2010 – 11	2,408	50.56	3	1
2011 – 12	680	14.00	3	0

Managing elephant habitat inside Protected Areas

One of the key issues in Bandipur concerns the management of elephant habitats within its forest areas. Many activities undertaken by the management are in the belief that such action helps—or at least, does not hurt—conservation of wildlife. However, there is accumulating evidence here and elsewhere that such actions, which include the regular clearing and maintenance of a dense network of roads, altering of local hydrological

regimes through the creation of check dams and waterholes, may not always be benign[23]. As part of being a Tiger Reserve, Bandipur has prepared Tiger Conservation Plans that have been reviewed, and the impact of management activities is one area where many pertinent observations have been made by reviewers, which need to be taken on board even in the context of elephant conservation. On a related note, as an area that is part of an alternate management regime which prioritises the tiger, it is of utmost importance that these measures be made more coherent with the objectives of elephant conservation.

Even with a relatively well-consolidated park like Bandipur, we noted that there are issues of possible encroachments (around Huskur Mala of Moliyur Range) and problems of disputed boundaries (near Kenchanahalli in N. Begur Range). These issues are long-pending and must be addressed at the soonest.

Managing non-PA notified forests for conservation by rationalising administration

Bandipur TR has pursued the rationalisation of management within designated forest areas fairly systematically. Over the last three years, it has ensured that areas that were immediately abutting Bandipur, but administratively outside their control, have been brought under their control. Examples of this include the newly created Omkara Range, where elephants from Bandipur had moved into this area (which was earlier part of Mysore Forest Division) causing serious conflicts, especially during 2007-08. Likewise, the recent inclusion of Gundlupet Range (earlier part of Kollegal forest Division) as a Buffer Range of Bandipur TR is a welcome move. However, the anomaly is that Nugu, which was previously managed as part of Bandipur TR, is now administratively under Mysore Wildlife Division, which is an anomaly that must be corrected.

Addressing the threat of commercial and developmental projects

In general, Bandipur's legal status as National Park and Tiger Reserve has helped stave off threats to elephant habitats within its boundaries from commercial and developmental projects. Provisions of the Wildlife (Protection) and Forest (Conservation) Acts have been used systematically, and public opinion too has favoured protection of remaining habitats. In 2010, there was a strong public sentiment against the proposed mining on the fringes of Omkara Range in Bolegowdanakatte, as a result of which the project became politically infructuous.

Reducing human dependence on forest biomass

Although long known as a park without human settlements within it (which is something of a rarity in India), Bandipur has always had a significant human footprint on its elephant habitats. This has been mainly in the form of pressures of fuel wood harvest and livestock grazing from the c. 200 villages along its northern boundary. Since 2004, an exemplary initiative led by an NGO called Namma Sangha (supported by the State and Central governments), which has worked cooperatively with the forest department, has led a shift in cooking fuel from forest-based fuelwood to cooking gas in almost all of the 35,000 households residing outside Bandipur. In households that were monitored between 2004 and 2007, there was a substantial decline of 65% in fuel-wood consumption

[23] A recent study by Prasad (2009) *Environmental Conservation*, 36:201-207), has shown significantly higher rates of tree death along road edges in Bandipur, which increases with width of cleared areas along roads.

(MD Madhusudan, *unpublished data*). Rather than punish villagers for harvesting an essential resource, Namma Sangha has made conservation-friendly energy alternatives affordable, and thus pioneered a creative solution that has made a significant positive change as regards one of India's most difficult conservation problems.

Notifying deemed forests

One of Bandipur's significant achievements is its consolidation of wildlife habitats outside designated forests. A total of 5,599 acres of revenue lands with forest cover were identified in the south-eastern part of the Tiger Reserve (see **Figure 3**). These lands are being actively used by a range of endangered wildlife including elephants and tigers, but as revenue lands, they were in constant danger of passing into land-uses that were not

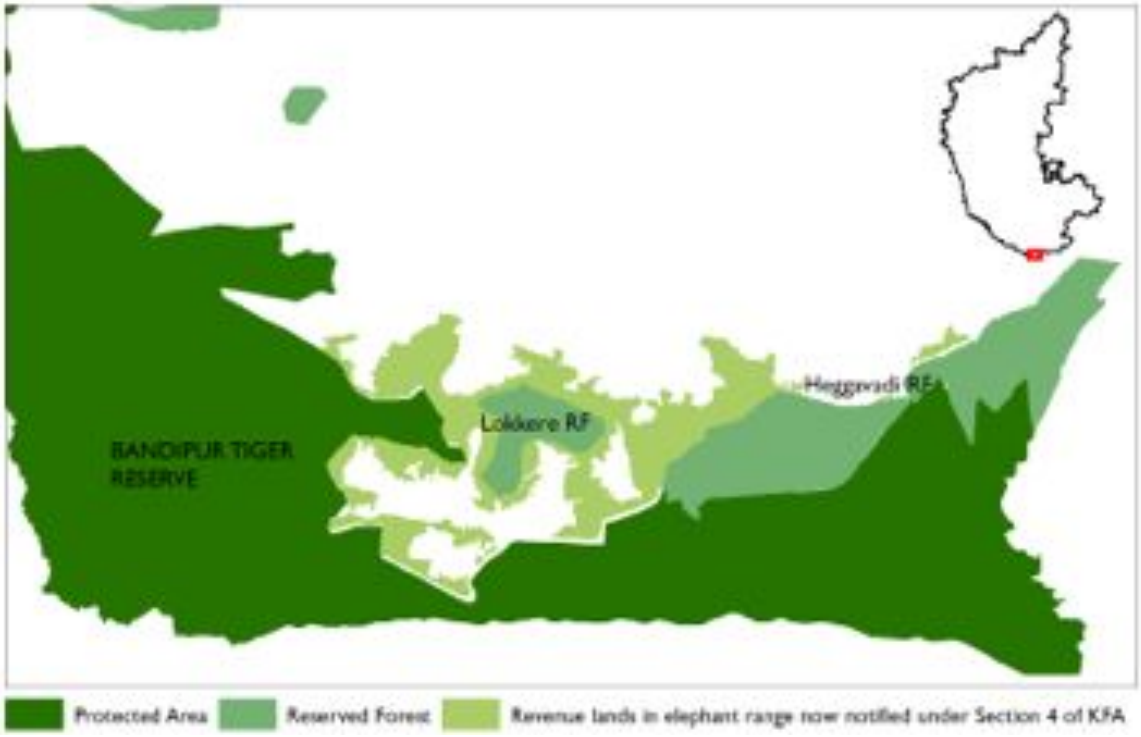

Figure 3: In order to consolidate elephant habitats around Bandipur TR, previously unprotected deemed forests under revenue jurisdiction have been handed over to the forest department and notified under Section 4 of the Karnataka Forest Act, 1963.

congruent with conservation objectives. Through a series of constructive collaborations between the Forest and Revenue departments and members of civil society, these lands were transferred from the Revenue to the Forest department, and paper work was initiated to notify these lands as RFs. Recognising that these areas were still used by local communities for grazing, the notification has however kept these areas out of the core of the Bandipur Tiger Reserve and open to these uses by local communities. In an area where there was rapid conversion of revenue lands to resorts and vacation homes, this move has considerably strengthened habitat contiguity for elephants in a sensitive region.

Declaring adjoining areas as Eco-Sensitive Areas to regulate land-use

Bandipur has also sought to regulate land use in private lands adjoining the PA bounda-

ry. This is a sensitive matter with profound implications to the rights of local people, and it is hence crucial that it is the outcome of a genuinely inclusive decision-making process. It is among India's first protected areas to notify an Eco-Sensitive Area (ESA, under the Environment Protection Act, 1986) for this purpose (see **Figure 4**). The ESA in Bandipur, incidentally, is also the buffer to the tiger reserve. The draft ESA notification issued in September 2011 has been publicly debated and changes have been made to it based on inputs of local communities and elected representatives. A final notification is now due. This notification ensures that large-scale transformations of surrounding private lands that may be inimical to wildlife conservation inside the park (e.g., creation of polluting industries, or unregulated expansion of tourist resorts) are prevented, whereas land-uses that provide local sustenance continue unhindered. Further, a broad-based management structure provides local representation in the management of the ESA.

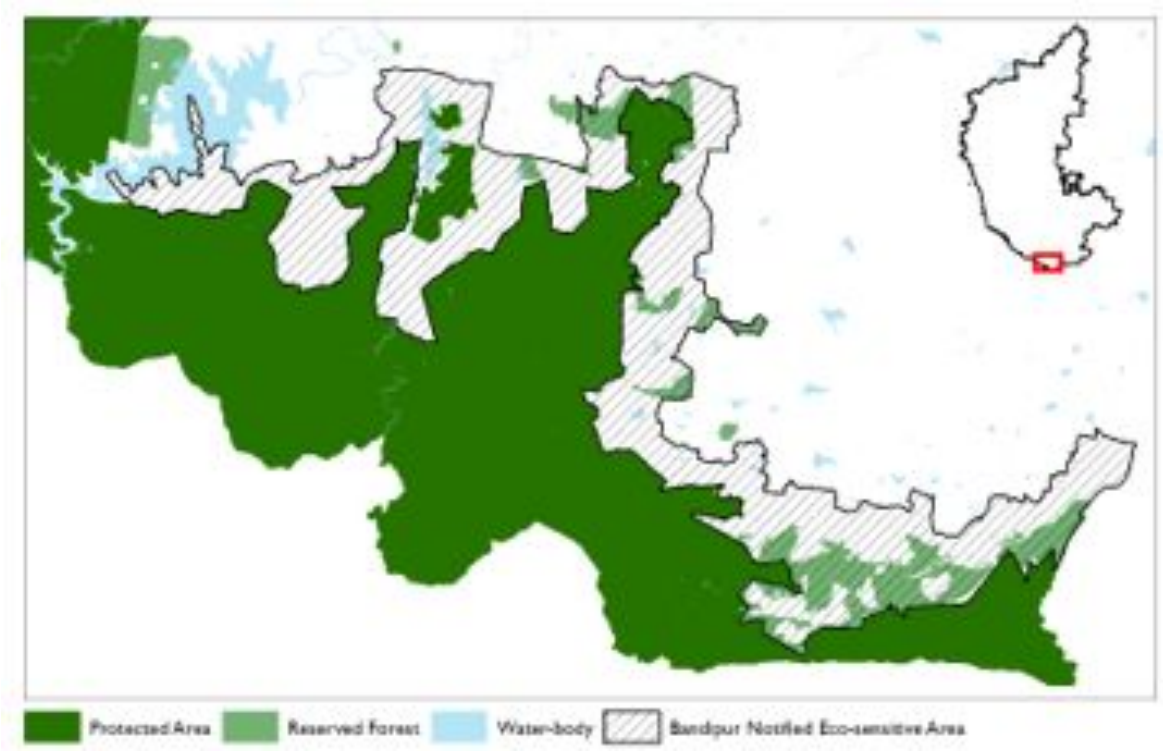

Figure 4: Areas to the north of Bandipur notified as Ecologically Sensitive Areas under the Environment (Protection) Act, 1986

Research and monitoring: more can be done

One of points that these data above highlight is the need for strengthening research and monitoring efforts. Although the park does keep records of conflict incidents, to have such data gathered and organised better would directly help management assess its own impact and take corrective action. This must include systems to monitor not just elephant populations and conflicts, but also to maintain records on barriers themselves, as well as on post-mortems of all elephant mortalities. The issue of research on elephant populations, their habitats and interactions with people is dealt with in Chapter 7.

3.5.2 *Malavalli Range: understanding disturbance and dispersing elephants*

Introduction

Towards the south-eastern part of the state, forests on either side of the Cauvery River in Mandya, Kollegal Wildlife and Kollegal Forest Divisions form an important habitat for elephants, while the river itself is a critical lifeline for these animals in an otherwise dry and rugged habitat. Several pressures on this habitat have been developing—especially in and around Malavalli Range of Mandya Division—in recent years in the form of increased tourism and mini-hydel projects. At the same time, elephant-human conflicts along the periphery of this region have been growing, and elephants are now more frequently reported to be moving far away from traditionally-used areas. In this section, we briefly summarise an analysis of factors that have contributed to these problems in this region, based on a detailed report[24] commissioned earlier by the Karnataka Forest Department, and authored by Sri Ajay Desai, Member of this Task Force.

Trends in elephant populations and human-elephant conflict

There is no reliable information on the trends in elephant populations of this region yet, but based on the data available from the Synchronised Elephant Censuses, it can be safely said that these areas, especially taken together with the adjacent areas of Kollegal Wildlife and Forest Divisions, are an important part of the state's elephant range. Although human elephant conflict in Mandya is not new, there are indications of an increase in its frequency and/or intensity. Human killing by elephants increased from an average of 0.3 people/year during the 2000-09 period to 1.7 people/year in the 2009-2012 period. During this period, injuries caused by elephants increased from an average of 1.4 people/year to 3.7 people/year. Further, cases of crop losses reported rose from 58 cases/year to 140 cases/year during the same period. Movement patterns have not been rigorously documented, but anecdotal evidence suggests elephants now using areas where they were traditionally not known to occur.

Potential drivers: perturbations to elephant habitat

As wide-ranging animals, elephants in a particular area are very likely to be affected by changes in habitat in adjoining administrative areas to which their ecological ranges may extend. Hence, this survey considered, not only Mandya Forest Division but also parts of the Kollegal Wildlife Division (Cauvery Wildlife Sanctuary) and the Kollegal Forest Division.

Habitat loss

Habitat loss is a well-known factor causing human elephant conflict[25]. There are elephant habitats in Mandya Division that are not part of designated forests, and as a result, they

[24]Desai, A. A. 2011. Elephant problems in the western part of Mandya Division (Karnataka). Unpublished report submitted to Karnataka Forest Department. 43 pages.

[25]AsERSM 2006. Report: Asian Elephant Range States Meet. Kuala Lumpur, Malaysia 2006. Report by: Dublin, H., Desai, A.A., Hedges, S., Vie. J.C., Bambaradeniya and Lopez, A. IUCN-SSC Report. IUCN, Switzerland.; Desai, A. A. 1998. Technical Report: Management Strategies for the Conservation of Elephants and Mitigation of Human-Elephant Conflict. GEF Project, FAO. Colombo, Sri Lanka. Sukumar R., 1989. The Asian elephant: Ecology and management. Cambridge University Press, Cambridge, UK.

have been more vulnerable to encroachment and other loss. These problems seem particularly chronic in Sathyagala Jagir and Dhanaguru State Forest. Another factor that adds to this problem is that optimal elephant habitats (flat areas also suitable for agriculture) have been lost and sub-optimal habitat (hills) remain for elephants.

Habitat fragmentation & degradation

Habitat fragmentation, too, is a major factor in altering elephant movement patterns and precipitating human elephant conflicts[2]. Three aspects of fragmentation were noted:

The first aspect is that habitats that are reduced to bottlenecks from past habitat loss are experiencing further degradation, and eventually fragmentation, due to anthropogenic pressures like cattle grazing and fuel wood removal making them less suitable for elephants.

The second issue is the construction of physical barriers such as canals, pipelines and roads that can cut off access to important parts of the elephant habitat and by obstructing traditional movement paths[2]. In Mandya Division, several private mini-hydro power projects have come up in recent years, the resulting network of canals, penstock pipes, powerhouses, roads and power evacuation lines fragment the western parts of the elephant range here. Disturbance is the additional problem these developments generate. A good example is the Dhanaguru State Forest, which is cut into two parts by the Shimsha Power house, its pipelines, canals and service roads, which run all the way from Nettakallu Village to Shimsha Village, and into the gorge to the Shimsha River. It was not clear if the environmental impact assessments and forest clearances for these mini-hydro-electric power projects have taken into account their potential impact on elephants. Given the obstructions to elephant movement and disturbance that these mini-hydro electric projects are causing, they could be a significant reason for elephant dispersal that is not consistent with known patterns.

The third concern is that, as a consequence of on-going habitat loss and degradation—especially livestock grazing and fuel wood removal—there are many poorly-shaped habitat patches with elongated interfaces between human use areas and elephant habitat, which increase the likelihood of conflict.

Human-caused disturbances

Human disturbances—which come in several forms such as developmental activity, mini hydro-power projects, increased vehicular traffic, increased human settlement at project sites, and the activities of service industries that follow—are largely underrated but can have a significant impact on elephant ranging and habitat use. Research[26] has shown that elephants (non-crop raiding groups and males) avoid human use areas by more than 1 km even when these contains critical resources such as access to water.

Tourism, too, is becoming a major disturbance in this area. There are two types of tourism, namely, religious tourism and wildlife tourism in this region. The main site for religious tourism is the Muthathiraya Temple at Muthathi. Human settlement, a farm and

[26] Desai, A. A. and N. Baskaran, 1996. Impact of human activities on the ranging behaviour of elephants in the Nilgiri Biosphere Reserve, South India. J. Bombay nat. Hist. Soc. December 1996: 93 (3) 559 – 569.

the FD recreation area spread across 500 meters on the Cauvery River bank which degrades and disturb nearly 1.5 to 2 km of river front. As cooking and consuming food here is also part ritual, the report estimates that nearly 2.7 tons of fuel wood would be used on festival days. There is a clear need to regulate and manage tourism in this area.

The economic successes of the fishing-based tourism along the Cauvery River Bank led to the construction of several other camps, all located at pristine sites that are ideal for wildlife (especially elephants). The development of such fishing camps (or tourist resorts), some of which are promoted by the State Government undertakings, is in total contradiction to the government's conservation agenda. They bring in enhanced levels of human disturbance into elephant habitats that were previously far less disturbed. There is hence a need to rationalize and come up with a better tourism plan that concentrates these facilities in a single or a couple of areas, rather than have them dispersed over a wider stretch of elephant habitat as is the case today.

Land use changes

Land use changes are changes, often on revenue or private lands that can impact elephants and their movement patterns depending on their nature, location and scale. At present signs of land use change are present across the landscape here but on a relatively small scale. But this trend is increasing bringing in greater external ownership, development and human population into the area. Implementation of law and policy that takes into account the ecologically sensitive nature of these lands, while respecting their private ownership is an urgent need in these areas.

Discussion

While some of these factors can bring about sudden changes in elephant movement and precipitate conflicts, this can be expected only when there are rapid and large-scale changes to habitat. This, however, is not the case with the elephant problems in Malavalli. The most likely causes for elephants 'wandering' outside the normal range is not due to a sudden changes in habitat quality or extent. They are the result of a gradual build-up and interaction of several factors—habitat loss, fragmentation, disturbance and land-use changes—that can adversely affect elephants. These factors, either singly or in combination, can bring about gradual pressure on elephants until some of the worst affected elephants break away from their normal ranging and are forced to wander in search of better habitat or movement paths. Given the slow pace of these adverse changes and also the slow pace at which the elephants have responded to this change, most of them go undetected in the absence of systematic monitoring of elephant populations and habitats. Urgent measures that reduce the impact of these factors on elephant habitats such as in the forests along the Cauvery are a key need, and options to manage them have already been discussed elsewhere in this chapter, and listed in our recommendations.

3.5.3 South-western Sakaleshpur: human removal or coexistence?

Reports of high levels of human-elephant conflict in Hassan and Kodagu district have been circulating for several years now. However, a closer examination of the situation indicated that the situation in the south-western edge of Hassan district was distinct from

that of south-central Hassan district (Alur *taluk*). The two elephant populations are distinct, and the conflict level in Alur is much higher than that in Sakaleshpur. Thus (as we shall show in detail below), south-western Sakaleshpur exemplifies a co-existence zone.

However, repeated representations have been made by some residents from south-western Sakaleshpur about the elephant menace, and a proposal is with the highest authorities in the state government to purchase several thousand acres of private land to 'strengthen the elephant corridor'. We have therefore examined the situation in depth, evaluated various options, and made specific recommendations vis-à-vis issues and proposals for conflict mitigation and elephant conservation.

Biophysical and social characteristics of region

The south-western portion of Sakaleshpur *taluk* of Hassan district lies along the crest-line of the Western Ghats (see Figure 5), linking forests of Pushpagiri WLS in the south to

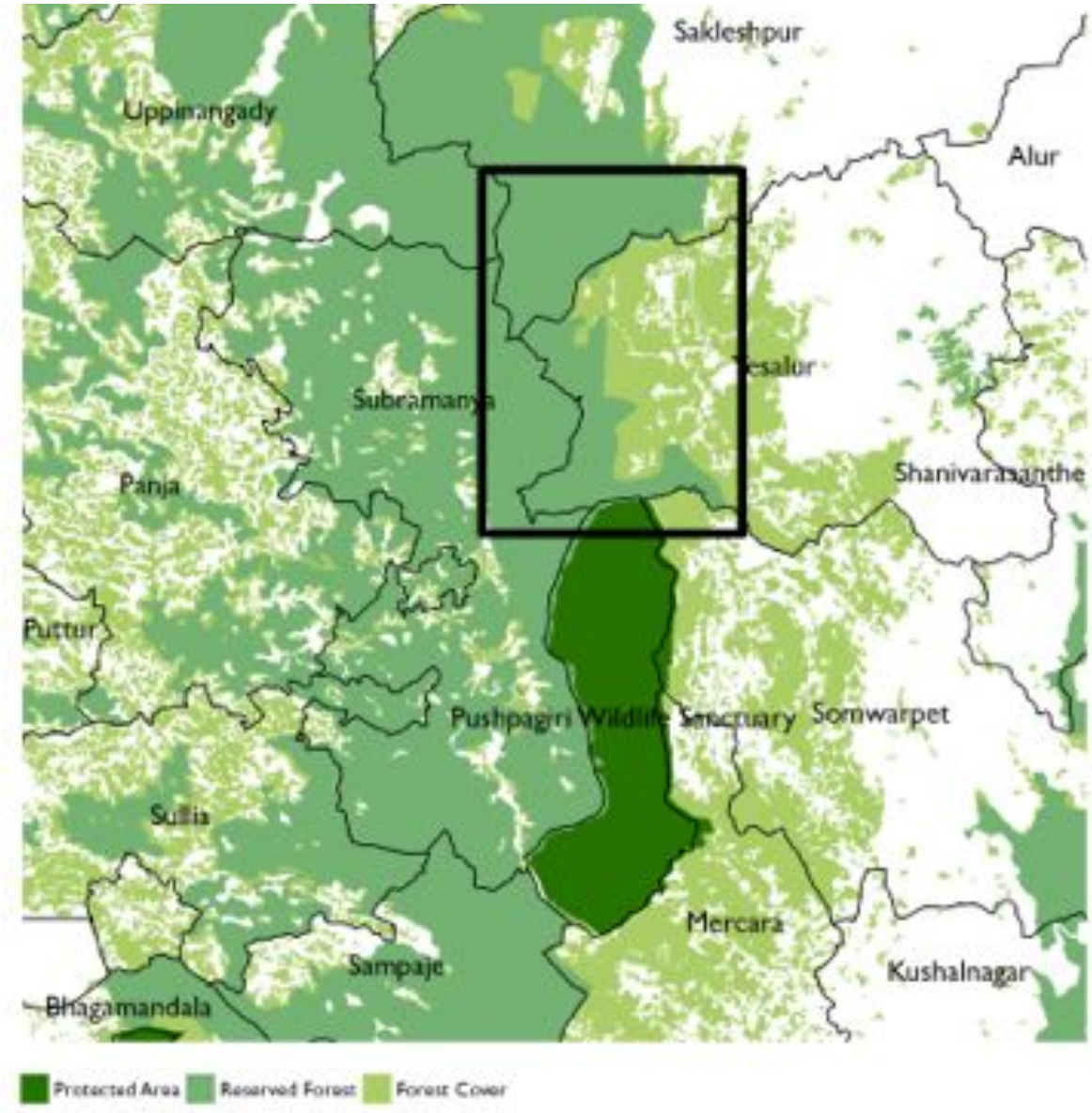

Figure 5: Crest-line of the Western Ghats showing study region (see box) of Sakaleshpur taluk.

those of Charmadi and Kudremukha National Park in the north. To its west are the slopes of the Ghats, covered with dense forest that lies with Dakshina Kannada district. This region is characterised by high rainfall (~4000mm annually), natural forest vegetation of the evergreen and semi-evergreen type and a highly undulating terrain, as a result of which this is not ideal habitat for elephants. Thus, the elephant population is relatively small, being estimated to be around 20 elephants ranging over the 70 sq. km forests and neighbouring forests to the west, south and north. Nevertheless, these forests (Bisle RF, Bisle Extension RF and Kagneri RF) have been included in the notification of the Elephant Reserve. In addition to elephants, these forests are also inhabited by tiger, leopard, sloth bear, deer, wild boar, among other fauna, though at low densities.

There is significant human presence, with valleys under crop cultivation (9% of the case study landscape, **Figure 6**) and many hill-slopes covered with coffee and cardamom cultivation under a partially opened tree canopy (13%). Also interspersed are significant patches of (possibly anthropogenic) grasslands (12%). There are about 10

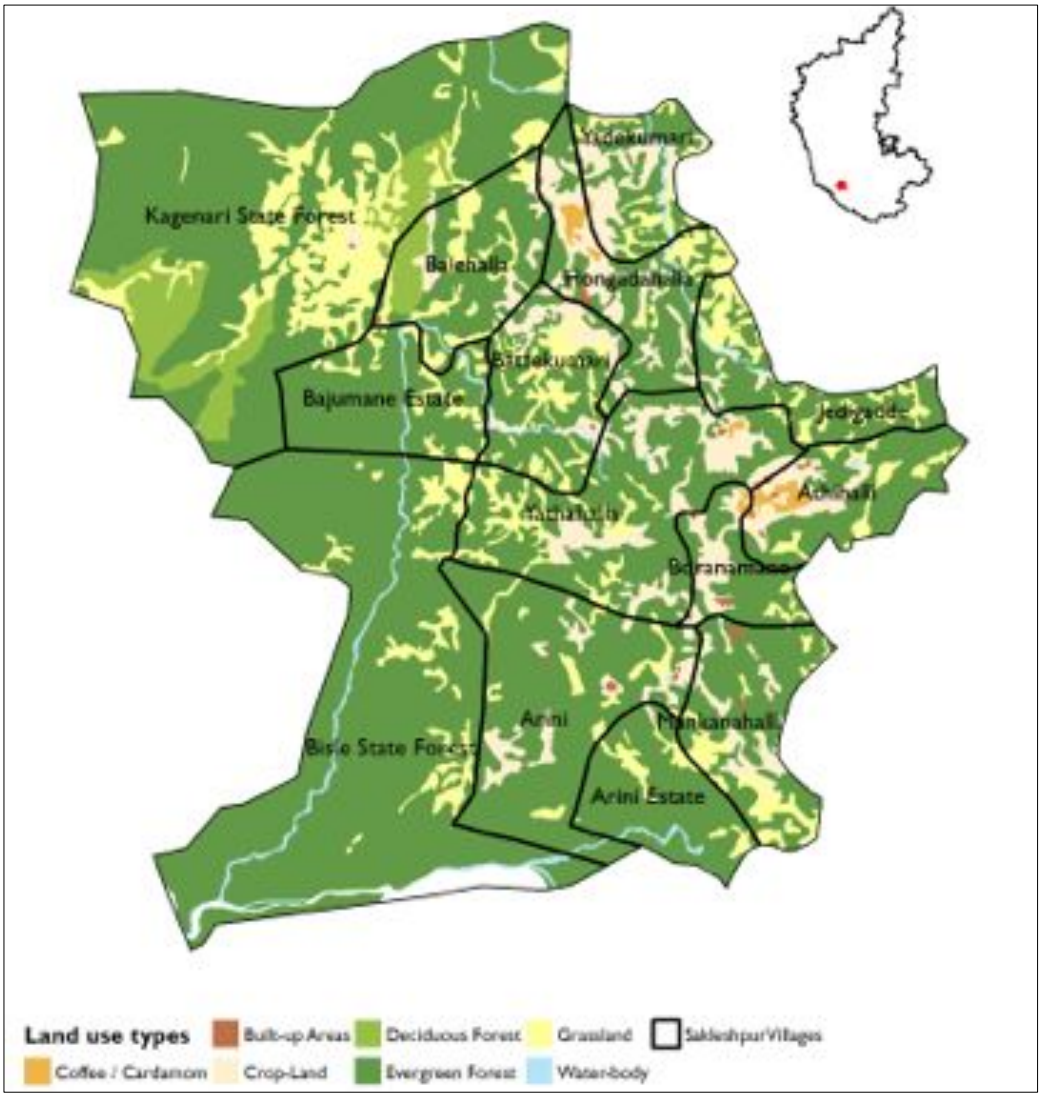

Figure 6: Map of southwestern Sakaleshpur showing land use (Data courtesy of KFD)

inhabited villages and 4 fully forested villages in the region south of the Mangalore-Hassan highway.

Table 5 shows that in an area of 14,000+ ha, the total officially privately owned land in these 14 villages is about 2,565 ha. Information provided by the DFO Hassan indicates that another 1,871 ha of revenue land has been either sanctioned or is in the process of being sanctioned. About 7,100 ha (is notified Reserve Forests[27], and the remaining government land of about 4,500 ha was till recently with the Revenue department and classified under various legal categories, largely *gomaal* land. About one-third of this land has been transferred administratively to the Forest Department since the 1990s and is in various stages of being notified as forest land.[28]

Table 5: Population and land-use information for 14 villages of southwestern Sakaleshpur

Total number of households	Total population (2001 census)	Total geographical area (ha)	Forest area from Census handbook (ha)	*Khushki* (dry land) (ha)	*Tari* (wet land) (ha)	*Bagayati* (orchards) (ha)	Coffee (ha)	Gramthaan (ha)	Sarkari (revenue) (ha)
722	3,421	14,135	10,540	158	773	3	1453	177	5,995

Source: Census 2001 village amenities register, Hassan Division Working Plan & Revenue Department

Thus, although 65% of the landscape is under forest cover of some kind (77% including grasslands), only 50% is under Reserve Forests (**Figure 7**), leaving 27% in revenue classifications. There is significant customary use of these forests and grasslands (especially that in revenue lands) for firewood and grazing, and also as much as 8% of land may be encroached (largely for cardamom and coffee cultivation). This creates a complicated situation for forest and environmental governance.

In short, this region is characterised by large but sometimes fragmented forest cover, forest under different legal jurisdictions and moderate local use, large areas under coffee cultivation and smaller areas under paddy and other lowland agriculture, and a low density of elephants. While the western half of this region has contiguous RF area, the eastern portion is more fragmented into forests, coffee and cropland.

Elephant Conservation: Status, Challenges and Measures

The status of elephants in this region is not well known. The estimated population is about ~20, but its composition and extent of movements is not understood. The availability of significant relatively undisturbed areas (although not ideal habitat for elephants in terms of terrain or vegetation) means that the elephant population is not under threat from habitat loss. Non-natural elephant deaths are also relatively low, with none being reported in the last two years.

The major threats to elephant conservation in this region are:

1. the construction of mini-hydel projects

[27] There are significant discrepancies even in the area of notified RF reported by various sources.

[28] Source: Annexure 2 of "Status of government lands in Hassan district".

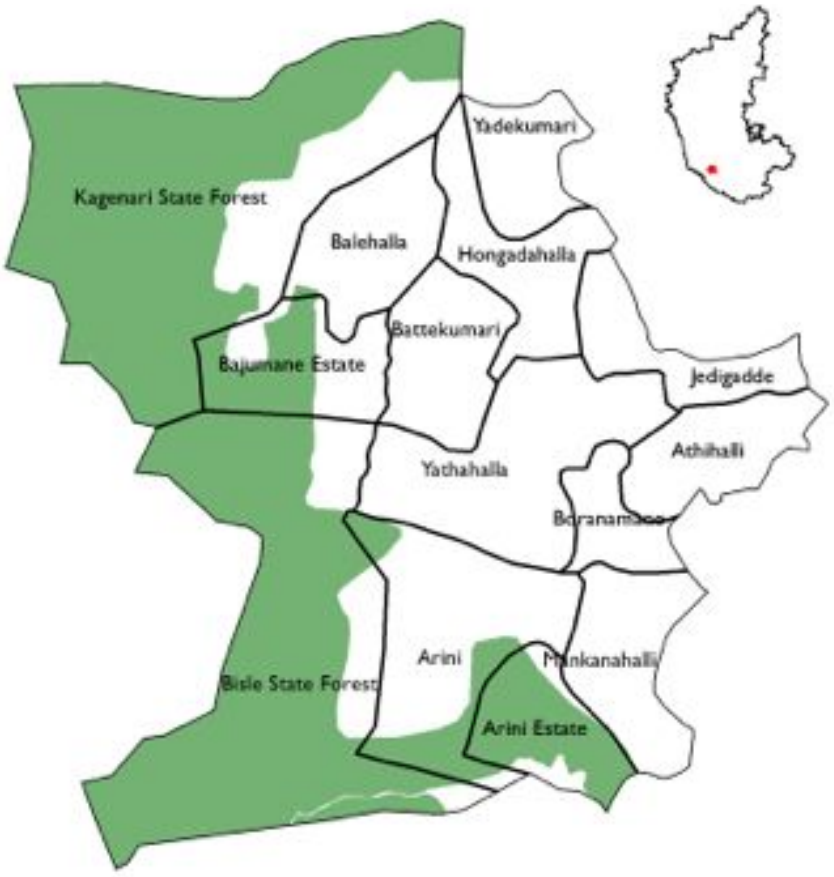

Figure 7: Villages and RF boundaries in the southwestern Sakaleshpur region (Data courtesy: KFD)

2. the possible degradation and progressive loss of habitat from illegal felling
3. the possible loss of connectivity with habitats to the North

We summarise the nature of these three threats and recommend specific measures to address them.

Disturbance due to mini-hydel projects

Hydropower is an obvious 'resource' of the Western Ghats. However, after an initial phase of major dam construction, the power generation agencies such as Karnataka Power Corporation have faced increasing resistance to the construction of large dams from local communities and environmentalists due to the major damages inflicted. An example of one such a project in this region is the Gundia Hydro-Electric Project (GHEP) proposed by KPC with a generation capacity of 200 MW. This project also triggered substantial controversy and the Ministry of Environment and Forests has so far denied environmental clearance for this project. The Western Ghats Ecology Expert Panel also recommends not going ahead with this project.

As a result, the focus has now shifted to smaller hydropower projects (less than 30MW). Several private power producers have already begun construction of mini-hydel projects in this region, as can be seen from Figure 8. The environmental impacts of such projects are, however, not insignificant and need to be evaluated on a case-by-case basis.

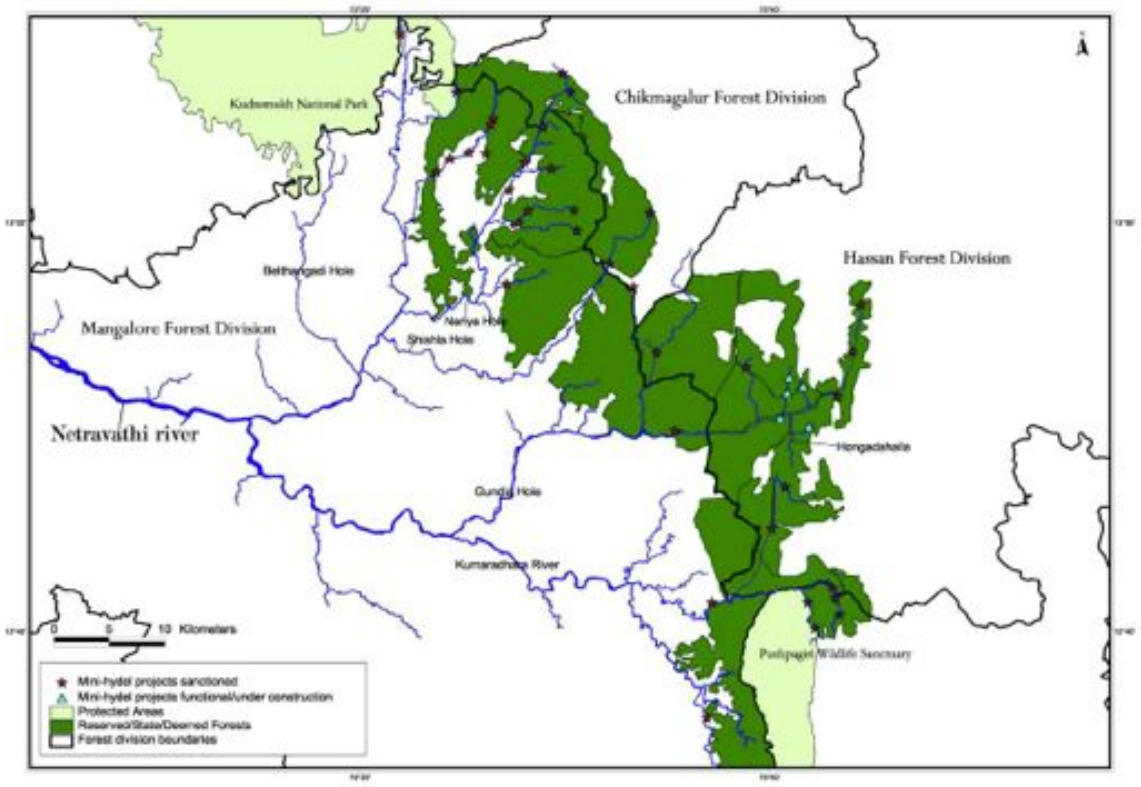

Figure 8: Locations of mini-hydel projects sanctioned or being constructed (triangles) in western Sakaleshpur and Mudigere taluks (Map courtesy of Sanjay Gubbi).

These projects involve the construction of multiple structures (weirs, penstocks, power house, access roads, transmission lines, etc.) at various locations in the forest. The construction of these structures causes significant disturbance (see **Figure 9**). Moreover, once constructed, the penstocks and impounded water can create a significant obstacle to the movement of wildlife, particularly long-distance foraging animals such as elephants.

In the case of south-western Sakaleshpur, it has already been brought to the notice of the High Court that the forest clearances granted to several mini-hydel projects were inappropriate. The concerned forest officials certified that the region contained no

Figure 9: Tunnel blasted in a thickly forested hillock for Yadakumari mini-hydel project

wildlife that is protected under the Wildlife Protection Act, a clear misrepresentation given the presence of elephants, leopards, and other wildlife in the surrounding forests. Furthermore, in the case of Maruthi Zen project, the central clearance process was avoided by disingenuously representing the two turbines as two independent projects so as to slip in below the 25MW threshold for clearance. From all available evidence, the location of these projects is at critical points of elephant movement, thereby if constructed they will significantly reduce the quality of elephant habitat.

Specific Recommendations

- The forest clearances given without attention to the substance of the FCA must be withdrawn immediately and these projects must be cancelled.
- The officers involved in providing such clearance on the basis of misrepresentation of the biodiversity of this area must be prosecuted.
- All future applications forest clearance related to mini-hydel projects or quarrying/mining located in areas that fall within the Elephant Conservation zone or the Co-existence must mandatorily be referred to the Chief Wildlife Warden for assessment of potential impact on elephants and other wildlife.

Poor regulation/management of areas with forest cover

Due to historical reasons, several forested areas of Hassan district have not been notified as Reserve, Protected or Village Forests under the Karnataka Forest Act. The Supreme Court, in the Godavarman case (WP(Civil) No 202 of 1995, T N Godavarman Thirumulpad vs Union of India), ordered that even such areas should be considered as 'forest' for the purposes of the Forest Conservation Act 1980, and it asked the state forest departments to survey and list such areas. These are now called 'deemed forest areas' by the FD. In the case study region, the FD has estimated that the area with the revenue department that is under tree cover and free from encroachments is ~2,800 ha (Annexure I of Hassan Division Working Plan).[29] Of this, ~1600 ha have already been transferred to the FD (Annexure II of Hassan Division Working Plan).

There are two types of concerns with lands being physically forested but not legally notified as forest. First, diversions of such forested lands to non-forest purposes (such as mini-hydel projects, or coffee cultivation) will occur without following the 'forest clearance' procedure under the FCA. The Supreme Court orders are meant to prevent this problem. However, in the absence of a clear change in the legal status of the land and this change being entered in the land records at all levels, the Supreme Court orders can end up being ignored (as there is no way for the village accountant to know—when certifying the status of a piece revenue land—that the land is 'deemed to be forest land' for the FCA). There is also the argument that land designated as forest land is better protected from encroachment because that is the responsibility of the FD, whereas if land is desig-

[29] Total extent of revenue land: 6543 ha; area over which *patta* rights have been sanctioned: 253 ha; area for which Form 53 (regularization) applications have already been submitted: 534 ha; area in which illegal/unregistered cultivation continues: 1086 ha; thus, area potentially available for transfer to FD: 4,671 ha. Of this, the area that is not wooded: 1,846 ha, Hence thickly wooded area available for transfer: 2825 ha.

nated as revenue land, the Revenue Department is usually unable to prevent encroachment because it does not have the staff to ensure land protection.

Second, FCA only provides for a procedure in case of diversion of the land. It does not prescribe forest management practices. Tree felling in such revenue lands would attract the Karnataka Tree Preservation Act, but its enforcement remains problematic, unlike with lands managed by the Forest Department. Therefore, it has been argued that changing the legal status of this land to bring it directly under the jurisdiction of the FD will solve both problems of forest-land diversion and regulation of illegal tree felling.

At the same time, due attention needs to be given to other factors. Local communities have historical rights and privileges in these *deemed forest* lands, some of which are classified as *gomaal* and therefore specifically designated to meet grazing needs. Conversion of such lands into Reserve Forests will result in serious abridgement of the rights of local communities. Historically, the takeover of common lands by the FD has been a source of much conflict in the Western Ghats and elsewhere[30]. The National Forest Policy of 1988 envisages local participation in the protection and management of forests, especially degraded forest. Further, the Forest Rights Act, 2006 provides a statutory framework for local communities to stake their claims for rights that may not have been properly recorded in the past. In this context, reclassification of revenue lands as forest lands without public consultation and involvement could be tantamount to violation of the FRA. It would therefore be advisable to initiate a procedure that is compatible with the FRA, and to convert these lands through due local consultation to a category which will allow local use such as Protected Forest (or CFR under FRA), generate some local interest in management, and also attract the conservation provisions of the Forest Conservation Act in a straightforward manner. Moreover, it must be noted that the seemingly fraudulent clearance granted to the existing mini-hydel projects (mentioned above) happened even though the lands were clearly designated as RFs.

Finally, the ETF noted that there is significant confusion over land records in this region: records do not tally between Revenue and Forest department, lands transferred are still not notified, and land details in village cadastral maps are not up to date at all.

Specific Recommendations

- First and foremost, since the problem with confusing land records is particularly severe in potential co-existence areas of western Hassan district, Kodagu, Chikmagalur, and Dakshina Kannada districts[31], the High Court may direct the Revenue and Forest departments to reconcile their records in these districts, carrying out spot surveys where necessary, and this reconciliation should be carried out under the supervision of a Committee constituted specifically for this purpose. The High Court may also direct the government to make available in the public domain free of cost all ex-

[30]Buchy, M. 1996.*Teak and Arecanut: Colonial State, Forest and People in the Western Ghats (South India) 1800-1947*. Pondicherry: Department de sciences sociales, French Institute. Guha, R. 1989.*The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya*. Delhi: Oxford University Press.

[31]ISEC and NST. 1998. People's database on land tenure, land-use, and land cover for land resource management: Results of a pilot study in Dakshina Kannada district. Institute for Social and Economic Change, Bangalore and Nagarika Seva Trust, Guruvayanakere, D.K. District

isting land record information, including cadastral maps, so as to enable public input into and scrutiny of the land record reconciliation process.

- Following the reconciliation of land records, the process of changing the legal status of "deemed forest" lands should be taken up. Deemed forest lands should be notified as Protected Forest that will allow for local management under the regulation of the Forest Department. Detailed prior public consultation must be carried out in every village where such change in legal classification is envisaged.

Possible loss of connectivity to the north

Very little data are available on the movement of elephants in this region. Anecdotal evidence suggests that perhaps some elephants move between south-western Sakaleshpur and areas to the north (Kemphole and Kabbinale RFs and beyond). To do this, however, they have to cross the Mangalore-Hassan railway line, the Mangalore-Hassan highway (which is now extremely busy day and night), and also the Mangalore gas pipeline. These would constitute significant obstructions to elephant movement. However, in the absence of a rigorous understanding of elephant movements, it is not possible to gauge the significance of these barriers.

Specific Recommendation

- We recommend that a detailed study be commissioned by the Project Elephant authorities on the movement of elephants northwards from south-western Sakaleshpur region, and if the above three structures appear to constitute significant barriers, ameliorative measures may be seriously considered.

Addressing Human Impacts

Field investigations indicate that the human-elephant conflict in this region is significant but of relatively recent origin (see **Figure 10**). Villagers reported that elephants were small in number and largely confined to the densely forested tract. The straying of elephants into agricultural fields leading to crop damage and occasionally to human deaths is a phenomenon of the past decade or less.[32] For instance, the total number of crop damage claims approved in villages adjoining the Bisle-Kagneri-Kanchankumari RFs during 2000-2009 is 1473. Of these, only 227 claims came in the period 2000-2004, indicating that the crop damage problem has increased 6-fold in the second half of this 10-year period.

The likely reasons for elephants coming increasingly out of their 'natural habitat' are many and have been dealt with in the main chapter. In this region, clearly disturbance in the forest due to mini-hydel construction, which began a few years ago, is likely to be one major factor, especially if one notes that some of the highest claims have occurred in villages adjacent to Kagneri RF where the projects are located. But other factors such as increased attraction of agricultural crops as food also cannot be discounted.

The measures to reduce the incidence of elephants damaging crops and causing harm to human life can be tackled in several ways. Clearly, prevention of disturbance in their natural habitat and ensuring connectivity in their paths is the first requirement,

[32]Discussions with villagers in Attihalli village, 6th March 2012.

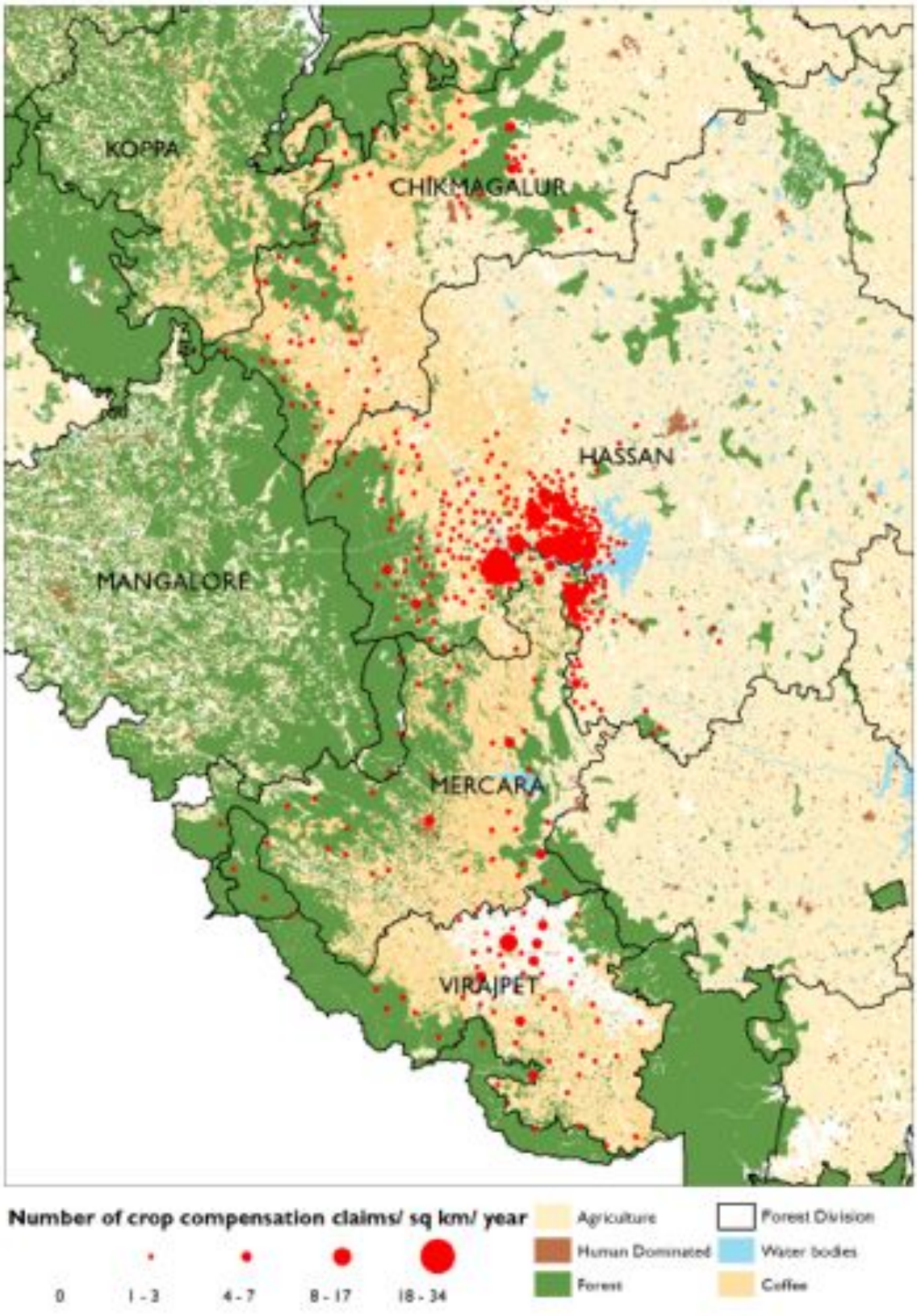

Figure 10: Although elephant-human conflicts in the Sakaleshpur region of western Hassan Division have increased in the recent past, they are not as intense as in the areas further east [Source: data on claims provided by KFD, compiled by C.M. Bipin; map by ATREE Eco-informatics Lab & NCF GIS Cell]

which has been addressed in the previous section. Two other approaches are discussed here: keeping elephants out, and purchase of private land.

Keeping elephants out

The conventional methods of limiting human elephant conflict have been implemented to some extent in this region but the complexity and uncertainties surrounding forest-revenue boundaries (discussed in page 66 above) as well as the fact that this region is a high rainfall area, dramatically reduce the utility of EPTs in keeping out elephants.

Specific Recommendation

Increased investments can be considered along key habitation areas east of the Bisle and Kagneri RFs in terms of non-lethal electric fencing. *Gram Panchayats* may be entrusted with the task of (and funds for) carrying out community fencing and responsibility and accountability for maintenance of these barriers.

Purchase of agricultural land and human resettlement

An extreme measure that is already being discussed is the purchase of agricultural land and the resettlement of villagers away from this region. We address this possible solution here because a proposal has been received by the Government of Karnataka from some farmers in the south-western Sakaleshpur region wherein they have offered their privately owned land to government for expanding the elephant corridor (as per letter received by the KETF from Sri Atthihalli Devraj, 31 March 2012, and files with the Hassan Forest Division). The key features of the proposal are:

1) A total of 416 farmers have 'offered' land amounting to a total of ~700 hectares (about 1750 acres).
2) The farmers are seeking a compensation of about Rs. 15 lakhs/acre for this land.
3) Some of these farmers are promising that they will also vacate all encroached lands in their possession along with these private lands.
4) These lands are located in a cluster of 5 villages in the southern portion of the case study region (which has 10 villages), adjoining Bisle State Forest and Bisle RF Extension (see Figure 11).

We scrutinized this proposal with due care, and have the following observations:

The contribution of this land purchase to elephant conservation would be small for the following reasons:

i) *The area being offered is only partial*: The total land offered for to the government for purchase is 700 hectares in a region where total official private landholding is 2565 ha plus unofficially held land is 1870ha. Even if some unofficially held land is vacated in the process, the total land so obtained would be less than one-third of the agricultural holdings in the area, and would be clustered in the southern parts.

ii) *The area being offered is fragmented*: As the map in Figure 11 shows, the parcels of land being offered are scattered across the landscape, while several other parcels

are not being offered. Thus, purchase of this scattered set of parcels will not lead to any addition of contiguous elephant habitat.

Figure 11: Map showing lands in southwestern Sakaleshpur, which farmers have consented to sell (yellow) for expanding elephant habitat. Areas where farmers have not consented to sell are shown in pink. Map provided by Hassan Division, KFD.

iii) *The elephant habitat is already intact*: As the maps above show, there is already very substantial *contiguous* forested habitat to the west of these villages, including the Bisle-Kagneri RFs as well as other RFs in adjoining Mangalore division. It is not certain whether the elephant movement is primarily in the south-north direction, but even if this is so, the 'width' of the elephant habitat is typically 5 km in just the up-ghat side (Sakaleshpur), not including additional habitat down-ghat (Mangalore side), and it runs from Pushpagiri in the south till the Mangalore-Hassan highway in the north. There is no obvious need for widening this habitat/corridor (see Figure 5).

iv) *The quality of the habitat will be limited*: Abandoned agricultural fields and coffee plantations will provide limited food resources for elephants. One of the reasons elephants enter agricultural lands today is because they provide a nutritious and easy source of food. This will no longer be the case once agriculture is abandoned.

Reduction in elephant impacts on society would be small because:

i) Purchase of some portion of private land will still leave a significant human population (possibly more than 50% of the current population) and agricultural activity in the region.

ii) Furthermore, purchase of land does not necessarily mean that the sellers will all leave the region. If they continue to stay, danger to their lives will continue, and the raiding of crops on remaining agricultural lands will continue.

Economic feasibility and efficacy

i) *The cost is exorbitant*: Purchase of 700 ha (nearly 1,750 acres) at Rs 15 lakhs per acre will require the government to spend a total of over Rs 260 crores. The current budget of Project Elephant in Karnataka is less than Rs 3 crores per year. Funds are simply unavailable for the proposed exercise. Most important, the benefits from this exercise will be a slightly increased habitat for ~20 elephants. This amounts to spending ~Rs 13 crores per elephant for a slight improvement of its habitat.

Democratic governance and social justice would not be served because:

i) *Absence of full village rehabilitation*: The national R&R policy states that villages must be rehabilitated as a whole, and this must be done after obtaining informed consent of the villagers. In this case, consent of all villagers has not been obtained, nor is it likely to be obtained.

ii) *Needs of the neediest*: Sale of land only benefits the land owner. However, a significant population of landless labourers or marginal farmers depends on these private lands for employment. There is no mechanism for compensating those who would lose wage labour opportunities due to such land purchase. Providing such a mechanism would further increase the cost of this proposal.

Specific Recommendation

In light of the above, we **strongly recommend against spending public money** on this proposal to purchase private land, an action that will have little positive impact on ele-

phant conservation, reduce elephant-human conflicts only slightly, and come at a very high cost to the treasury, all for a small population of elephants which is disturbed by other factors.

Summary

The south-western region of Sakaleshpur *taluk* exemplifies the situation of small population of elephants residing in a medium-sized habitat, facing significant disturbance due to developmental activities such as mini-hydel projects and possibly loss of connectivity due to highway/railway line and pipelines. Elephants may leave forests perhaps due to such disturbances, but may also raid crops for their food value per se. Given the relatively small size of the elephant population, **co-existence** is the only solution. Such co-existence will require a serious regulation of developmental activities that today seriously compromise the integrity of elephant habitats. It would also require understanding elephant movements better and seeing whether and how connectivity lost due to highways and railway lines can be restored. Around key settlements, it may help to strengthen barriers around agricultural areas, especially if done through the involvement of local communities. Other than these steps, additional measures to address cross-cutting problems such as electrocution of elephants must also be part of the package in such regions. However, measures involving wholesale purchase of agricultural land are neither necessary for elephant conservation, nor will they solve the problem of crop raiding and human deaths due to elephants.

3.5.4 Alur-Arkalgud: coexistence or elephant removal?

The major elephant-human conflict zone in Hassan district, and indeed in Karnataka, is the area at the junction of Alur, Arkalgud and Sakaleshpur *taluks* of Hassan district and Somwarpet *taluk* of Kodagu district. The Elephant Task Force carried out a field visit in this area, heard and received petitions from the residents, held discussions with forest officials, studied secondary data, and took into consideration all studies up to now on this problem. We present here a detailed analysis of this problem, and recommendations.

Site definition and characteristics

This elephant-human conflict area has been referred to by different names at different points in time. At the onset of the elephant problem in the 1980s, it was referred to as 'Kattepura area', which referred to the tiny Kattepura RF to the south of Hemavathi reservoir, but also included the equally tiny Doddabetta RF to the north of the reservoir (see Figure 13). As the elephant problem grew, it began to be referred to as the Alur elephant problem, and eventually as 'Hassan elephants'. However, this last label is misleading, because, as explained in the previous section and based on field observations, there are at least two distinct populations of elephants in Hassan district: one on the western fringe (western Sakaleshpur) along the forests of the Western Ghats, and the second in the predominantly human-dominated Alur and Arkalgud *taluks* in Hassan and Kodagu districts, respectively. Here we refer to the latter population whose approximate range is given in the blue box in Figure 12.

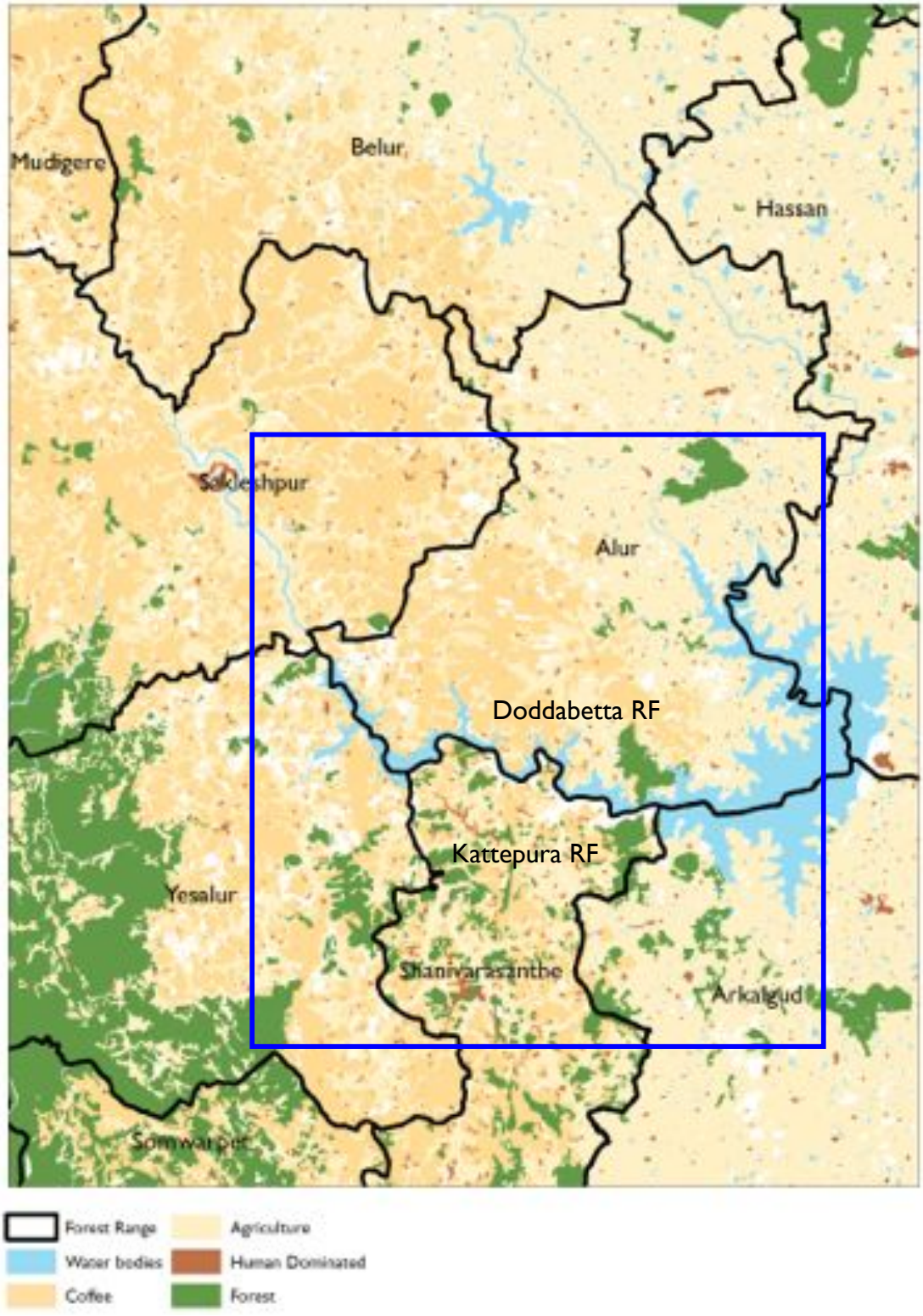

Figure 12: Forest cover (including social forestry plantations) in the Alur area shows that <5% of its area has forest cover, which is scattered in small patches across the area with no connectivity. Box denotes very approximate area of the "Alur elephant" problem.

Although the Alur elephants range beyond just Alur *taluk*, one may get an idea of the overall geography of the region by looking at data for Alur *taluk*. Eco-climatically, Alur lies in the so-called transition zone between the hilly (Malenad) region and the

eastern plains, with average annual rainfall of ~930mm and a flat to mildly undulating terrain. The pattern of land use in Alur *taluk* as per official records is given in Table 6. It shows that currently hardly 1% (4.8 sq. km) of the area is under notified forests. The major portion of the land is under cultivation, which is dominated by food crops (>16,000 ha) but also contains significant area under coffee (~5,000 ha).

Table 6: Land use in Alur *taluk*, Hassan district

Land use details	Area (ha)	Proportion Area (%)
Total Geographical Area	40,265	100%
Forests	487	1%
Net Sown Area	21,643	54%
Cultivable waste, pastures& misc. trees	5,886	15%
Fallow	3,934	10%
Area not available for cultivation	8,315	21%

Source: Hassan District at a Glance 2009-10

The population of Alur *taluk* was ~86,000 in 2001 and, thus, the current population density of this region is over 200 people/sq. km, much higher than the Malenad region. The vast majority of agricultural holdings are small or marginal in size (≤2 ha). In brief, this is a densely populated region with minuscule forest area and majority of land under cultivation, with cropland interspersed with coffee plantations on the hillocks, by mostly small and marginal farmers.

Current elephant population

An attempt was made to estimate the elephant population in Alur. As this is a small and widely scattered population the standard methods of estimating populations will not yield useful results. So an alternate approach was used. All villages were systematically monitored by selecting villagers who were knowledgeable about elephant use of areas around their villages. These people called the Forest Department where registers were maintained in each Range to record all reports of elephants. On the dates when population estimation was carried out, teams were sent to all locations where elephants were reported. This team tracked the elephants and recorded the number of elephants present as well as the age-sex composition of the elephant groups whenever they were visible[33].

This effort revealed that there was a minimum of 26 elephants in the area. Of 25 animals actually observed and classified across 8 social units (including 2 solitary individuals), there were 6 adult males, 8 adult females, 4 sub-adults (1 male, 3 female), 6 juveniles (3 male, 3 female) and one calf (< 1 year old)[33]. Another approach of population estimation using genetic (DNA) sampling (for individual identification) is also underway at Jawaharlal Nehru Centre for Advanced Scientific Research at Bangalore.

[33]Srinivasaiah, N.M. & Sinha, A. 2012. *Elephant Refugees: Rapid Assessment of the Status of Elephants in the Conflict-Ridden Areas of Hassan*. National Institute of Advanced Studies, *unpublished report*.

Magnitude of the elephant-human conflict in Alur region

Elephant-human conflict began to be reported in the Alur region in the early 1980s. At that time the elephant population consisted largely or entirely of sub-adult and adult male elephants. Attempts were made to capture and relocate 13 elephants in the 1980s. This was only partially successful: conflict declined for a while, but resurfaced in the post-2000 period with more dispersal of elephants into this area. Over the past decade, the elephant-human conflict has become severe, both from the point of view of people and of the elephants. Conflict in terms of area affected has increased significantly. In 2007 the Forest Department reported that a total of 38 villages were affected by elephants, while currently the department reports that 79 villages are affected. Clearly, the immigrant elephants are expanding their range, and would continue this process if unchecked.

Crop/property damage

The trend in crop damage in the region since 2003-04 has sharply risen as evidenced in **Figure 13**. Further, as the map in **Figure 14** shows, conflict in this region is widespread and intense, and considerably greater in than the areas to the west (western Sakaleshpur).

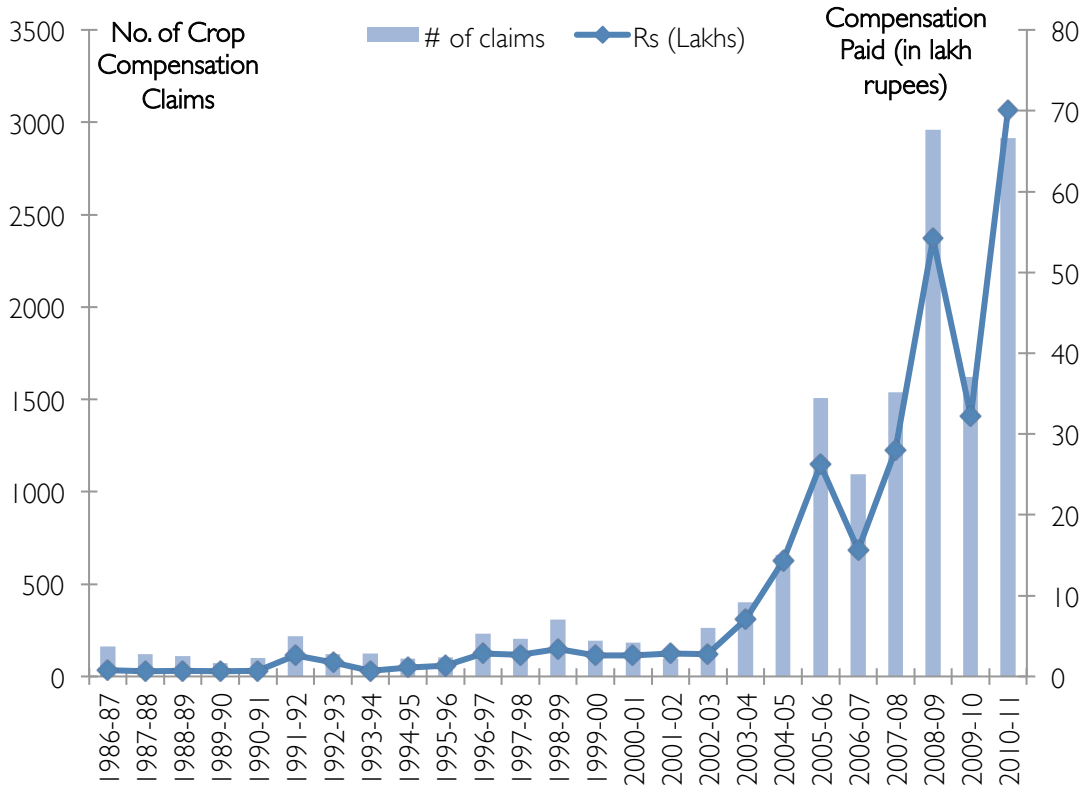

Figure 13: Trend in human elephant conflict in the Hassan region, indexed by number of crop compensation claims filed and compensation amounts disbursed annually (Data: KFD)

Human deaths

Elephant-human conflict has also resulted in very significant loss of human life and limb. During the period 1986-2006, elephants attacked people on 276 occasions; a total of 33

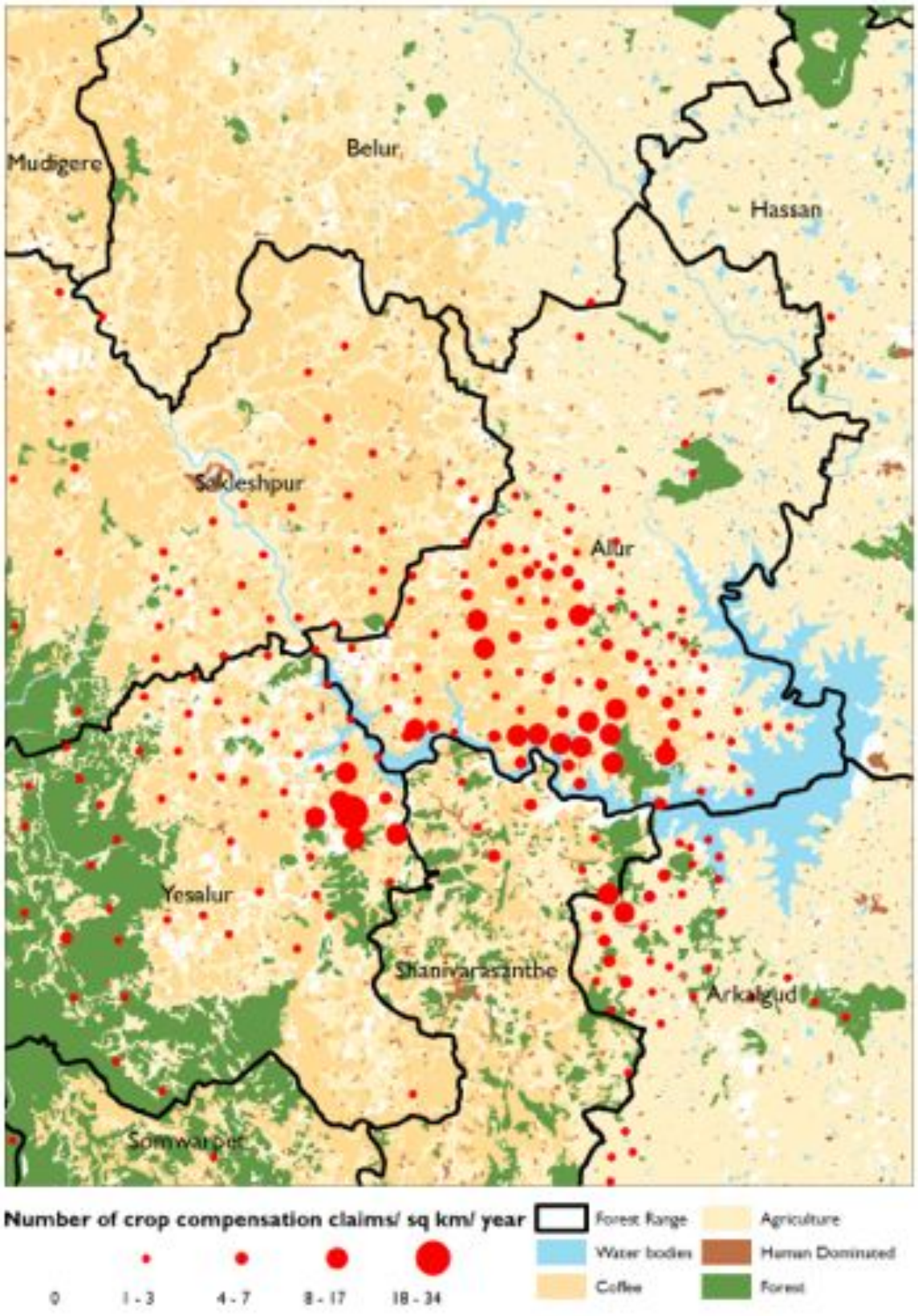

Figure 14: Distribution and intensity of conflict in the Alur-Somwarpet-Arklagud-Sakaleshpur region as indexed by crop compensation claims from various villages in the region between 2000 and 2009. (Data from KFD, compiled by CM Bipin, mapped by ATREE Eco-informatics Lab & NCF GIS Unit)

people have been killed and elephants in this area have injured 243 people. Over Rs. 25 lakhs has been paid as compensation for these deaths and injuries. Of these 33 deaths, 10 deaths have occurred in the last three years. More recently between 2007 and 2011 a further 13 people have been killed by elephants in this area. This represents an average of 3 humans killed every year and given the small number of elephants (less than 30), human mortality is very high, and unacceptable.

Such high rates of killing result in fear psychosis among people that hampers their ability to work and live normal lives. Most outdoor activities cease by 6 pm in the severely affected areas, as people are too scared to venture out, because elephants normally move out of the forest at that time. This is seriously affecting their ability to work and earn a living. School-going children, too, face the same problems as they encounter wild elephants when waiting at the roadside for a bus or walking from the bus stop to their house in the evening.

Consequently, people have become extremely hostile towards elephants and conservation. They see elephants not only as a real danger to their lives but also their livelihoods being destroyed by elephants. They also feel that normal life has been adversely affected by the presence of elephants. They vent their anger on the Forest Department and also hinder its ability to discharge its duties effectively. They have also threatened in public meetings to take the law into their hands and kill the elephants. **Clearly, elephant-human conflict in the Alur area is showing an increasing trend, has already reached untenable levels, and therefore requires serious action to prevent major social unrest.**

Cause of the problem: Hypothesis 1: People encroaching on elephant habitat?

A major debate has raged in conservation circles as to the cause of the Alur elephant-human conflict. Some elephant lovers have argued that the Alur area was until recently a natural elephant habitat, and that rapid expansion of agriculture and coffee plantations, compounded by submergence under the Hemavathi reservoir resulted in the loss of this habitat and displacement of the elephants. The solution proposed therefore is of 'restoring the habitat to the elephants' by removing the 'encroaching' human population. We investigated this possibility and our findings are as follows.

a) Legally notified forest area that was submerged under Hemavathi reservoir was only 36 ha (source: Hassan Division Working Plan). (Bulk of the area submerged under the reservoir was agricultural land (64,000 ha)).

b) Forest area given for rehabilitation of displaced farmers from the Hemavathi reservoir submergence was about 1220 ha.

c) Some other areas were forested but not legally notified as forests. However, an examination of Landsat imagery from 1973 indicates that these areas were less than a few thousand hectares (see Figure 15).

d) The assessment of satellite imagery from 1973 and 2000 given in Figure 15 also shows that even in the early 1970s, there were no contiguous patches of habitat.

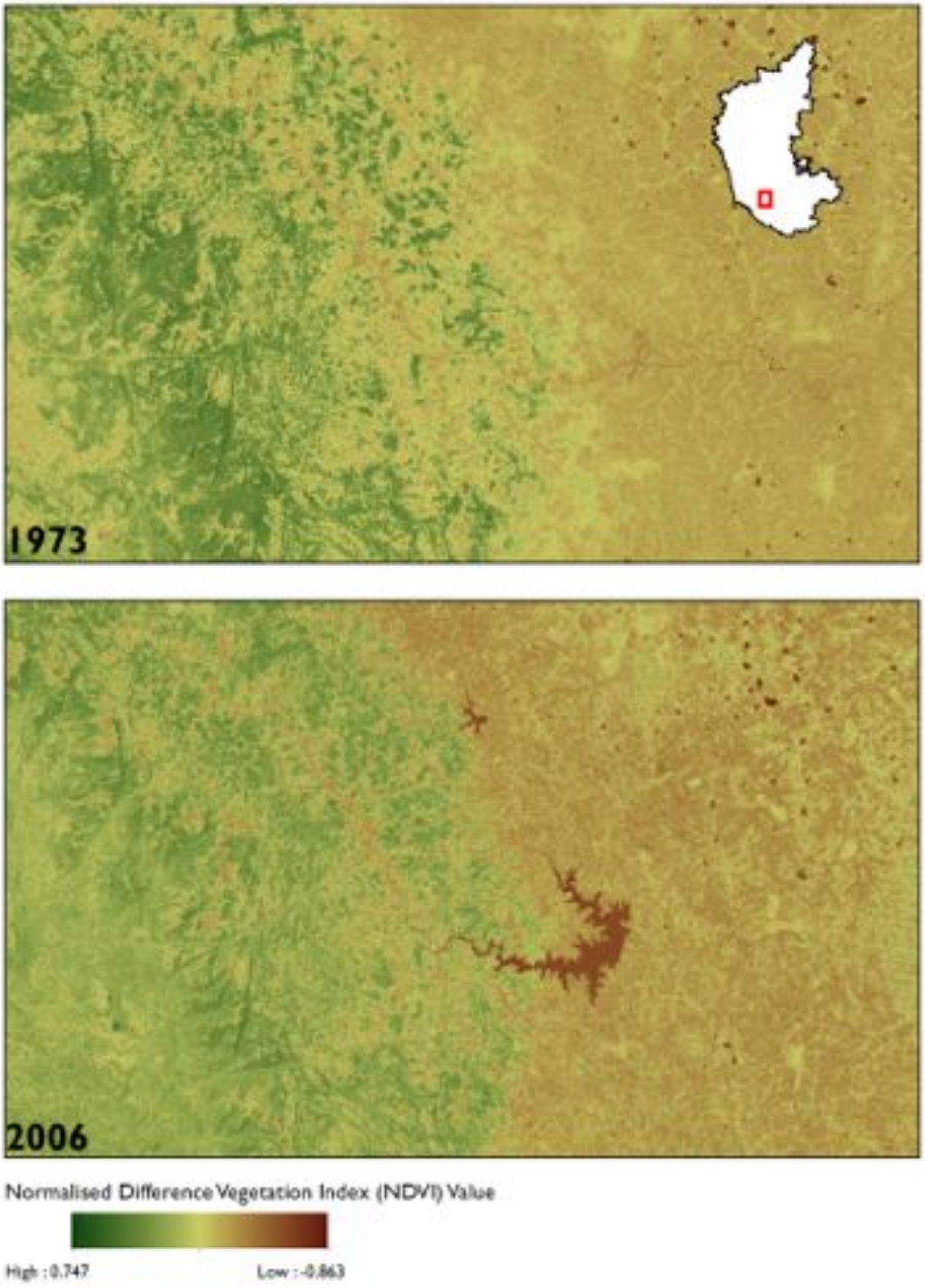

Figure 15: A comparison of the satellite imagery from 1973 (above) and 2006 (below) showing relative changes in land cover in Hassan. It is clear that the areas submerged by the Hemavathi Reservoir did not contain forest even in 1973.

Thus, the total forested area in this region just before the construction of the Hemavathi reservoir was less than 50 km^2. This cannot be said to be a large area for elephants and no such area can support a large or even a medium-sized population of elephants. Ele-

phants, if at all present in this region in the late 1960s, would have been very low in numbers.

Conclusion: **There has not been significant natural elephant habitat in the Alur area for at least 4 decades or more. Whatever habitats existed prior to the construction of Hemavathi Reservoir were tiny and highly fragmented. Therefore, people have not encroached significantly on elephant habitat in the past 4 decades.**[34]

Cause of the problem: Hypothesis II: Elephants encroaching on production landscapes

While the extent of forest cover today is less than 10 sq. km (when patches of forest in Somwarpet *taluk* are included), the area in which elephants roam today in this area is more than 300 sq.km. This is established from field observations, mapping of conflict areas, as well as data from radio-collar monitoring of one elephant over a 10-month period. The area covered by the radio-collared elephant was 290 sq. km (**Figure 16**). Most of this area is coffee plantation and agriculture, along with human settlements. Clearly, the elephants today are not residing in their natural habitat.

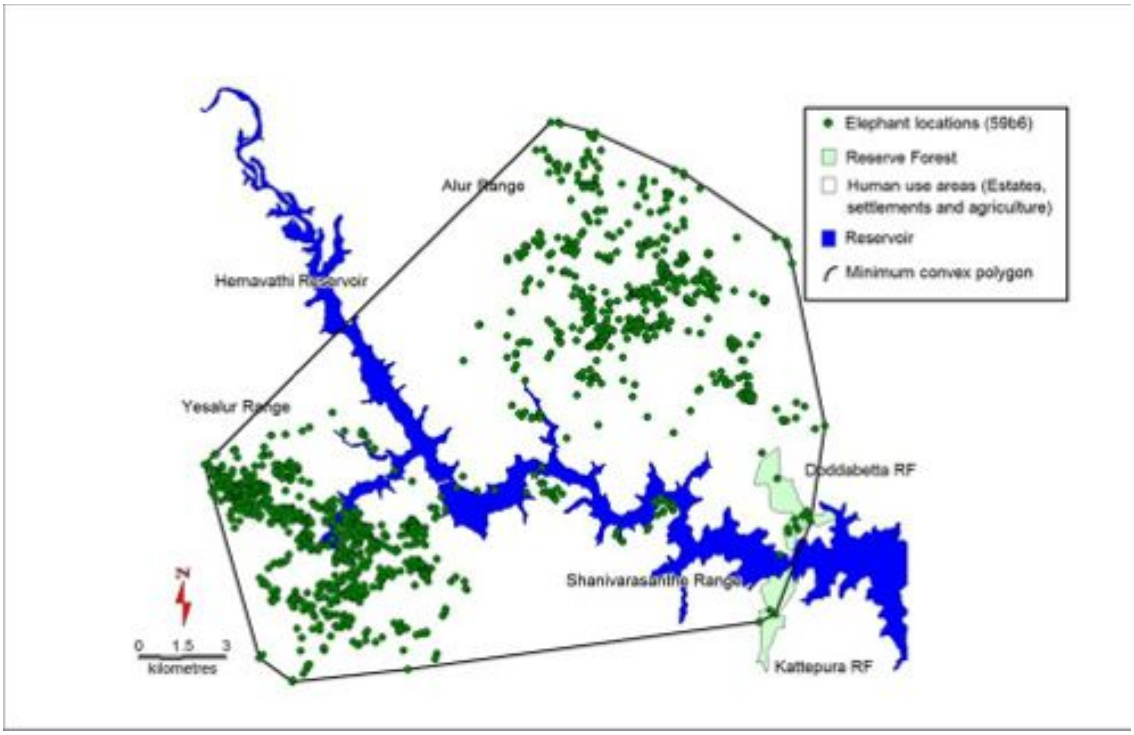

Figure 16: Movement of radio-collared male elephant over a 11-month period (December 2010 to November 2011). The approximate area covered is 290 sq. km.

The population of elephants has also been increasing. From about 13-15 elephants in the 1980s, it has increased to 26-32 elephants today. Interestingly, this increase has happened in spite of translocation of all the males in the late 1980s (of which only a few returned), and the death of at least 9 elephants during 2007-2010 (due to electrocution or retaliatory

[34]It is certainly possible that far back (more than a century ago) this area had natural forest and a significant elephant population. But then this would be true of many areas, including what is today suburban Bangalore, and cannot be used as a basis for management decisions.

killings). For such a small population to show an increasing trend in spite of such a high removal rate implies that the population is being constantly augmented by a steady influx of elephants, presumably from the south.

The population composition also supports the hypothesis of a 'dispersing' population, where the elephants move away from their original natural habitat into other areas due to a combination of factors (possibly increased competition for resources in the natural habitat and attractiveness of other habitat such as croplands for food). Whereas in the 1980s, the population was an all male population, today the population consists of females, their young and young males. Since an all male population could not have bred, and in any case most of these males were captured and translocated or killed, the current group of elephants have clearly dispersed from larger populations, probably in the south. Former Chief Wildlife Warden of Karnataka, Sri Appaya notes that the population was replenished by additional dispersal of males; further female groups also moved in during the 1990s[35]. Finally, the area over which the population is ranging is expanding, as shown by the increased number of villages (from 38 to 79) reporting crop damage or human death.

Conclusion: **All these factors point to one conclusion, viz. that the current population of elephants in the Alur region did not exist there 30-40 years ago, but is a dispersing population from some larger population (most probably from the south), and it has moved in relatively recently (less than two decades ago) and ranges over largely non-natural habitat (coffee plantations and agricultural lands).**

Possible ways forward

We now examine two possible solutions to the problem of Alur elephants: increasing elephant habitat by purchasing private land and relocating people versus removing the elephants themselves.

Option I: Increasing habitat for elephants

The presence of elephants in an almost entirely human-dominated landscape is the cause of the Alur problem. While the elephants are able to survive in this landscape because it provides both food (from croplands) and shelter (in coffee plantations), the high degree of conflict and negative social impact is precisely because of this pattern of elephant movement. One solution could be to expand the 'natural' habitat of the elephants from the present fragments of few square kilometres to one that covers most of their range, i.e., about 300 sq. km. This is a major task that would require acquiring bulk of this area from private landholders, and then restoring it to some sort of 'natural' habitat (from its current cultivated state).

1. *Consolidation of existing forest patches*: Existing forest patches are very small in size and are widely scattered. First consolidating them by linking them with corridors within the Alur area would serve no purpose, as the overall size would be too small for elephants. Corridors would create only pathways and patches would in many cases be

[35] Appaya, M.K., 1995. Elephants in Karnataka (India): a status report. In: JC Daniel and H Datye (eds) A week with elephants. Bombay Natural History Society and Oxford University Press, Bombay.

small as the corridors. We must take into account the largest forest patch is less than 4 km^2 while the area required is 300 km^2.

2. *Corridors*: Creation of corridors to other large elephant habitats outside this area is pointless as these elephants have already left those larger habitats and moved into this area due to various pressures on them in their native habitat. These elephants are already used to moving through purely human use areas and as such there are no barriers to their free movement even without corridors. The fact that they have not gone along either direction where potential corridors can be established indicates that they have no inclination to move in those directions. At present there are no constraints to their movement in either direction given their ability to move through human use areas with ease. Corridors towards the Kodagu forests will therefore only facilitate the movement of more elephants into this area. This may ensure genetic viability of this population but any such corridors will not address elephant-human conflicts (that would further increase) or expanded habitat requirements of these elephants.
3. *Recovery of encroached lands and land under the revenue department* also poses the same problem. These lands are likely to be small-sized patches and scattered around Alur and thus recovering them would not create a contiguous large habitat patch. We would still recover very little habitat from such an exercise. In addition to creating corridors to link ineffective (in size) areas we would need to restore these areas as elephant habitat. This would be a very costly and difficult task requiring a lot of time.
4. Thus, the only option that remains is the **purchase of private land**. Assuming that an acre of land costs Rs 5 lakhs (which is probably on the lower side, given that farmers in Sakaleshpur are demanding Rs 15 lakhs/acre), a single square kilometre (100 hectares) of land would cost Rs 12.5 crores. Even if an over-generous estimate is made that 100 of the 300 sq. km of land is encroached and from it farmers can be evicted without compensation, the land that have to be purchased would be 200 sq. km. The total cost of purchase of this land would be of the order of Rs 2,500 crores. Further expenses would have to be incurred on compensation for houses, infrastructure, civic amenities, resettlement of the landless workers, restoration of forest, etc. would add significantly more to the costs. In comparison, the money spent on elephant conservation throughout the country by Project Elephant (Government of India) **since its inception** in 1991 to 2009 is Rs 154.5 crores and the annual budget of Project Elephant for the whole of Karnataka is Rs 2.5 crores. **Thus, 1000-times the annual budget of elephant conservation in Karnataka would be required to purchase land in Alur for approximately 26 elephants.**

Restoring habitat

As already mentioned, the mere acquisition of agricultural land does not solve the problem of conflict. Any acquired land would have to be restored to natural vegetation that would be useful to elephants. While acquired cropland may initially be covered by grass, the chances of weed invasion are high. Preventing this would require years of intensive and extensive management on scales not practiced by the Forest Department. For exam-

ple, removal and management of weeds even in well-funded Tiger Reserves is done only at the scale of at most a few hundred hectares a year.

We would also have to take into account the time needed for natural habitat to regenerate and provide sufficient fodder for elephants. This would not happen overnight. How elephants respond to the lack of resources (crops) during that period is difficult to predict with animals that are habituated to crop raiding and to dispersing. They may simply expand their range into new areas during this period. Having seen from past experiences in this and other localities in the country that they can even move into pure agricultural areas when they disperse; such a scenario is not unlikely in the interim period when habitat is being restored. Suggestion that managers should grow crops for elephants is not realistic. The Forest Department does not have to capacity or resources for this. The area under agriculture would be in the region of 20,000 to 30,000 acres and thousands of people are engaged in agriculture. Even if we assume that a skeleton staff can manage agriculture on this scale the Forest Department would still need to hire a few thousand people implement this.

Threat of further dispersal or expansion of range

As this is a dispersing population it's ranging cannot be considered as being stable so there is no guarantee that these elephants will remain here in the long run. They are likely to disperse into other areas and also expand their range. Present data clearly shows that the population is expanding its range. There has been range expansion from the fringes of Kattepura and Doddabetta initially (in the 1980s) to the 79 villages today. If elephants are to be conserved here then we have to decide on the issue of further dispersal of elephants from this area. First we allow dispersal and expansion, which would result in the problems expanding to other areas and the need to go through with a similar conservation or removal exercise in those new areas too. Or we confine these elephants to their present range and thus avoid expansion of the problem. Confining them to their present range would require that we enclose this population using barriers so that they cannot expand their range. The costs and feasibility of doing so and the long-term benefits would need to be carefully weighed.

Feasibility and cost of putting up elephant-proof barriers

The coffee estates and agricultural areas form a mosaic and this would require inordinately long barriers (Electric Fence or EPT) to be erected to protect agricultural areas from elephants. The estimated perimeter would be in the region of 1000 km. The costs of erecting and maintain these barriers would be prohibitive. The costs of non-lethal electric fence would be in the region of Rs. 25 crores and maintenance would be over Rs. 4 crores annually at the current rates that the government is paying. Electric fences by themselves may not be a long-term solution and the costlier option of using elephant-proof trenches would also have to be looked into. Such funds could be more usefully spent in providing barriers in the Conservation Zone or even Co-existence Zone for protecting agriculture and people from much larger and more viable populations of elephants.

For such a major effort to be worthwhile, the conservation benefits would have to be significant, considering the cost involved. Unfortunately, this is not the case.

1. Ecological viability: the population of elephants involved (25-30) is not an ecologically viable population (see Appaya and Desai, 2007).A population of 100 to 130 (depending on the age-sex composition and the need to have a minimum effective breeding population of 50 individuals) would be the minimum needed to address the needs of short-term conservation needs (also see Chapter 2). This would then require translocating 100-odd elephants from other locations to this area. But such a population could require more than the present 300 km^2 for their survival, and this means acquiring even more agricultural/coffee land.
2. In the context of overall elephant conservation needs in Karnataka and in India, these elephants currently play no meaningful role. Even if they are effectively conserved at high costs their numbers will remain very small; at present there are an estimated 26 elephants but, even if we allow the population to build up, at best 100-odd elephants can be established in this area if 300 km^2 of land is made available to them. Such numbers are not likely to play a major role given that Karnataka has 5,300-6,200 elephants while India has about 28,000 elephants in the wild.
3. **In short, the option of restoration of elephant habitat in Alur region is practically unachievable, will impose an exorbitant financial cost, and may not solve the problem in the long run, and the conservation gains from this measure do not at all justify this effort or expenditure.**

Option II: Removal of elephants and stopping future influx

In a situation where co-existence is impossible and the in situ conservation option is extremely expensive and pointless, the only option that remains is removal of elephants. Of course, this option has its own challenges. For instance, one decision to be taken is whether the captured elephants should be relocated to another forest or whether they should be retained in captivity.[36]

In all cases it is important that a qualified and experienced team prepares detailed protocols and guidelines so that everything is done in a scientific and systematic manner. Poor planning and implementation will result in failure no matter which management option is implemented. We must recognize that we are dealing with a problem (in all elephant habitats) that will require sustained and systematic management in the long-term and, as such, it is critical that the KFD develop skills and knowledge to deal with problems and management requirements immediately.

All these issues need to be addressed before embarking on a large-scale operation. However for purposes of initial trials when dealing with a few elephants all steps may not be needed as some data and knowledge is gained only through experience.

[36] The option of culling is neither legally permissible nor desirable keeping in mind cultural attachment to the elephant.

The removal of elephants from the Alur-Arkalgud *taluks* would require elaborate planning. A team of veterinarians, mahouts, wildlife biologists, and forest staff under the leadership of the Chief Wildlife Warden, is needed to plan the operations and execute this plan by adopting a judicious combination of traditional and modern techniques in elephant capture. The following points may be kept in mind while planning for the capture of these elephants.

As the elephant is a highly social creature, it would be highly desirable to capture an entire family group in any single operation so as to not split the family. While the exact details of the operations will have to be planned, we can think of combining a traditional method such as the *kheddah* (driving into stockade) with modern methods (chemical restraint) to achieve this goal. The location of capture is a very important consideration. A good understanding of their movement paths and patterns is necessary in order to select the best location for the operation.

The design of the stockade (if used), possible method of luring them inside and the choice of drugs in darting and restraining the elephants can be worked out by an expert team. The idea would be to restrain the movement (immobilization in standing posture) of the matriarch and the other adult females, perhaps through the use of xylazine alone, or if necessary in combination with acepromazine or ketamine mixture. This would not put down an animal (that could result in the rest of the group running away) as with the use of etorphine hydrochloride.

It is also essential to induct a person with knowledge of *kheddah* operations; if it is difficult to find someone with this expertise today in the south, it may be possible to get a person from the northeast.

While the cost factor will have to be worked out in detail, a preliminary estimate would be in the order of Rs 2 crores to Rs 4 crores for the entire operation of capturing 26 elephants.

The next point that was considered by KETF was whether the elephants should be translocated to their natural habitat or retained in captivity. In the course of our deliberations it clearly emerged that translocation of elephants had a high chance of failure, as there is a distinct possibility that the elephants may move back to the Alur area. If translocation was to be attempted as a learning experiment, the animals would have to be released at a place far way from Alur *taluk*, say, the Kollegal Forest Division that is about 250 km away from Alur, with one or more elephants fitted with radio/GPS collars to track their movement. This would require detailed field surveys in Kollegal as well as detailed consultation with people residing in villages in this division, as there is a distinct possibility of the elephants continuing their crop raiding habits. Past experiments with relocating bull elephants from Alur at places such as Nagarahole and Bandipur have failed with the animals returning to Alur. The Sri Lankan experience with translocating family groups has also been mostly failure. The Alur elephants have been ranging in this area for well over a decade making it highly unlikely that they would settle down at a different location in the state. Therefore, the members of KETF felt that it would be prudent to retain the captured elephants of Alur in captivity.

A camp for training these elephants and eventually retaining them for departmental use should therefore be established at a suitable location in the Hassan-Kodagu districts.

Stopping the influx of new elephants into the area

The Alur area for all practical purposes would have to be isolated and the influx of new elephants into this area stopped, or at least greatly minimised, in future. Isolating this region would require the erection of suitable barriers along the northern periphery of the distribution of elephants in Kodagu district. The precise alignment of the barriers, and the nature of the barriers, can only be determined through detailed ground survey.

It is still possible that in future some more elephants could immigrate into the Alur area. In such instances, it would be advisable to capture them at the earliest, before they have a chance to settle down here, and experiment with translocation to a far-away forest region in the state.

Four members of KETF have expressed a dissenting opinion on the issue of capture of elephants from the Alur area. This dissent note along with replies by the Chairman, KETF, is included in Appendices A and B, respectively.

3.6 Summary and key recommendations of this chapter

The recommendations emerging from this chapter are at two levels: overall state-level actions and specific recommendations for two sites that were referred to by the Honourable High Court. We summarize below the main recommendations at these two levels.

3.6.1 State-level recommendations

a. Elephant management, including conservation and conflict mitigation needs to be handled differently in different areas. We propose zonation of all areas in which elephants are present into 3 zones: Elephant Conservation zone, Elephant-Human Coexistence zone, and Elephant Removal zone.

b. Elephant management will then require adoption of different approaches in different zones, along with some common cross-cutting strategies. In brief, the emphasis in the Conservation Zone has to be on maintaining habitat integrity, keeping elephants within forest boundaries, and preventing poaching for ivory. The emphasis in the Coexistence Zone has to be on mitigating conflict through more engagement with local communities, better management of elephant habitat such as monoculture teak plantations, and prevention of encroachment or conversion of community-use areas. The only option in Removal Zones is capture of elephants, and either relocating them or maintaining them in captivity.

c. A number of additional elephant management strategies cutting across some or all these zones are required. These include community involvement in maintenance of barriers such as electric fences and elephant-proof trenches, awareness campaigns on conflict mitigation and elephant conservation, increased support for research, better

collection and maintenance of data by KFD, and further improvement of the *ex gratia* mechanism.

d. A state-level **Karnataka Elephant Expert Group** needs to be formed to initially assign areas to zones in a scientific manner, and then to help develop management plans using the above strategies and monitor their outcomes.

3.6.2 Site-specific recommendations:

a. The problem of elephant-human conflict in Hassan district has to be separated into two parts, corresponding to two distinct elephant populations, one operating in south-western Sakaleshpur and the other in the Alur area.

b. South-western Sakaleshpur must be classified and managed as a Co-existence zone. The main management strategies for this region must be:

   i. All forest clearances given improperly to mini-hydel projects must be cancelled immediately, and concerned officials who have *prima facie* misrepresented facts about presence of elephants and other wildlife while recommending such projects must be prosecuted.

   ii. All future applications for forest conversion in areas classified as Elephant Conservation or Coexistence Zones must be cleared by the Chief Wildlife Warden.

   iii. A study must be commissioned on the consequences of the Mangalore-Hassan highway, railway line and pipeline on the north-south movement of elephants.

   iv. Deemed forests must be regulated better by first reconciling FD records with Revenue Department, and re-designating them as Village Forests, Protected Forests or CFRs under FRA, depending upon the context, people's rights and preferences through a participatory and transparent process.

   v. Subsidies may be provided to small and marginal farmers to install standardized electric fencing to protect their crops.

   vi. Maintenance of barriers could be transferred to the local bodies (*Gram Panchayat*s, Eco-development Committees) along with sufficient funds for this purpose.

   vii. The proposal to acquire land from farmers in western Sakaleshpur must be rejected, as it will neither add significantly to elephant conservation nor be financially viable.

c. The Alur (i.e., Alur-Arkalgud-Somwarpet-Sakaleshpur border) area faces very high levels of human life loss and crop damage due to elephants, and this is showing an increasing trend. Given the minuscule area of forests in this region, the high density of human population and predominance of agriculture and horticulture on the landscape, and the small, dispersing and unviable nature of the elephant population, majority of the KETF members believe that there is no option but to treat this area as being an Elephant Removal Zone. Therefore:

   i. All proposals to move people, or acquire lands for corridors or habitat must be rejected.

ii. Elephant capture must be planned meticulously with the help of veterinarians, wildlife experts and mahouts. Drug immobilization, perhaps combined with a traditional method such as *kheddah*, should be the choice of method as it would be advisable to capture an entire family in an operation.

iii. Since relocation is unlikely to succeed in the case of the Alur elephants, they will have to be kept in captivity.

Photo: MD Madhusudan

Unable to cross structures such as these penstock pipes, elephants are often completely cut off from parts of their home ranges

Picture courtesy: Google Earth

When elephant habitats are squeezed from either side by agriculture, development and human dwellings, elephants face the tough choice between moving through narrow corridors such as the one above, or using cultivated landscapes and risking conflict with people.

Chapter 4
Corridors for elephant conservation

4.1 Understanding and interpreting elephant corridors

The terms *wildlife corridor* and *elephant corridor* have been used very often, not just by ecologists, but by the media and a wide range of non-specialists as well. Below, we briefly review the concept of a wildlife corridor and discuss its practical relevance in the context of elephant conservation.

Ecologists have typically defined the term *corridor* to refer to narrow strips of land that differ from the larger habitat matrix in which they are embedded[37,38] or pathways by which animals move[39], but occasionally even to describe a discontinuous patchwork of habitat refuges[40]. The functional role of corridors is a limited subset of the role played by wildlife habitats. While wildlife habitats provide suitable conditions for a wide variety of species to forage, reside and reproduce, wildlife corridors are intended to serve the sole purpose of facilitating temporary occupation by and movement of species between suitable wildlife habitats[38,41].

The dictionary definition or everyday understanding of the word "corridor" is a narrow passage between two places. It suggests that a wildlife corridor is a passage that connects two larger habitat patches used by animals. While it is indeed true that animals need linkages between habitat patches to move between them, it is not always true that these linkages must themselves be habitats of good quality. Indeed, in the case of elephants it has been suggested that corridors should not be attractive habitats, as otherwise elephants would linger in these lands and come into increased conflicts with surrounding agriculture[42]. Animals may often use areas that are marginal habitat, or even non-habitats, to move between habitat patches. It is therefore more helpful to think of corridors as areas offer linkage or connectivity to animals to move between habitat patches[43]. Thus, while animals may use available habitat passages that offer *structural* connectivity to move between habitat patches, we also find that they may sometimes be obligated to utilise areas that cannot be thought of as part of their normal habitat (e.g, tea plantations, agricultural fields) to move between habitat patches. In such cases, the connectivity is more *functional* rather than structural.

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[37]Forman, R. and Godron, M. (1986) *Landscape Ecology*. Wiley, New York, 619.

[38]Beier, P. and S. Loe. (1992). A checklist for evaluating impacts to wildlife movement corridors. *Wildlife Society Bulletin* 20:434–440.

[39]Bennett, A. F. (1999). Linkages in the landscape: the role of corridors and connectivity in wildlife conservation. IUCN, The Netherlands.

[40]Date, E.M., Ford, H.A. and Recher, H.F. (1991) Frugivorous pigeons, stepping stones, and needs in northern New South Wales. *Nature Conservation 2: The role of corridors* (eds. D.A. Saunders & R.J. Hobbs pp. 241–245. Surrey Beatty, Chipping Norton, New South Wales, Australia.

[41]Bond, M. 2003. Principles of wildlife corridor design. Center for Biological Diversity, Tucson, USA.

[42]Lahiri-Choudhury, D.K. 1991. Keeping wild elephants at bay. In: SK Eltringham (ed.) *The Illustrated Encyclopedia of Elephants*. Salamander Books, U.K

[43]Dobson, A., Ralls, K., Foster, M., Soule, M.E., Simberloff, D., Doak, D., Estes, J.A., Mills, L.S., Mattson, D. and Dirzo, R. (1999) Corridors: reconnecting fragmented landscapes. *Continental conservation: scientific foundations of regional reserve networks. Island Press, Washington, DC*, 129–170.

In the context of elephant conservation, the term corridor is typically used to refer to a relatively narrow stretch of land within a larger habitat matrix that can be and is used by elephants. Experienced elephant observers have noted that a corridor of even 200 metres would be used by elephants[44], or that corridors of 0.5 to 1.0 km in width are regularly used by elephants[6]. The first action plan of Project Elephant prepared by Ministry of Environment and Forests thus prescribes corridors of about 1 km width as being sufficient to allow elephant movement[45]. The 2005 publication "*Right of Passage*: *Elephant Corridors of India*"[46], sponsored by the Ministry of Environment and Forests, provides a detailed treatment of elephant corridors, including in Karnataka state.

The role of a corridor for elephants may include one or more of the following functions:

1. Help maintain gene flow across the population within the overall landscape. Conservation biology theory suggests that the movement and successful reproduction of even one individual per generation (in the case of elephants, 20 or more years) is sufficient to maintain gene flow and genetic variability
2. Preserve the traditional seasonal movement and annual home range of an elephant family or clan within the landscape. This function obviously requires that all elephants of a family or clan are able to successfully negotiate a corridor on a regular basis.
3. In the present context of future climate change, a corridor would also facilitate possible dispersal and adaptation to a changing environment so as to ensure the survival of a species population.

In the Indian context of a large human population within a matrix of forest and multiple land-use, it may become inevitable to set priorities when it comes to investing resources in securing or strengthening corridors for elephants. Among several considerations, we suggest the following set while setting priorities based on the value of a corridor:

1. Exclusivity or otherwise of the corridor: Priority should be higher when there is only a single corridor that allows movement and gene flow of the target species between two habitats in the landscape and proportionately lower when two or more corridors are present that play the same function.
2. Actual use of a corridor by the target species: The mere presence of "corridors" does not necessarily mean that a target species such as the elephant is likely to use all of them to an equal extent. If data are available that shows a more intense use of a corridor this would receive higher ranking as compared to another that may be used only occasionally. Corridors that are used by both sexes should be valued higher than one used only by one sex. A corridor used by elephants that has been severed recently would again be a priority for restoration.

[44]Davidar, E.R.C. and Davidar, P. 1983. Investigation of elephant migration paths in the Nilgiri Hills and inquiry into impediments to the free movements of elephants there and recommendations for the provision of corridors for their movement. Unpublished report to IUCN/SSC Asian Elephant Specialist Group, c/o Bombay Nat. Hist. Society. 20pp.

[45]MoEF (1993). Project Elephant (Gajatame). Ministry of Environment and Forests, Govt. of India, New Delhi.

[46]Menon, V., Tiwari, S.K., Easa, P.S. and Sukumar, R. (Eds.), 2005. *Right of Passage*: *Elephant Corridors of India* (Conservation Reference Series, No. 3). Wildlife Trust of India, New Delhi.

3. Geometry of a corridor: A corridor that provides a direct link (measured on the ground as the shortest possible distance) between two habitat areas in the landscape should receive higher valuation than another that takes a more circuitous route. A corridor that goes through more difficult terrain (as perceived by the animal; this could be steeper terrain for instance) would receive lower valuation than one going through more favourable terrain. The dimensions of corridors (length and breadth) also need to be considered. Longer corridors also need to be broader for them to be effective, but such corridors are also more difficult to achieve in practical terms (especially when there are existing human settlements); in fact, with the elephant a long, narrow corridor could considerably increase the potential for conflicts with people and agriculture.

To summarise, in the context of elephant conservation, when we talk about corridors, it is important to consider both aspects of connectivity—structural and functional—that a potential corridor may offer between two or more larger tracts of habitat. Traditionally, in India, the focus of enhancing large-scale habitat connectivity for a wide-ranging species like the elephant has been focused on identifying and securing (often by acquisition) corridors that provide *structural* connectivity, in the expectation that such corridors also offer *functional* connectivity. Increasingly, it is being seen that animals like elephants may periodically and/or locally use certain human-dominated landscapes such as coffee and tea estates and even open agriculture to move through, and that it is as critical to sustain the *functional* connectivity they provide. In the case of these *functional* corridors, however, purchase of lands to secure connectivity is rarely practical or even necessary, and safe passage for animals may need to be negotiated with local landowners using a combination of land-use regulations and economic incentives. Provisions under existing legislations such as the Environment Protection Act (1986) to declare Ecologically Sensitive Zones, or the Wildlife Protection Act (1972, amended in 2006) to declare buffer zones for Tiger Reserves or other Protected Areas should be used to the extent possible to achieve these management goals. We illustrate this with an example below from the Bandipur Tiger Reserve.

4.2 Strengthening habitat connectivity: the Bandipur example

One of Bandipur's most commendable achievements is the manner in which it has attempted to consolidate both *structural* and *functional* connectivity of its core habitat and surrounding landscapes for elephants. This is something that has been addressed at two levels.

Firstly, a key aspect of strengthening *structural* connectivity for elephants has been through the consolidation of wildlife habitats outside designated forests. About 10 years ago, a very critical corridor in eastern Bandipur, termed as the Kaniyanpura corridor, that was merely 50 metres wide to the north of the deep Moyar gorge close to village Kaniyanpura, was widened to about 300-400 metres through transfer of uncultivated revenue lands to the forest department and realignment of an elephant-proof trench with the financial assistance of Project Elephant, Govt. of India, and technical assistance of scientific institutions. This was the first time that an elephant important corridor had been strengthened in the country. Then, a total of 5,599 acres of revenue lands with forest

cover were identified in the south-eastern part of the Tiger Reserve (see Figure 17). These lands were actively used by a range of endangered wildlife including elephants and tigers to move from the extensive tracts of forests of Bandipur on the west to habitats in Sathyamangalam WLS (in neighbouring Tamil Nadu) and BRT WLS on the east. But, as revenue lands, they were in constant danger of passing into land-uses that were not congruent with conservation objectives. Thus, through a series of constructive collaborations between the Forest and Revenue

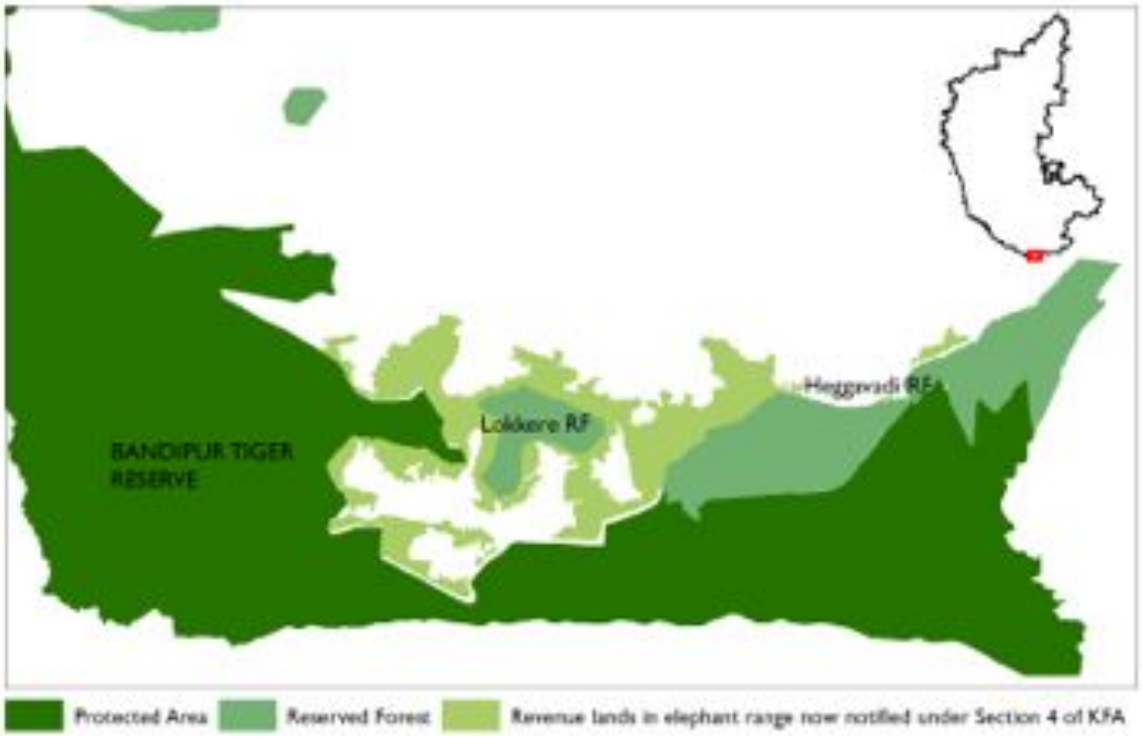


Figure 17: Existing structural connectivity across the southeastern parts of Bandipur Tiger Reserve, previously in unprotected deemed forests, have now been consolidated by being handed over to the forest department and notified under Section 4 of the Karnataka Forest Act, 1963.

departments, facilitated by members of civil society, these lands were transferred from the Revenue to the Forest department, and paper work was initiated to notify these lands as reserved forests. Recognising that these areas were still used by local communities for grazing, the notification has however kept these areas out of the core of the Bandipur Tiger Reserve and open to these uses by local communities. In an area where there was rapid conversion of revenue lands to resorts and vacation homes, this move has considerably strengthened habitat contiguity for elephants in an ecologically sensitive region.

Secondly, Bandipur has been among India's first protected areas to notify an Eco-Sensitive Area (ESA, under the Environment Protection Act, 1986) to regulate land uses on private lands along its boundary (see Figure 18). This notification ensures that large-scale transformations of surrounding private lands that may undermine *functional* connectivity available to wildlife, or be otherwise inimical to wildlife conservation inside the park (e.g., creation of polluting industries, or unregulated expansion of tourist resorts) are prevented, whereas land-uses that provide local sustenance continue unhindered.

Further, a broad-based management structure provides local representation in the management of the ESA. The draft notification issued in September 2011 has been publicly debated and changes have been made to it based on inputs of local communities and elected representatives. A final notification is now due.

While this regulation may enable maintenance of functional connectivity (e.g., the movement of elephants across private agricultural land, say from Lokkere RF in the north to the southern portions of Bandipur TR, see Figure 2), there is urgent need to complement the regulatory restrictions (under the ESA) that apply on these private lands with:

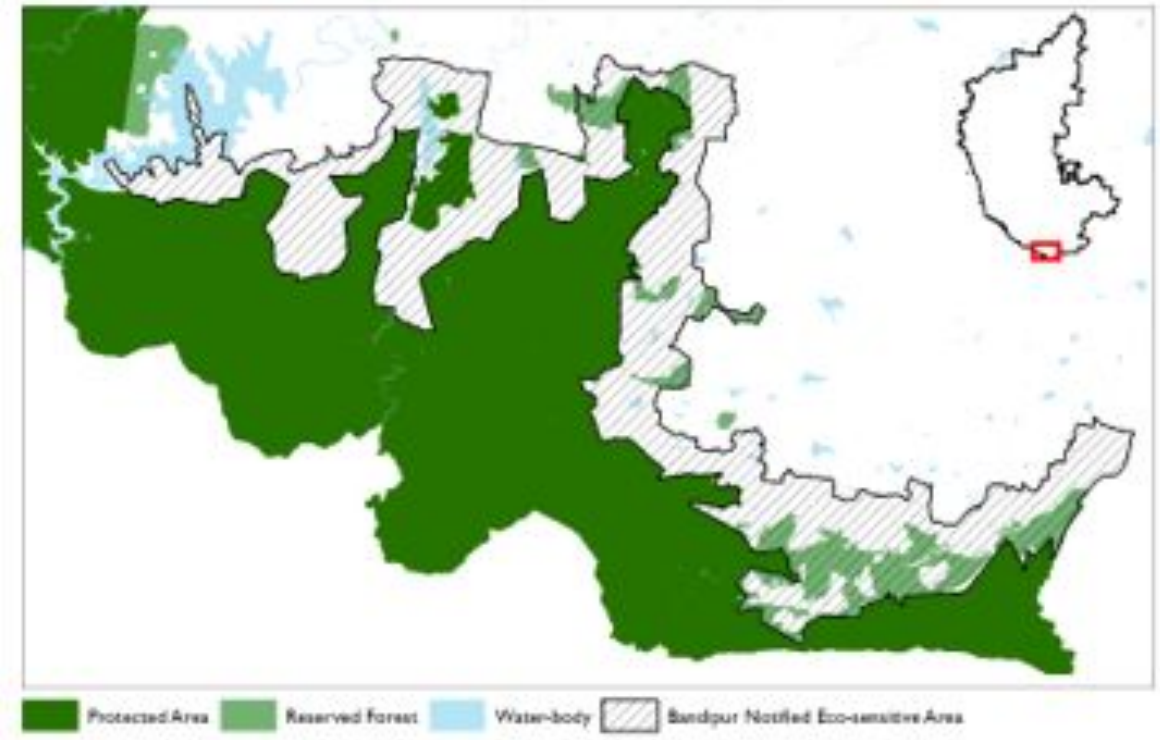


Figure 18: Although Bandipur has actively tried to strengthen barriers along its northern boundary, the existence of an Ecologically Sensitive Area to its north enables functional connectivity for elephants, especially around Nugu Wildlife Sanctuary and the Mangala-Jakkhalli-Yelachetty region.

(a) incentive mechanisms that address the potential economic costs of facilitating elephant movement through private production lands, and (b) mechanisms that enhance safety to human life and property in this *functional* corridor without impeding elephant movement.

4.3 A lost corridor: example of the Punjur-Kolipalya Corridor

A second case study pertains to an elephant corridor in BRT Sanctuary identified and documented during the early 1980s[47] but subsequently lost (Figure 19) due to lack of understanding of the importance of such areas by the administration. This corridor termed

[47]Sukumar, R. 1985. Ecology and Management of the Asian elephant (*Elephas maximus*) in southern India with special reference to the Sathyamangalam and Chamarajanagar Forest Divisions. Technical Report: Centre for Ecological Sciences, Indian Institute of Science, Bangalore.

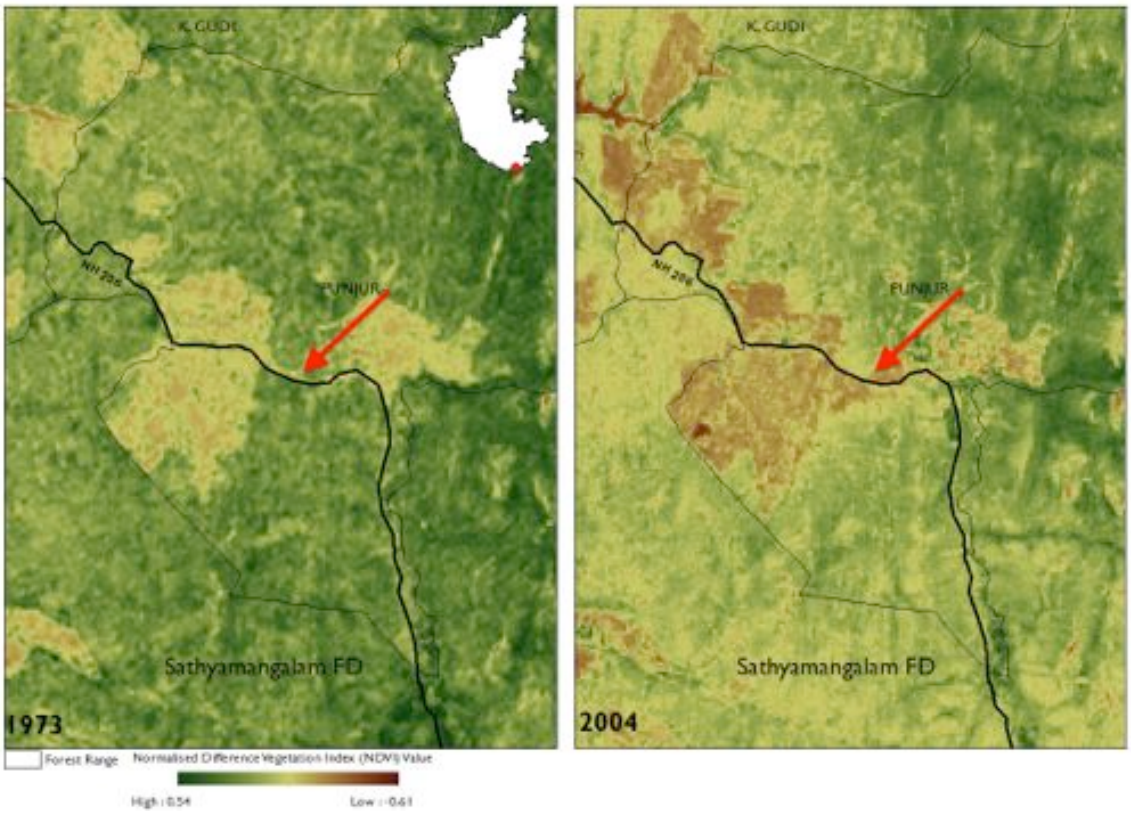


Figure 19: Satellite imagery showing the loss of the Punjur-Kolipalya corridor (shown by the red arrow) over three decades.

as the Punjur-Kolipalya corridor after the two villages abutting the passage (also named as "Chamarajanagar-Talamalai" in *Right of Passage* after the two Reserve Forests it connects) was an important passage for large numbers of elephants moving in a north-south direction between the BRT Sanctuary (Karnataka) and Sathyamangalam Forest Division (Tamil Nadu). A 1-km strip of Reserve Forest (technically within a Wildlife Sanctuary) between Kolipalya to its west and Punjur to its east constituted this corridor. To the east of Punjur the movement of elephants is constrained by the steep terrain of BRT, while to the west of Kolipalya an alternative narrow corridor (termed as Talavadi-Mudahalli corridor) is not only circuitous but also very close to the periphery of the elephant range and, hence, brings elephants into greater conflict with agriculture. The Chamarajanagar to Sathyamangalam Highway (NH-209) passes through these corridors.

Around 1990-91, the Karnataka Forest Department resettled *Soliga* tribals from Bedguli to land falling within the Punjur-Kolipalya corridor to the south of NH-209. The *Soliga* were earlier employed in coffee estates at Bedguli and were settled near Punjur in order to provide them employment in a few coffee estates at Punjur. This new settlement, named as Srinivasapura, cut-off the free movement of elephants through the corridor. Land at Bedguli reclaimed from the *Soliga* was planted with the exotic *Eucalyptus* to increase the tree cover; this did not improve the biodiversity of the land. Details of the number of families resettled near Punjur and the present status of the families are awaited from the Karnataka Forest Department.

A narrow strip of land, forming part of the elephant corridor to the north of NH-209, was still uncultivated at this time. However, a land grant of 600 acres had been made to *Harijan* and *Lambani* communities in Chamarajanagar State Forest[48] on condition that they should organize themselves and establish a co-operative farming society failing which the land granted to them would revert to the Government. For several decades the part of the land grant made to the north of National Highway 209 remained uncultivated; during the 1980s and 1990s, for instance, this land was certainly not cultivated. During the visit of the members of the Karnataka Elephant Task Force it was noticed that this land was now cultivated. Inquiries revealed that in recent years this land (meant for co-operative farming) had been sold to other people under various sale deeds, which is in contravention of the grant conditions. When the matter was questioned by forest department officials, the plaintiff filed a suit, where the Honourable Trial Court at Chamarajanagar passed its orders upholding the sale transactions[49]. Recently, the Government of Karnataka has authorized District Government Pleader at Chamarajanagar to appear and prefer regular appeal before the Senior Civil Judge Court on behalf of the State of Karnataka A/W application under Order 41 Rule 3A of CPC. Assistant Conservator of Forests, Chamarajanagar is monitoring the litigation.

Securing the Punjur-Kolipalya corridor on the ground brings up the uncomfortable issue of potentially resettling people who currently reside in this key area. Further, it must be borne in mind that some of them include the *Soliga*, a Scheduled Tribe who have already once undergone the pains of relocation in the early 1990s. If any action be initiated to secure this corridor, it is of utmost importance that it genuinely engage and discuss these proposals with residents, and evolve terms for such resettlement that empower voluntary decision-making by residents. Further, the government must ensure that any resettlement, if attempted, is backed by independent oversight to ensure social and economic justice to affected community at all stages.

[48] As per G.O. AFD 330 DST 58, dated 18-5-1959,

[49] Orders dated 18-7-2011 in OS 109/2004 at the JMFC Court, Chamarajanagar.

Photo: K Murthy

Unnatural mortality is a serious issue in elephant conservation. Over the last decade, retaliatory killing in conflict situations has become a major cause of unnatural elephant deaths

Photo: MD Madhusudan

Elephants often die when farmers, desperate to protect their crops, but unable to afford non-lethal electric fences, sometimes illegally electrify fences by connecting them directly to live wires.

Photo: Kalyan Varma

Elephant habitats are not only under threat from ill-planned development projects, but also from poorly sited extractive industries such as quarries and mines.

Chapter 5
Other issues in the conservation of wild elephants

A number of other issues relating to unnatural deaths of elephants, land diversions near the forest boundary, and administrative problems relating to mitigation and management of elephant-human conflicts are dealt with in this chapter.

5.1 Unnatural deaths of elephants

Poaching for ivory and electrocution or gunshot injuries as anti-depredation measure are the generally most important causes of unnatural deaths of elephants (Table 7).

Table 7: Details of natural and unnatural deaths of elephants in Karnataka during 2007-12

S. No	Year	Natural	Gunshot –Poaching	Gunshot –Other	Electrocution	Accidents / Other	Total
1	2007-08	105	5	3	9	6	128
2	2008-09	96	2	4	19	8	129
3	2009-10	103	3	10	22	0	138
4	2010-11	100	1	7	13	0	121
5	2011-12	103	0	3	15	1	122

Besides these two factors another important reason for the unnatural death of elephants is due to gunshots. The reasons and the action taken by the forest department for prevention of unnatural deaths of elephants are given below-

5.1.1 Elephant deaths from ivory poaching

The number of unnatural deaths of elephants due to ivory poaching has come down over the past decade. During 2011-12 no such incident was reported in the state. Forest department has taken a number of measures for prevention of poaching incidents in both protected as well as territorial forests of elephant home range areas in the state. One of the important steps has been the establishment of Anti-Poaching Camps (APC) in sensitive areas. These camps are located at vantage points in the interior forest areas. Staff have been provided with arms & ammunition, wireless sets, and other important accessories needed for their day-to-day work, as well as clothing and rations. Most of the APCs are equipped with solar panels for providing lighting and charging facilities for the batteries. The network of APCs is connected through patrolling routes used by senior officers to monitor and co-ordinate efficient working of the APCs staff.

The expenditure towards the maintenance of these APCs is met by various departmental schemes including the Centrally Sponsored Scheme "Project Elephant". However due to the limited allotment under these schemes it is necessary to augment and sustain funding for such protection activities. Besides this, at a few places, where additional APCs are required and wherever the infrastructure (like construction of sheds, improving communication, providing bore wells for water supply etc.) has to be

strengthened, requirement of sufficient funds have to be met. Under the CSS Project Elephant during 2011-12 18 numbers of APCs were provided in the state. During year 2012-13, 19 numbers of APCs are proposed in the state plan of operation, under the Centrally-Sponsored Scheme "Project Elephant".

5.1.2 Elephant deaths from conflict-related electrocution and gunshot wounds

Death of elephants due to electrocution is one of the main reasons of unnatural deaths of elephants in the state. Such electrocution deaths happen mainly because of two reasons - sagging of conductors of transmission lines (11 K.V. or 220/440 Volts domestic supply lines) and illegal tapping or use of 220 V electric power to the farm fences.

Deaths of elephant due to sagging electric lines are caused when the height of the lowest conductor of transmission/electrical lines is not kept at the minimum height of 20 feet from the ground level in gentle terrain, and 30 feet from the ground in steeper terrain, as specified by the draft guideline document on linear intrusions drafted by the National Board for Wildlife[50]. It is necessary to provide extra number of poles, to ensure minimum safe height (especially in the hilly areas/undulating terrain). Recently several such incidents are reported from Kodagu and Hassan districts. There was also an incident reported from the Nagarahole National Park, where a department camp elephant was electrocuted in the D.B. Kuppe range (H.D. Kote *taluk*) due to sagging 11 K.V. lines. Despite the network of barriers such as trenches and solar-powered electric fences, sometime elephants (because of their ecology and behaviour) do move out of the forest/range areas. The fringe areas of the elephant's home range (including the Kodagu and Hassan districts) need to have minimum ground clearance to ensure their safety and that of other wild animals. Sagging electric lines can even be dangerous to the human life (and property) also. The Karnataka Elephant Task Force visited one such spot at Badaga Bangala on 05-05-2012 where a tusker was electrocuted due to sagging electric lines on 12-04-2012. Although complaints on sagging electric lines have been made on several occasions by the concerned coffee estates and the forest department to the officials of electric supply companies, no prompt action has been taken, resulting in electrocution of elephants in such areas.

Similarly, some farmers having lands on the forest fringes also resort to electrocution. In such cases it was found that the wire fence around the farmlands is connected illegally with the source of regular current supply (meant for either pump sets or houses). This is done illegally especially at night. Whenever wild elephants stray out of the forest and come in contact of live wire (connected with the regular CHESCOM power supply source) they get electrocuted. Such actions are not only in violation of Wildlife (Protection) Act, 1972, but are also in violation of Indian Electricity Act and other provisions of Indian Penal Code and Criminal Procedure Code. Although the department has taken up this matter seriously with the power supply companies and their vigilance squads, 15 such deaths of elephant were reported during 2011-12. Illegal tapping of power in the farmlands poses a serious threat to the protection of elephants. With the changing cropping pattern towards high investment cash crops, some farmers take such desperate

[50]Government of India. 2012. *Guidelines for linear infrastructure intrusions in natural areas: roads and power lines*. http://envfor.nic.in/assets/FIRSTDraft%20guidelines%20roads%20and%20powerlines.pdf

measures to save their crops from damage by elephant, in the process electrocuting them or other animals. Generally in such incidents of electrocution, a complaint is lodged with the police as the offence is punishable under the provision of various Acts as stated above. Section 135 of Electricity Act 2003 deals with the theft of electricity and section 138 with the interference with meters or works of licensee. Wildlife (Protection) Act-1972 section 2 (16) deals with definition of hunting, section 2(36) deals with definition of wild animal, section 9 deals with the prohibition of hunting, section 39 deals with wild animals etc., to be Government property and section 51 deals with penalty. Section 58 of Wildlife (Protection) Act, 1972 deals with the 'offences by companies', which in this case involves the regional electricity supply companies.

Chief Engineer and Chief Electrical Inspector to the Government of India, Central Electricity Authority, New Delhi in his letter no- CEI/1/28/2002 dated: 15-03-2002 has addressed a letter to Chairman, State Electricity Board on the subject of poaching of wild animals by electrocution - action required to be taken by the State Electricity Boards to curb such crimes and another letter dated: 27-03-2002 by the Joint Secretary, Ministry of Power, New Delhi, addressed to Chairman of all State Electricity Boards, CMDs of Public Sector undertakings under the Ministry of Power and Chairman, Central Electricity Authority, has clearly directed them to take enforcement and preventive measures to check the killing of wild animals due to electrocution. Despite, the matter being informed to the CHESCOM by the concerned coffee estates and also by the forest department, the CHESCOM has not shown the desired seriousness in rectifying the problem.

Many of the cases of unnatural deaths are still in the investigation stage and charge sheet against the accused are yet to be filed. Effective deterrence in the form of quick arrest/investigation and filing of charge sheet is necessary to prevent such offences. Such cases can be referred to fast track courts for trial.

When elephants die due to gunshot, complaints are also lodged with the police. In such instances, theft of ivory is not the primary motive and, therefore, such cases are classified under the category of gunshots. The offence committed here is not only under Wildlife (Protection) Act 1972 but also under various sections of the Arms Act, Indian Penal Code and Criminal Procedure Code. Many a time the weapons used in committing the offence are country-made illegal weapons such as muzzle-loading guns.

There is a need to have effective co-ordination among the revenue, police, forest and power department (electric supply companies) for monitoring of cases of unnatural deaths of elephants, especially due to electrocution and gunshot. It is also necessary to have 3-tier committees at state, district and *taluk* level, involving the officers of all concerned departments on the lines of the crisis management system for prevention and control of forest fire in the state.

In view of this it is recommended that:

1. Energy Department should take immediate action to set right the problem of sagging transmission/electric lines (11 K.V. and 220/440 Volts) in and around the elephant range areas to ensure that minimum ground clearance at any point should not be less than 20 feet on flat ground and greater on sloping ground as specified in guidelines from the National Board of Wildlife. These areas should be clearly identified by the

Karnataka Forest Department and intimated to the Energy Department for rectification.

2. Energy Department should take regular maintenance of transmission/electrical lines in elephant range areas, taking the assistance of the Forest Department where needed. In case any defects are noticed and informed to the local officials of electric supply companies, they should take immediate action to set it right, failing which action should be taken against the concerned officials under the relevant laws.
3. Special efforts should be made by the electric supply companies (especially CHESCOM/HESCOM/BESCOM) to detect the theft of power/illegal current connection to wire fences around the farmlands in the fringe villages of elephant home range. In case any violation is found, electricity connection should be disconnected for at least three months, besides initiating action against the culprit.

For the cases of elephant electrocution/unnatural deaths due to gun shot or otherwise, on the complaint given by the Forest Department, police should take prompt action to prosecute culprits under various sections of Indian Penal Code, Code of Criminal Procedure, Indian Electricity Act/Arms Act and Wildlife (Protection) Act 1972 (to arrest the accused, complete investigation and file charge sheet in a time-bound manner). Such cases should be tried in the fast track courts.

To ensure accountability and regular review of such cases, action should be taken to form the state/district/*taluk* committees by involving all the officers of various departments, on the lines of crisis management system for prevention and control of forest fire in the state.

5.1.3 Quality of post mortem reports and record maintenance

There is a need to enhance the quality of post mortem examinations and maintenance of records of all elephant deaths, natural as well as unnatural, in order to better understand the respective role of such deaths in elephant population dynamics. A standard format for post mortems and record keeping should be developed with the help of experts. In all cases of elephant mortality, we recommend that, as is being done now by the National Tiger Conservation Authority, all post mortem examinations be held with external observers, and the KFD create a separate section on its website on which to record and display post-mortem reports. Further, a more scientific process of carrying out and recording post mortems, such as maintaining photographic evidence of the carcass, GPS location, and collection and preservation of tissue samples for diagnosis of cause of death would enhance the quality of elephant mortality records and, ultimately, help in management decisions.

5.2 Quarrying within 100 metres of Reserved Forest boundaries

During interactions with officers and field staff of Kollegal Forest Division and Ramanagara Forest Division on 01-06-2012 at Sathanur, the problem of quarrying within a distance of 100 metres from the forest boundary was brought to the notice of the Elephant Task Force. As per the provision of Rule 41 (2) of Karnataka Forest Rules-1969, no land

within 100 metres of the boundary of a Reserved Forest shall be granted for occupancy. However, it is reported that, in violation of this rule, there are several cases of occupancy being granted in Kollegal and Ramanagara Forest Divisions by the Revenue authorities. Such grants include those for stone quarries that are now operating within this prohibited distance in revenue/*patta* lands. Both these divisions are part of the Mysore Elephant Reserve.

Quarrying within a distance of 100 metres from the Reserved Forests can cause serious disturbance to wildlife, including wild elephants, in the vicinity and may result in escalation in elephant-human conflicts in the region. As a result of such disturbances, elephants may stray out into human habitation and crop-lands. The stone blasting does not cause only disturbance but is also detrimental to the safety of elephants. Quarry pits close to the reserved forest boundary can result in accidental injury to wild animals.

In view of this it is essential that land grants/quarry leases made in violation of Rule 41(2) of K.F.R. 1969 should be cancelled forthwith. It is informed that in the case of State of Karnataka vs. I.S. Nirvane Gowda in Civil Appeals No. 7309-10 of 1996, decided on July 15, 2003 in the Supreme Court of India, the Honourable Court has held that "… when the lands were included in the reserved forests, the entries in the revenue records were of no consequence and further, where *saguvali chits* did not confer any title on the suit lands. This apart the revenue authorities were not competent to deal with the property which was part of the reserved forest…" This clearly established that land grants made in violations of Forest Act/Rules are void.

5.3 Administrative issues in managing elephant-human conflicts

The beats, which are abutting the private lands in the wildlife/territorial forest divisions of MER, are subjected to very high intensity of elephant-human conflicts. There is a need that forest beats, in the high intensity human-elephant conflict areas should have the additional post of a special beat guard and a watcher attached to it to handle elephant-human conflict on a 24 X 7 basis. Since these areas experience serious conflict, strong vigil is required to tackle the situation. Therefore extra posts of frontline staff in the cadre of beat guard and forest watcher need to be sanctioned in the beats facing elephant-human conflict. In case of urgency, the authority to post RFO and other frontline staff when ever needed (at any time during the year), should be with the Principal Chief Conservator of Forests/Chief Conservator of Forests.

Besides filling up of all the vacancies, it is also necessary that incentive should be provided to the frontline staff for their good work in such high conflict zones and handling the wildlife emergencies in the forest department.

In some cases the officials obtain transfers from wildlife areas, in short time, which affects the protection and conservation, works in the wildlife areas adversely. There is already a Government order, which prohibits the transfer of frontline staff before completing the terms of 5 years by such officials. Therefore it is necessary to strictly enforce the Government order to ensure that front line staff should not be transferred before completing 5 years term.

5.4 Setting up toll free phone lines for rapid response to conflict situations

The Karnataka Forest Department should set up toll-free telephone lines at the level of each Forest Range within the distributional range of wild elephants in the state in order to respond rapidly to assist people in case of injuries from elephant attacks or to chase elephants from agricultural fields and settlements. These dedicated lines should be manned on a 24x7 basis, especially during the peak months of elephant-human conflict.

5.5 Streamlining payment of *ex-gratia*

As per one of the directions of Honourable High Court the payment of *ex-gratia* for cases of loss of human life/injury/disability to the victims and for the crop damage cases, to the farmer should be done promptly. It was suggested that sufficient funds should be made available with the Principal Chief Conservator of Forests (Wildlife) at the beginning of the financial year and authorization to incur the expenditure as per the actual requirement should also be given in the beginning of financial year itself. Yet, there are many problems with both its premises and practice at multiple levels.

While recommending that this approach be carefully and critically reviewed, we do emphasise that, in the interim, the State may be again directed to streamline/speed up their disbursal in order to provide timely relief to people. The budget head in the office of the Chief Wildlife Warden for payment of *ex-gratia* should be managed on the lines of the Calamity Relief Fund (as is being managed in the office of the Deputy Commissioner of the district) and availability of funds in this budget head should be always ensured in order to make quick payments to people for incidents involving injury or loss to human lives in encounters with elephants.

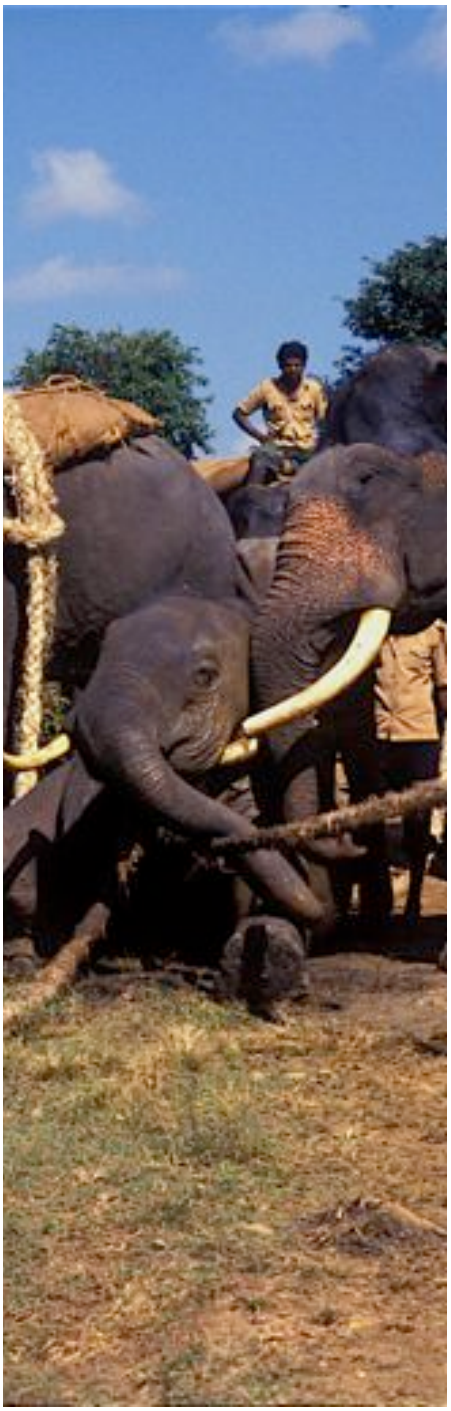
Photo: MD Madhusudan

Keeping the elephant—a creature not only of majesty, size and strength, but also of great intelligence, sociality and sentience—in captivity is but a 'necessary evil'.

Photo: MD Madhusudan

Ensuring the welfare of elephants in captivity requires that their trainers and handlers too receive better welfare, training and support

Photo: HNA Prasad



Trained domestic elephants are essential in managing situations of acute human-elephant conflict (e.g., in the Alur region), which may involve capture of wild elephants.

Chapter 6

Welfare and management of captive elephants in Karnataka

6.1 Capture of wild elephants to manage conflicts: a background

1. The Wildlife (Protection) Act, 1972 (WPA-1972) recognises capturing of elephants as a tool for managing elephant-human conflicts. A comparison with all other legally permissible tools, as presented below, would reveal that this is an important tool—perhaps even a necessary evil—for mitigating elephant-human conflicts in Karnataka.

2. Section 11 stipulates that the Chief Wildlife Warden (CWLW) may permit the hunting of an elephant (Schedule-I animal) if s/he is satisfied that it has become dangerous to human life or is so disabled or diseased as to be beyond recovery. As defined under Section 2(16), the term 'hunting' has a very wide meaning and it includes killing, capturing, trapping, driving or baiting any wild animal and every attempt to do so. However, the provisions of Section 11 are subject to the following riders:

    - No elephant shall be ordered to be killed unless the CWLW is satisfied that such animal cannot be captured, tranquilised or translocated.
    - No elephant shall be kept in captivity unless the CWLW is satisfied that such elephant cannot be rehabilitated in the wild and records his reasons in writing.
    - The CWLW cannot delegate his powers under Section 11 in respect of elephants to any other authority [Ref. Section 5(2)].
    - Killing or wounding in good faith of any elephant in defence of oneself or any other person is not an offence except when the said person, when such defence becomes necessary, was committing any act in contravention of this Act or any rule or order made there under.
    - Provisions of Section 11 are not applicable within a National Park or a Wildlife Sanctuary.

3. Section 11 is applicable only when an elephant poses a direct threat to human life. As a corollary, elephants known to be habitual crop-raiders or habitual house-breakers cannot be dealt with under this Section. Section 12 however provides management options in such cases. Section 12 empowers the Chief Wildlife Warden to permit any person, on payment of the prescribed fee and subject to such conditions as he may specify, hunting of a wild animal for certain specified purposes which include education, scientific research and scientific management. However, prior permission of the Central Government is mandatory under this Section in respect of Schedule-I animals like elephants. The expression "scientific management" in this Section has been defined as:

    - translocation of any wild animal to alternative suitable habitat; or
    - population management of wildlife, without killing or poisoning or destroying any wild animal.

4. The option of translocation as prescribed under Sections 11 and 12 is not without limitations. The State may not have a safe and suitable area where the elephants can be relocated. The local people may also resent the translocation of problematic elephants into their neighbourhood because of increased risks of conflicts. Mass translocation of elephants has not been attempted in India for want of necessary expertise as well as doubts about suitability of areas for translocation. In a few attempts with relocation of elephants in ones and twos (i.e. sub-adult or adult bulls), they are mostly known to have returned to the original sites. Experience gained in other parts of the world also suggests that the option of translocation of elephants should be exercised with caution. It has been reported from Sri Lanka that translocating and restricting elephants to protected areas will be detrimental to their survival, as it limits resource access[51]. Higher mortality rate and poorer body condition have been reported among translocated African elephants than the local resident elephants[52]. Therefore, translocation of elephants as a suitable or viable management tool remains an open question at the moment especially in situations where the area selected for relocating the elephants already has a high-density elephant population.

5. Population of elephants in India is estimated at 28,000 individuals, with Karnataka topping the list with about 5,800 elephants. Of these, some populations (as seen in Section 3.5.4 on page 73) do occur in areas, which we have referred to earlier as Elephant Removal Zones, where the options of conserving them *in situ*, are virtually non-existent. Such situations have been addressed in some African countries by removing elephants through culling (i.e. killing). Such culling is generally thought to be unacceptable, given the cultural and religious sensibilities of the people in India. Section 12 of the WPA-1972 also permits population management only without killing, poisoning or destroying elephants. This limits the options for population management of elephants to the following:

   a) Enhancing the extent and quality of elephant habitat.

   b) Regulating elephant population by fertility-control measures.

   c) Translocating elephants to areas of lower abundance.

   d) Capturing of elephants for the purpose of retention in captivity.

6. Procuring additional habitat for elephants and improving the quality of existing elephant habitats in the face of the increasing human population and need for land is a tedious, costly, uncertain and long-drawn process. Fertility control measures in the form of immuno-contraceptives have been tried with limited success on wild elephants in South Africa[53]. But such methods are yet to be tried in Indian conditions.

[51]Fernando, P.; Wikrarnanayake E.D.; Janaka, H.K.; Jayasinghe, L.K.A.; Gunawardena, M.; Kotagama S.W. and Weerakoon, D., Pastorini, J., 2008. Ranging behavior of the Asian elephant in Sri Lanka. *Mammalian Biology* 73: 2-13.

[52]Pinter-Wollman, N., Isabell, L.A. and Hart, L.A. 2009. Assessing translocation outcome: Comparing behavioral and physiological aspects of translocated and resident African elephants (*Loxodonta africana*). *Biological Conservation* 142:1116–1124.

[53]Fayrer-Hosken, R.A.; Bertsctinger, H.J.; Kirkpatrick, J.F.; Grobler, D; Lamberski, N; Honneyman, G. and Ultrich, T., 1999. Contraceptive potential of the porcine zona pellucida vaccine in the African elephant (*Loxodonta africana*). *Theriogenology* 52: 835-846.

Limitations of the option of translocations have already been discussed. This presently leaves us with the time-tested option of elephant capture.

7. Capture of elephants has been on-going in India, in general, and Karnataka, in particular, since ages. The traditional methods of capturing include *kheddah*, *mela shikaar* and pit method. *Kheddah* is useful for capturing of entire families or herds of elephants, but its original practitioners are no longer available. *Mela shikaar*, used for capturing selected elephants in singles (usually sub-adults or calves), will not be applicable as it would disrupt the social structure of elephant families. Pit method, earlier practised in the southern states, was meant for capturing single elephants and has been discarded now because of the fatal injuries that it may cause to the trapped elephant. Therefore, capturing of elephants at present is done mostly by chemical immobilisation, a method in which the Karnataka Forest Department (KFD) has considerable experience. When an entire family or group has to be captured, it may be necessary to do so using a combination of chemical immobilisation and *kheddah*.

8. Further, the issue of the fate of captured elephants remains. In Karnataka, captive elephants constitute less than 3% of the total elephant (wild plus captive) population, as compared to 12% for the whole country, 24% for Arunachal Pradesh, 20% for West Bengal, 19% for Assam, and 12% for Kerala. Therefore, given on the one hand, that the state faces situations where elephants may need to be removed from the wild in order to manage conflict, and on the other, given that it has relatively low numbers in captivity, we suggest that it may be necessary to judiciously exercise the option of taking elephants from the Removal Zones into captivity, while also carefully exploring the possibilities of translocation (which would ensure that these animals remain part of the state's wild population).

6.2 Capturing for domestication

1. An important issue in capturing of elephant is about its subsequent use and maintenance. Elephants, unlike other wild animals, are not kept in captivity as such. Fortunately, they can be tamed, trained for handling by *mahouts* (elephant drivers) and *kavadis* (assistant to the *mahouts*), and kept in restrained conditions. KFD possesses the requisite expertise of giving training to captured elephants using specially built enclosures (*kraals*) and *kumki* elephants.

2. Given their large requirements of food and the need to engage a *mahout* and a *kavadi* for each individual elephant, keeping and maintaining elephants is expensive, and involves a long-term financial commitment. It, therefore, makes sense if the captured elephants are put to some economic use. In fact, elephants were captured in the past because of their usefulness as draught animals or their application in wars, timber operation, and game hunting. In the modern times, captive elephants have already been replaced in war and transport sectors by machines and vehicles. Timber operation is highly restricted due to legal and ecological considerations. Game hunting is prohibited under Section 9 of the WPA-1972. Capturing of elephants for commercial purposes is no longer permissible under the WPA-1972. The WPA-1972 permits capturing of elephants only for resolving elephant-human conflicts or for educational and scientific purposes, including population management. But the fact remains that

wild elephants can still not be kept in captivity without some amount of taming for reasons primarily related to safety and management and, secondarily, with economics. In other words, elephants captured for mitigating elephant-human conflicts through population management will need to be tamed and put to some legitimate, though not-overtly commercial, use to make the whole exercise sustainable.

6.2.1 Recommended use of the captured elephants

The following measures are, therefore, recommended in respect of elephants captured for resolving elephant-human conflicts and population management:

1. The capturing should be done only by Karnataka Forest Department, involving experts from outside the department when needed.
2. The captured elephants should be trained and used for departmental purposes only.
3. Elephants could be used for legally-sanctioned forestry operations.
4. They can be used for regular patrolling by the forest staff for protection of forests and anti-poaching operations.
5. They can be used for population enumeration of wild animals as well as monitoring and tracking of animals in research projects.
6. They can be used effectively in managing human-wildlife conflict through driving and capturing of problem animals. They can also be used for rescuing sick, injured wild animals or abandoned calves.
7. They can be used for tourism purposes in forests and protected areas, thereby eliminating or reducing the use of vehicles that need costly and elaborate road networks, and cause sound and chemical pollution. The proper use of elephants in wildlife tourism also provides most tourists with a unique experience.
8. Some of the captured elephants, particularly, young or sub-adult elephants, can be used for educational purposes in government-controlled zoos in Karnataka, or given to other zoos in the country or abroad as a part of animal-exchange programme duly approved by the Central Zoo Authority (CZA). Retired elephants (above 60-65 years of age) can also be kept in zoos.
9. Elephants can also be used in relief operations at the times of floods and other natural calamities.
10. The KFD may, if so required, transfer some of the captured elephants to sister forest departments in other States if they wish to use the elephants for the same purposes as above.
11. The captured elephants must not be given or sold to temples, circuses or any commercial organisation.

6.3 Current status of captive elephants in Karnataka

Based on the databases of the Karnataka Forest Department and the NGOs Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF)[54] there are about 159 captive elephants in Karnataka—111 under the government ownership and 48 under private ownership (31 with temples and religious institutions, 10 with private individuals and 7 with circuses). In addition, 20-25 private elephants are reported to be visiting the border areas of Karnataka every winter from the neighbouring areas of Kerala for the purpose of logging. Karnataka's resident government-owned captive elephants in camps are distributed as follows in Table 8.

Table 8: Distribution of government-owned captive elephants in Karnataka (2012)

	Forest Division / PA / Zoo	Camp	No.of elephants
A	Rajiv Gandhi National Park (Nagarahole)	Kanthapura	18
		Nagarahole	1
		Balle	15
		Total	*34*
B	Bandipur Tiger Reserve	Bandipur	7
		Ramapura	11
		Total	*18*
C	BRT Tiger Reserve	K. Gudi	3
		Total	*3*
D	Madikeri Division	Anekadu	3
		Dubare	15
		Nisargadhama	1
		Total	*19*
E	Shimoga Wildlife Division	Sakrebyle	17
		Total	*17*
	Total (Forest Camps)		**91**
F	Chamarajendra Zoo, Mysore		8*
G	Bannerghatta Biological Park, Bangalore		10
H	Pilikula Nisargadhama, Mangalore		2
	Total (Zoos)		**20**
	GRAND TOTAL		**111**

* not including 2 African elephants

[54]Varma, S. Rao, S. Ganguly, S. and Hasbhavi, R. 2008. *Database for Captive Elephants and their Mahouts in Karnataka: Protocol and Significance*. Report: Compassionate Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore.

Table 9: An age-sex break-up of the Karnataka's captive elephants

Age Class of Animal	Males				Females			
	Camps	Zoos	Private	**Total**	Camps	Zoos	Private	**Total**
Calf (Age < 1y)	2	0	0	**2**	1	0	0	**1**
Juvenile (Age 1-5y)	9	2	1	**12**	2	4	1	**7**
Sub-adult (Age 5-15y)	12	0	3	**15**	10	3	11	**24**
Adult (Age 15-65y)	36	3	3	**42**	13	8	29	**50**
Old (Age > 65y)	1	0	0	**1**	5	0	0	**5**
Total	**60**	**5**	**7**	**72**	**31**	**15**	**41**	**87**

1. It can be seen from above (Table 9) that there are more bulls (60) than cows (31) in the Forest Camps but more cows (15) than bulls (5) in the zoos. It can also be seen from the above table that there are more cows (41) than bulls (7) in the private ownership.
2. It can also be seen that only 49 of the 91 camp elephants in the age group of 15-65 years are fit for working. But, as learnt from the local forest officers, a large number of camp elephants are not used for most part of the year. A few elephants are used for anti-depredation duties and wildlife tourism purposes.
3. As against 91 camp elephants, KFD has sanctioned posts of only 62 *mahouts* (Pay Scale: 10400-16400) and only 67 *kavadis/kothwals* (Pay Scale: 9600-14550). At present 26 posts of *mahouts* and 11 posts of *kavadis/kothwals* are lying vacant. To cope up with the acute shortage of *mahouts* and *kavadis/kothwals*, the KFD has engaged 44 temporary staff on daily wages. There are 4 posts of elephant *jamedars* to supervise the camp elephants of which 1 post is presently vacant. There are also 4 sanctioned posts of veterinary doctors in the KFD who are posted at Shimoga, Nagarahole, Bandipur and Mysore.
4. Control and management of the forest camp elephants is carried out in accordance with the Rules 88-111 of Chapter-II of the Karnataka Forest Code, 1976. This Code makes detailed prescriptions with regard to training of elephants, selection of camp sites and sanitation, pasturage of elephants, feeding and scale of rations for elephants, watering and bathing of elephants, working of elephants, marching of elephants, rest and recess season for elephants, healthcare and treatment of elephants, care of pregnant elephants, disposal of dead elephants, elephant accoutrements and elephant establishment. The prescriptions of the Forest Code were laid down when logging was the primary use of these elephants and, thus, a revision of the same keeping in view the present technique of capturing of elephants (viz. chemical immobilisation) and present uses of captive elephants (e.g. patrolling forests, elephant-human conflict mitigation, wildlife tourism) is called for.
5. Rule 100 of Chapter-12 of the Karnataka Forest Rules, 1969 provides for retail sale or auction sale of captured elephants and sale of elephant at a concessional rate to any person, temple, etc. which is in contradiction with Section 49B of the WPA-1972 and should be amended. KFD's government order[55]prohibits the sale, offering and dona-

[55]G.O. No. AAPAJI 223 FWL 99 dated 28.6.2000

tion of captive elephants to temples, mutts and religious institutions. There is a need to make this G.O. a part of the Karnataka Forest Rules, 1969.

6. Zoo elephants are governed by Chapter IVA of the WPA-1972 and the Recognition of Zoo Rules, 1992. In particular, no zoo can acquire, sell or transfer any elephant without prior permission of the Central Zoo Authority (CZA) as stipulated in Section 38-I. CZA, vide its letter No. 7-2/94-CZA (VK) dated 20.1.95 has directed all zoos to ensure that elephants are not chained for most part of the day[56]. In November 2009, the CZA directed that all captive elephants will be removed from zoos to forest camps. It is understood that the CZA is reviewing this directive. All zoo elephants in Karnataka have access to veterinary care as required by the CZA.
7. Apparently, neither the forest camp elephants nor the zoo elephants in Karnataka have been micro-chipped despite directives issued by Project Elephant, Govt. of India.

6.3.1 Status of privately owned elephants

1. The 31 elephants belonging to temples and religious institutions and 10 elephants belonging to private individuals are located in Bangalore, Belgaum, Bellary, Chikmagalur, Chitradurga, Davanagere, Dakshina Kannada, Gulbarga, Gadag (Shirhatti), Kodagu (Dubare) Mysore, Shimoga (Hombuja) and Udupi. All the 7 circus elephants are reported to be in Bangalore.
2. Temple elephants are used for ceremonial purposes. Circus elephants are used for entertainment. Some of the elephants owned by private individuals are used for tourism.
3. Commercial dealing in all Schedule-I species including elephants is banned in terms of Sections 44 and 49B of the WPA-1972. Under Section 41, no person can possess, procure, sell or transfer an elephant without prior permission of the CWLW. Section 42 authorises a CWLW to issue an ownership certificate in favour of a person for possessing an elephant after satisfying himself that the applicant has adequate facilities for housing, maintenance and upkeep of the animal. But an elephant-owner cannot sell his elephant or dispose it off by any other mode of commercial nature because of an amendment carried out in Section 43 (1) in April 2003. Apparently, all the 48 elephants were procured by their owners before the legal restrictions came into force. Theoretically, the number of privately-owned elephants in Karnataka should not increase now unless some elephant covered by ownership certificate is transferred to Karnataka from another State.
4. Zoos, by definition [Ref. Section 2(39) of WPA-1972], include circuses. But it is doubtful whether the circus elephants in Karnataka are being looked after in accordance with the provisions of the Chapter IVA of the WPA-1972 and the Recognition of Zoo Rules, 1992.
5. As many as 45 of the private elephants are registered with the Chief Wildlife Warden, but only a few of them have been micro-chipped so far.

[56]Member-Secretary, CZA's letter No. 7-2/94-CZA (VK) dated 20.1.95 to all zoo directors.

6. Most of the private elephants are handled by temporary and poorly trained *mahouts* and *kavadis*. With the exception of a few enlightened owners (e.g. elephants maintained by Aane Mane Foundation at Dubare), management of elephants owned by private owners leaves much to be desired and the elephants do not get access to proper veterinary care.

6.4 Welfare measures and their enforcement

Domestication of elephants in India often receives criticism on grounds of cruelty and apathy exhibited by many *mahouts* and owners – particularly in circuses, zoos and temples. The traditional capturing and training methods have been condemned by many as being archaic and cruel. Some critics complain that the life of elephants in captivity is quite the opposite of those in the wild. But there are many others who point out that captive elephants are gradually going out of fashion and, consequently, the art and expertise of capturing, training and handling of elephants, developed over thousands of years is on its way to disappearance. As stated earlier, the practitioners of the famous Mysore method of *kheddah* are no longer available. The existing practices relating to captive elephants in Karnataka have been critically examined by knowledgeable persons on specific aspects of management and welfare of elephants. A detailed examination of captive elephants under different management regimes in Karnataka has been carried out by Varma and others[57]. Some major observations are as follows:

1. The provisions of the Karnataka Forest Code, 1976[58] relating to upkeep of the camp elephants are not rigorously followed due to lack of supervision by senior officers. The service registers and the health registers of the camp elephants are also not being properly maintained, resulting in lack of scientific data on these animals. Accoutrements of many elephants are reported to be either substandard or poorly maintained.
2. Camp elephants are mostly concentrated at a few sites. This results in over-grazing by the camp elephants and degradation of the adjoining forests. This also often creates logistical problems since many of the areas where the services of these elephants are required are far away from these camps.
3. A large number of the forest camp elephants, though otherwise fit for work, remain under-utilised for want of any specific policy of the KFD.
4. Bull elephants form the majority of the forest camp elephants and also a significant proportion of the zoo elephants and the privately-owned elephants. Adult bulls often come into *musth* when they may pose threat to the safety of the people. The skills and the resources available with *mahouts*, both in the government and the private sector, for dealing with the elephants in *musth* are not adequate.
5. There is no legally enforceable code or rule in respect of management and upkeep of the privately-owned elephants in Karnataka. As pointed out in Para 3.5.5, Section 42

[57]Varma, S., Reddy, P.A., Sujata, S.R., Ganguly, S. and Hasbhavi, R., 2008. Captive Elephants of Karnataka: An Investigation into Population Status, Management and Welfare Significance. Report: Compassionate Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore.

[58]Government of Karnataka, 1976. Karnataka Forest Code.

of the WPA-1972 stipulates that the CWLW must satisfy himself that the applicant has adequate facilities for housing, maintenance and upkeep of the elephant before issuing an ownership certificate. But in practice, it is usually not done. The KFD lacks resources to carry out periodic checking of the living and working conditions of the elephants under private custody. As pointed out by Varma and others[57], elephants belonging to temples and private individuals mostly lack proper drinking and bathing facilities. It may be mentioned that the Government of Kerala has promulgated rules for managing privately-owned elephants[59].

6. The circus elephants in Karnataka do not appear to be complying with the norms and standards for captive elephants prescribed by Central Zoo Authority.
7. Elephant is known to be a social animal. But a large number of elephants in temples and religious institutions in Karnataka live solitarily and do not get the opportunity to interact with other elephants; they thus suffer from psychological disorders.
8. Elephants in the Mysore zoo and those with the temples and religious institutions in Karnataka reportedly do not get adequate physical exercise due to constraints of space.
9. The present crop of *mahouts* and *kavadis* of both the departmental and the private elephants, particularly those engaged on temporary basis, are not properly trained in respect of many of the elementary skills expected of them as well as the psychology and general well-being of the elephants under their charge. Many of the *mahouts* and *kavadis*, for example, do not know how to make hemp ropes and *gaddis* for their elephants. Many of the departmental *mahouts* at Sakrebyle Camp (Shimoga) apparently have no experience of wild elephants.
10. Most of the elephant handlers are fully illiterate and are unable to take advantage of the modern knowledge and techniques in respect of captive elephant management. Ironically, illiteracy is also the reason as to why the experienced *mahouts* are unable to document their knowledge and skills.
11. A large number of *mahouts* and *kavadis*, particularly in the private sector, are not provided with appropriate wages, accommodation, healthcare and insurance cover. It is evident that neglect of *mahouts* leads to neglect of elephants under their charge.
12. A large number of *mahouts* and *kavadis*, both in the government as well as private sector, are reported to be alcoholic. Many of them do not follow proper hygiene and suffer from ailments (such as tuberculosis), which may affect their elephants as well. Many *mahouts* and *kavadis* become physically weak as they grow in service and cannot follow the rigorous regime required to look after their elephants.
13. The 4 (four) sanctioned posts of veterinary doctors are not adequate to look after all the forest camp elephants. The privately-owned elephants are scattered over various districts of Karnataka where there are hardly any veterinary doctors experienced enough or trained to deal with elephant-related ailments. The rules framed by the Veterinary Council of India stipulate that chemical immobilisation should be carried out only by registered veterinarians. But very few veterinarians in Karnataka have the

[59]Government of Kerala, 2003. Kerala Captive Elephants (Management and Maintenance) Rules.

expertise to carry out chemical immobilization of elephants. The darting of elephants is usually done by forest officials or researchers. Cases of casualties among the immobilised elephants in the absence of proper veterinary backup are not uncommon.

6.5 Recommendations

1. A revision of the provisions of the Karnataka Forest Code, 1976, keeping in view the modern techniques of capturing of elephants (viz. chemical immobilisation) and the present day uses of captive elephants (e.g. patrolling forests, conflict mitigation, nature tourism) is called for. The Code should provide for the insurance of the elephant and the *mahout/kavadis*. The Code should also fix the retirement age of working elephants (preferably at 65 years).
2. Rule 100 of the Karnataka Forest Rules[60]needs to be amended to make it compatible with the WPA-1972 and the KFD's government order[61].
3. The KFD should set up more elephant camps in different forest divisions and Protected Areas and distribute working elephants across vulnerable beats, anti-poaching camps and anti-depredation units, each with not more than 5 elephants ideally. Adequate housing facilities should be arranged for *mahouts* and *kavadis* at each camp, whose location should be selected carefully so as to not add pressure on the forest from the presence of such an establishment. A special camp in the state under the care of veteran and experienced *mahouts* should cater to the training needs of newly-recruited *mahouts* and *kavadis* and for training newly captured/rescued elephants. KFD should ensure adequate fodder supply for the elephants either by raising plantations at a location or by purchasing fodder in order to reduce grazing/browsing pressure on the neighbouring forests.
4. The KFD should expeditiously fill up all existing vacancies of *mahouts* and *kavadis/kothwals* and should create some more posts to take care of the additional elephants in hand. Promotion to the posts of elephant *jamedar* and *mahouts* should be made from the lower posts of *mahouts* and *kavadi/kothwal*, respectively, strictly on merit and not merely by seniority.
5. The Karnataka Government should promulgate rules for control and management of privately-owned elephants on the lines of the Kerala Captive Elephants (Management and Maintenance) Rules, 2003. The rules should empower the KFD to confiscate elephants not being maintained properly by their owners. The rules should also provide for the insurance of the elephant and the *mahouts/kavadis*. The Chief Wildlife Warden should arrange half-yearly inspections of privately-owned elephants with the help of a panel of inspectors comprising of designated forest officers/designated veterinary officers/experts in captive elephants/Honorary Wildlife Wardens/Members of the State Wildlife Advisory Board/ NGOs. The rules should also provide for private owners to send their elephants with *mahouts* to a designated camp for at least one month in a year for the purpose of health check-up and socialising with other elephants.

[60]Government of Karnataka, 1969. Karnataka Forest Rules.

[61]Karnataka Forest Department's G.O. No. AAPAJI 223 FWL 99 dated 28.6.2000.

6. KFD, with the help of experts, should undertake screening/evaluation of the elephant handlers (*mahouts* and *kavadis*), both in the government and the private sector. A sample evaluation form is available in the Elephant Code Book[62]. Refresher courses should be arranged for elephant handlers putting up poor performance. Special skill-upgradation courses should be arranged for the promising elephant handlers. Elephant handlers should be exposed to elephant ecology, psychology and modern concepts of animal welfare.
7. The KFD may consider revising the recruitment rules for *mahouts* and *kavadis/kothwals* prescribing minimum educational qualification for the new entrants. For the serving illiterate *mahouts/kavadis/kothwals*, the KFD may arrange adult education programme with the help of NGOs. They may be offered one or two additional increments in their salary by way of incentive for achieving a prescribed qualification.
8. All elephant handlers, both of the departmental and private elephants, should be subjected to compulsory health check-up, including for tuberculosis, once a year. The KFD may also arrange alcoholic de-addiction camps for the elephant handlers with the help of NGOs.
9. Elephants in captivity should undergo regular health screening, not only for body condition, parasites and general diseases, but in particular, for tuberculosis.
10. KFD, with the help of the experts, should also organise orientation/sensitisation programmes for the owners/managers/supervisors of captive elephants (including forest officers at the subordinate level) to help them understand the basics of captive elephant management and issues relating to the elephant welfare.
11. KFD should, with the help of the Veterinary Department and Kerala Agricultural University, initiate training programmes for veterinary doctors to build up their capacity to deal with injuries, ailments and general healthcare of elephants. The objective should be to ensure that each district having wild or captive elephants should have at least two trained veterinary doctors. The KFD should also arrange training for selected veterinary doctors in darting techniques and facilitate their participation whenever chemical immobilisation of elephants is being organised.
12. All forest divisions having camp elephants should have darting equipment and appropriate drugs to take care of problematic captive elephants, especially bulls in *musth*. The present system of keeping the *musth* elephant chained to a post for weeks together is unhygienic. It may be appropriate to earmark an enclosure of at least 2 acres (barricaded by elephant-proof trench or power-fence) and release the *musth* elephant inside with a drag chain[54].
13. KFD should complete micro-chipping of all captive elephants (both departmental and privately-owned) in a time-bound manner. CUPA and ANCF have prepared a database of most of the elephants and their handlers along with photographs of the elephants[54]. KFD should get this database updated from time to time.

[62]Chowta, P. 2010. *Elephant Code Book*. Asian Nature Conservation Foundation and Aane Mane Foundation, Bangalore.

14. Finally, the KETF would like to make a recommendation on an issue that much discussed in recent years by animal welfare groups, and is probably an emotive issue in the state. KETF notes that the Dasara festival involving the display of elephants at Mysore is a grand expression of Karnataka's rich cultural heritage that merits preservation. Nevertheless, as a demonstration of the State's commitment to addressing issues in the conservation of its wild elephants, as well as the welfare of its captive elephants, we suggest that the heavy 750 kg golden *howdah* carried by the lead elephant in the Mysore Dasara procession be replaced with a much lighter replica or carried in a chariot drawn by the elephant. Such a symbolic gesture, especially as something that crowns a series of measures to further elephant-human coexistence in Karnataka, could make the state a national and international leader in elephant conservation.

Chapter 7

Role of research and monitoring in elephant conservation and management

Science is a pursuit driven by the intellectual curiosity to understand the workings of our physical and natural world. With a highly intelligent, social and charismatic species such as the elephant, there is obviously great interest both among scientists and the public at large to understand its biology and behaviour. In the context of elephant conservation, however, science also serves as an important tool at two key levels: first, it can help diagnose and understand conservation problems, and second, it can help monitor if the conservation solutions that we implement are indeed having the desired outcomes. Beyond better monitoring of conflicts, science can contribute to a better understanding and management of elephant habitats. Given that much of available research expertise lies outside the Forest Department, it is essential to create enabling conditions for researchers to strengthen the scientific foundations of conservation and management. There have been moves in recent times to restrict scientific research within key elephant habitats in Tiger Reserves on the plea that it disturbs wildlife, in particular the tiger. Not only is this view incorrect, we think it goes against the very spirit of India's national policy on wildlife conservation[63]. As an enterprise of "organized scepticism", science has rarely flourished in rigid institutional contexts. Therefore, special efforts are required to create the right institutional contexts in which we can generate and use reliable knowledge to make conservation decisions.

Below, we identify a few key areas where scientific research and monitoring needs to be strengthened so as to aid conservation and management of elephant populations

7.1 Reliable estimation of the distribution, abundance and structure of wild populations

One of the key currencies used to assess the health of elephant populations are their distribution and abundance. The current approach is called the "synchronized elephant census" (SEC) and typically uses two methods to obtain estimates of population sizes - direct count method (usually a sample or total "block count"), and an indirect count method (the line transect dung count), plus a waterhole count in order to obtain data on population structure (age-sex class). While there are some advantages in using the present methods, the active involvement of a large number of forest staff being one of them, there are also several inadequacies that require to be addressed through R&D as well as the adoption of more advanced population estimation methods. The direct "block count" method makes assumptions about the universal detection of elephants within a sampled block that are not valid, while the indirect "dung count" method requires advance planning and conduct of dung decay rate experiments that are rarely done by the forest department. We should therefore move towards more robust elephant population estima-

[63] National Wildlife Action Plan (2002-2016), http://projecttiger.nic.in/actionplan.asp

tion and monitoring methods in the state, for which purpose a team of biologists can be entrusted with the task of developing the protocols.

7.2 Monitoring the demography of wild elephant populations

Conservation implicitly aims to maintain a stable population of a target species or promote the increase of an endangered population to a safe level. Monitoring populations and understanding the ecological drivers of their dynamics is thus central to conservation science. The dynamics of elephant populations of southern India are regulated by variations in birth rates and death rates in tune with inter-annual rainfall variability, as well as a skewed male:female ratio as a consequence of selective poaching of males for ivory. Elephant populations in the south, especially in Karnataka, are also found at very high densities in protected areas, and its implications for the future health of the population are not understood. A programme of research on population structure and dynamics, and monitoring the physiological health of key elephant populations of the state as at Nagarahole, Bandipur, BRT Sanctuary and Cauvery WLS would help decision-making on population management.

7.3 Monitoring the extent and status of elephant habitats

Planning at the landscape scale for the conservation and management of elephants require precise spatial information on the distribution of elephants, including that of solitary bulls and dispersing herds. Monitoring the extent of elephant "habitats" would also help determine if elephant ranges are shrinking, stable or expanding, information that would guide policy on management of the species.

7.4 Understanding the impact of management interventions on elephant habitats

A number of direct management interventions are made within elephant habitats. These include creating artificial waterholes, manipulation of vegetation (such as creating fire lines, grasslands, removing invasive plants, etc.), laying roads, and planting trees. The short- and long-term implications of such interventions have to be monitored and understood.

7.5 In-depth and long-term monitoring of ecology, behaviour and conflict

Basic ecological and biological studies of the elephant are needed, certainly in key populations, to provide the scientific basis for management decisions. A species such as the elephant with superior intelligence and cognitive abilities shows considerable flexibility and adaptability to a changing environment and novel situations whether in their foraging habitats and ranging patterns or in their social behaviour and conflicts with people. Long-term studies on these aspects using a number of modern tools such as GPS-telemetry, stable isotopes, genetics (DNA profiling) and hormonal analysis are needed at a number of sites in Karnataka for a more comprehensive understanding of the elephant.

7.6 Monitoring socioeconomic contexts of elephant-human conflict and its management

The material costs of elephant-human conflicts include loss to crops and property, while the direct human costs are incurred in debilitating injuries and loss of lives. Indirect costs, rarely measured, are loss of human productivity through guarding of fields at night and keeping fields in fallow for fear of depredation. The real costs to people and society of elephant-human conflicts thus go beyond mere loss of cultivated crops. Mitigation of elephant-human conflicts through barriers such as trenches and high-voltage electric fences, or organizing elephant drives presently consumes a significant proportion of budgets for elephant conservation. However, documentation of gains from such investments in the form of possibly reduced conflicts (frequency of crop raiding, loss of human lives) as well as compensation claims from people is presently poor. Systematic recording of data on these aspects in all forest divisions would greatly aid in making decisions on the utility of these management interventions in economic and social terms.

7.7 Studies on captive elephants

Elephants in captivity can be used to advance our knowledge of elephant biology in several ways. They provide the only opportunity for research on developing non-invasive methods of monitoring stress hormones or reproductive hormones, knowledge that may be useful in monitoring wild populations for stress levels or developing contraceptives for population control. Similarly non-invasive genetic studies of elephants can be validated using samples from captive individuals. Research on elephant diseases such as tuberculosis and herpes virus would help in their diagnosis and control among captive elephants. Research on captive elephant behaviour would help develop welfare measures and humane methods of training and use.

APPENDICES

Appendix A

Note of dissent by Sri B.R. Deepak and Sri N.R. Kamath

Background

On account of Hemavathi Reservoir project and the blockage of the corridor from Thithimathi up to Arakalgud *taluk* specially near Banavara, the present problem in Alur-Arakalgud *taluk* relating to elephant menace is still existing and aggravating day by day.

It is our duty to provide food to all the elephants that can never be ignored. We cannot expect elephants to eat whatever naturally available in forest in this zone. The blocking of movement of the elephant by fencing all the properties by the individual is also one of the reasons for the present elephant human conflict. Solar fencing or tranquilizer is a temporary solution for the problem. Excavation of trenches will not solve the problem. Maintenance of trenches is most important.

As suggested in my report, it has to be first verified as to –

1. total number of human being affected by Hemavathi Reservoir Project and identify them
2. the land granted to these farmers will also be identified and the acreage of land in their possession should also be identified.
3. Pattern to which these farmers are cultivating should also be identified.
4. New elephant corridor has to be set up by clearing lands available in Zone I where the elephants have their own movements and others human beings who are affected by the acquisition of lands have to be shifted and replaced in good atmosphere whether they get modern facilities.

Solution

There are several lands leased out by the forest department for private persons for cultivation of tea, rubber, cardamom in the neighbouring Kodagu District and also in Hassan, Chikmagalore, Mysore Districts. Five rubber estates which were leased by erstwhile forest department to private companies of which the lease lapses in the year 2012.

As regards determination of lease, litigation is pending before High Court of Karnataka in W.A No.880/2008 and connected cases. Thus, rubber estates and also Cardamom estate and other coffee estates belonging to companies like Tata Coffee, BBTC and natural places where affected persons of Alur-Aarakalgud *taluks* can be shifted and settled by educating them of community farming and provide them employment as well as the right in this rubber estates by providing good accommodation wherein they have to take part in farming activities, rubber tapping, coffee picking, tea leaves extraction and responsibility should be given to them to take part in farming. Copies of relevant judgments are enclosed herewith in my report.

Education has to be provided to people hailing from tribal community and those interested in the livelihood of animal protection and educate people for protecting ele-

phants as per curriculum provided under Veterinary Science and every elephant watcher with appropriate salary and other conveyances and educate them on using tranquilizer suitable rehabilitation centers to provide water resources to elephants. Elephant corridor armed with tranquilizers to deal with elephants without causing any harm to elephants. The land acquired from the farmers in Zone I have to be divided into four Zones and have to be put in service to cultivate these lands with paddy, sugarcane crops providing food for the elephants and such measures should be taken in consultation with experts.

Translocation of elephants is a great loss and is not a permanent solution as the elephants will go back to its original areas and it causes threat to life of the human beings. In the process translocation as could be seen from the earlier experience is not feasible. Government can initiate necessary proceedings for acquisition of aforesaid Coffee Estates, Cardamom Estates, Rubber Estates, Tea Estates under Land Acquisition Act which are in thousands of acres in Hassan, Kodagu and Mysore, Chikmagalur Districts. Such acquisition does not affect the other property holders.

People who are affected by the elephant menace are about 40,000 people in Alur and Akaralgud *taluk*. They can be easily rehabilitated by acquisition of above properties. Elephant Watchers have to be appointed in each Corridor. Elephant Watchers Academy has to be started immediately to train the watchers to give them necessary Certificate and the training should be essentially conducted with relevance to Mathunga Shasthra, a copy of which is already furnished.

Range Officers have to be upgraded and should be attached to Veterinary Hospitals and equipped with tranquilizers, JCB & TIPPER Vehicles for day to day work.

Conclusion

In view of the above suggestions, we after seeing all the situations by visiting the spot by making full visit we opine the translocation of the elephant from its existing Zone is not advisable and will not solve the problem. In fact, the translocation of the elephants is not a permanent solution. The poverty of the human being in Zone I is also a matter of concern. The human beings here do not have necessary infrastructure for their basic living. The farmers and human beings have to be replaced in a proper farming area. Hence the above suggestions are given. The profit making companies such as, rubber plantation, coffee estates and tea gardens, as stated above its owners or share holders are well settled in their life and are living comfortably even in foreign countries. The Tata Coffee and BBTC coffee companies in Kodagu are certain places, in addition to above rubber plantation, where the farmers effected by elephants and in Zone 4 or other places like Maldare in Kodagu can be suitably accommodated with all comforts, necessary legislation to acquire these lands requires to be considered by law making authorities.

Zone-4 Farmers and all human beings will have a sigh of relief if above process is contemplated and activated to make it a reality which pattern can be followed in other Human Elephant Conflict Zones also in future.

Appendix B

Chairman's Response to note by Sri B.R. Deepak and Sri N.R. Kamath

There are several inconsistencies, lack of evidence and incomprehensible sentences and suggestions in the dissent note provided by esteemed members of KETF, Sri B.R. Deepak and Sri N. Ravindranath Kamath, and supported by Sri V.V. Angadi and Dr C.H. Basappanavar. I would like to make the following specific observations to the points mentioned:

1. Our four esteemed colleagues are under the mistaken notion that the task force is recommending **translocation of elephants**. In fact, it has been made clear in the last two meetings of KETF that **translocation is not being recommended** but, rather, that capture and retention in captivity is being recommended in the case of the Alur elephants.
2. The Hemavathi Reservoir project lies to the **north** of Arkalgud *taluk*, and therefore the issue of this reservoir blocking the "corridor" from Thithimathi up to Arkalgud *taluk* does not arise as the entire forested region here lies to the **south** of the reservoir. It may, of course, be argued that the Hemavathi project submerged former elephant habitat and displaced animals on either side, southward into Arkalgud *taluk* and northward into Alur *taluk*. However, there is no evidence of such loss of natural habitat (and displacement of elephants) from satellite imagery pertaining to 1973 (prior to construction of Hemavathi dam) that the KETF examined. Even in 1973, the region was largely agricultural as seen in the satellite images (see Figure 15 on page 79) and elephants did not have easy access to the Hemavathi river. Most of the submergence by the reservoir was agricultural land, as also seen from the statement in the dissent note that asks for verification of "total number of human (*sic*) affected by Hemavathi Reservoir Project….".
3. Reports by Sri M.K. Appaya (former Chief Wildlife Warden of Karnataka) clearly indicate that wild elephants began to move into the Alur-Arkalgud region during the 1980s, with young bulls moving in first, followed during the 1990s by family groups. The intense elephant-human conflict has thus been caused by this immigration of elephants into a region settled and cultivated by people for well over a century[64], and in any case, certainly before the creation of the Hemavathi Reservoir.
4. Several sentences in the dissent note are incomprehensible, at least to the Chairman of KETF. Examples of such sentences are:
    a. "New elephant corridor has to be set up by clearing lands available in Zone 1 where the elephants have their own movements…" [*Response*: If people are cleared of their lands these would become "habitat" and not "corridor" for elephants. The latter term implies that elephants have to use the passage or corridor to move somewhere else, but it is not clear where they are supposed to move].

[64] Abhishankar, K. 1971. Hassan District Gazzetteer, Government of Karnataka.

b. "Elephant corridor armed with tranquillizers to deal with elephants without causing harm to elephants" [*Response*: This sentence is incomprehensible].

c. "…every elephant watcher with appropriate salary and other conveyances and educate them on using tranquilizer suitable rehabilitation centers to provide water resources to elephants" [*Response*: This is again difficult to understand, but what I could glean from this sentence is that forest watchers have to be trained in using tranquilizers. This is completely against the law. Drugs used in tranquilizing elephants are often powerful narcotics and banned substances. Their improper use could result in fatality among people and elephants. Only qualified veterinarians are authorised to use these compounds].

5. The suggestion that all people from the areas of Alur-Arkalgud *taluks* where elephants operate currently be moved out implies that a minimum of 40,000 people would have to be relocated and an area of nearly 75,000 acres of mostly private lands be acquired. This idea is so patently absurd that it is not worth further comment.

6. The suggestion that elephant managers should refer to the *Mathunga Shastra* is interesting, because this ancient text on elephants (about 1000 years old) refers almost exclusively to **management of elephants in captivity**, a situation that the authors of the dissent note have shunned as a solution to elephant-human conflict in Alur-Arkalgud *taluks*.

7. Possibly the only useful suggestion in the dissent note from the esteemed members is that people from tribal communities be trained and provided suitable livelihoods towards the cause of animal protection. I wholeheartedly endorse this suggestion.

Appendix C

Summary of steps taken by Karnataka Forest Department in respect of barriers for mitigating elephant-human conflicts

[Prepared by Dr. C.H. Basappanavar with editing by Chairman, KETF]

Background

The Honourable High Court of Karnataka in its *suo moto* W.P. No.14029/2008, based on press reports on the mysterious deaths of four elephants in Mysore district, directed Karnataka Government to constitute 'Monitoring Committee' to review action taken by Forest Department from time to time, with regard to the Report and an Action Plan filed on 12-3-2009 and Comprehensive Action Plan filed on 17-4-2009 on 'Human-Elephant Conflict Mitigation' by Dr. C.H. Basappanavar, whose services were requisitioned to assist the High Court. Accordingly, Monitoring Committee met five times and reviewed action taken by KFD on the directions of Honourable High Court and arrived at a decision that there was no end to conflicting factors and that it could only be managed with a view to mitigate conflict.

Action taken report

Pursuant to the Affidavit filed by Principal Chief Conservator of Forests (Wildlife) before the Honourable High Court on 13th September 2011 and various subsequent reports filed before KETF members during meetings and field visits, the following observations of which are briefly narrated, followed by specific suggestions:

Maintenance of Barriers – elephant-proof trenches and high voltage electric fencing across Mysore Elephant Reserve (MER)

Karnataka Forest Department (KFD) has attempted to contain wild elephants within the boundaries of the elephant reserves with the help of barriers such as elephant- proof trench (EPT) and high voltage electric fencing, etc. The details as furnished by Chief Conservator of Forests & Director, Project Elephant, Mysore, are:

Table:----- Details of Creation and Maintenance of Barriers

year	Length of EPT in km		Length of Solar fencing in km		Amount spent on barriers	Amount earmarked for anti- depredation squad engaged for sending the elephants back to forest
	Fresh excavation	Mainte-nance	Fresh installation	Mainte-nance	Rs. In lakhs)	
2008-09	33.07	44.64	62.62	8.88	22.99	25.00
2009-10	26.95	58.61	49.35	124.30	165.53	58.40
2010-11	172.85	4.00	153.50	21.00	702.152	70.56
Proposal for 2011-12 (Incomplete)	151.80	100.00	92.00	75.00	130.38	73.85*

The information furnished to Honourable High Court in the affidavit shows mixed trends as to the effectiveness of the barriers created. Bannerghatta, BRT Sanctuary and Bandipur National Parks reported signs of reduction in conflicting factors, as evidenced by reduction in crop compensation, followed by deaths in elephants and people. It is further stated that maintenance of barriers was periodically attended to by involving Eco-development Committees (EDCs) from villages located along the fringes of the Protected Areas. The members of the Karnataka Elephant Task Force visited several sites along the boundary of Bandipur National Park to examine the efficacy of the high voltage (solar-powered) electric fence and elephant-proof trench created during 2009-2010. It also met with members of the EDCs to question them about the system of maintenance of the electric fence and the problems they faced. They were satisfied about the effective functioning of the barriers in the past 1-2 years. This was unlike the electric fence erected at Bandipur about a decade ago that failed completely after one year because of neglect of maintenance; the responsibility for maintenance was vested entirely with the forest department with no participation of local people. KETF is thus convinced that the involvement of local villagers, in this instance through the Eco-development Committee, has been crucial to the success of the barriers. This should be the basic model for future projects involving barriers to deter elephants.

Sections of both the eastern boundary and the western boundary of Nagarahole National Park were also examined by the members of KETF during the field visits. Considerable expenditure had been incurred along the eastern boundary to maintain the EPTs through concrete structures along drainage courses. The general impression was that these barriers were largely effective. A section of the western boundary along the border with Wyanad Sanctuary in Kerala was also examined by the KETF. It was noted that a section of the EPT ran along the edge of a winding road with the potential for vehicular accidents (i.e. 2- and 4-wheelers falling into the EPT); precautions thus need to be taken to prevent any accidents especially at night. The DCF Nagarahole also made a

presentation showing the sections of the park boundary that have been secured through barriers and sections where the local terrain was proving to be a challenge to erection of barriers.

Kodagu and Hassan districts reported unsatisfactory performance, on account of problems in maintenance of EPT and electric fences. In high rainfall zones EPT gets filled up with rain water and many a time the sides collapse creating easy opportunities to elephants to cross over to neighbouring estates or paddy fields. Invariably, elephants attempt to push the side walls and fill up the trenches. Similarly, it has reflected poor maintenance of electric fence. These lacunae are believed to have given rise to increased elephant-human conflict, resulting in increased deaths on either side, and heavy damage to crops and property. These are reflected in increases of overall *ex gratia* amounts. In Hassan, it has increased from Rs. 65.7 lakh in 2008-09 to Rs. 88.9 lakh during 2011-12, and similarly, in the divisions of Kodagu, it has increased from Rs. 98.9 lakh during 2008-09 to Rs. 171.5 lakh during 2011-12.

Further, according to the contents of the affidavit, elephant-human conflict is reported to be on the increase, due to conflicting interest among local communities. It is also opined that some people are in favour of barriers so as to protect their crops and property, while others oppose them as they would like to take their cattle inside the PAs for grazing and other prohibited activities. There are yet others, who are interested in smuggling of timber for trading in nearby towns and fuel wood for their tobacco barns.

During three years 2008-11, over 233 km of EPTs have been dug and over 265 km of solar-powered electric fencing has been erected across the state at a total cost of Rs 890.5 lakhs (see table on previous page).

It must also be mentioned that fire crackers and guns have been provided to the anti-depredation squads for scaring away elephants that come out of the forest into agri-cultural land.

Table: 3.3 Human Death due to wildlife

Sl.No	Year	No's of human death
1	2007-08	61(NA)
2	2008-09	40 (NA)
3	2009-10	24(9)
4	2010-11	33(8)
5	2011-12 (as on 31-01-2012)	14(8)

Figures given in brackets indicate deaths due to other wild animals.

Recommendations

1. *Distribution of crackers*: The impact of fire crackers on elephants, in terms of deafening sound and possible irritation from burn injuries, has to be assessed before adopting these on a large scale as standard anti-depredation measure by the squads. Elephants being intelligent animals, they have to be handled with caution in order to drive them back quietly into the forests.
2. *Electric fencing*: It is necessary to come up with standard specifications of solar-powered electric fences in terms of its design and execution for effective and durable service. These specifications may, of course, vary from site to site depending on local terrain and other conditions. The past experience of various designs of electric fences in Karnataka as well as other places should be taken into consideration while adopting any particular model.
    - Daily inspection of entire length of fence by trained and committed personnel in charge, be made mandatory and he shall look after a stretch of over 8-10 km.
    - There shall be either an inspection path or an inspection road along the stretch of fence, depending on the local circumstances, for effective maintenance.
    - Remaining stretches of PAs in the state also be completed with solar fencing as a time-bound programme.
    - The participation of local farming communities in maintenance of barriers should be the standard model and made mandatory. The present policy of involving the Eco-development committees should be continued for this purpose.
3. *Elephant-proof trench (EPT)*: Standard dimensions of EPT (3m x 2m x 1.5m) be adopted where a trench is absolutely needed. In case of loose soils stone pitching on either side of EPT be made mandatory. Stone wall/dry rubble wall be erected where necessary. Regular repairs and maintenance of EPT/walls be ensured.
    - Double security system (ETP + Solar fence) must be restricted only to high-risk zones.
    - EPTs must be first tried out in the drier regions and their efficacy in relation to costs of digging and maintenance proven before large scale adoption in the state.
    - EPTs should not be undertaken in high rainfall zones of the state. This would include areas above approximately 1800 mm annual rainfall as in the Brahmagiri, Pushpagiri, Talacauvery, Sakaleshpur and similar regions.
    - Where it is considered unnecessary, EPTs should be phased out in favour of electric fences.
4. *Other anti-depredation methods*:
    - Use of traditional methods of driving them in desired direction should also be tried out. Elephants associate the sound of wood-cutting to the presence of people and do not venture to advance in that direction. Such natural sounds were used

effectively during *kheddah* operations by tribes to drive elephants in a desired direction.

- Chilli-tobacco paste smeared on a rope has been reported as partially successful in keeping away elephants, with almost complete success reported in deterring family groups in drier regions[65]. This can be tried judiciously in dry regions of the state during the crop harvest season when raiding by elephants is typically at a peak.
- Mechanical barriers that are strong enough to withstand any force used by elephants, as in the case of Addo National Park (South Africa), may be considered for Bannerghatta National Park that is close to Bangalore city and is witnessing excursion of elephants to surrounding areas.

5. *Ex-gratia payments to affected farmers*: It is also reported in the affidavit that compensation against crop damages increased with effect from 30-4-2011. Deaths of humans due to elephant attack also increased between 2009-10 and 2010-11. Perusal of data furnished in the above table, though it is clarified by Field Director, Project Elephant, that sudden spurt in the payment of *ex-gratia* payments for 2010-11 and 2011-12 arose due to clearance of pending bills of previous years despite directions issued by the Honourable High Court as far back as 2009-10.

Table:3.4 Ex-gratia Payments (as on 31-03-2012)

Sl. No	Year	No of Cases	Ex-Gratia Amount (Rs. in lakhs)
1	2006-07	9384	178.509
2	2007-08	18344	349.327
3	2008-09	28560	466.998
4	2009-10	16425	412.229
5	2010-11	34588	948.801 *
6	2011-12	21219	698.000*

*** Ex-gratia amount includes pending payments of the earlier years.**
Figures given here include crop damage, cattle killed, human death, permanent disability, human injury and loss of property due to wildlife (including elephants)

6. *Anti-depredation camps and flying squads*: Anti-depredation camps have been put in place, to drive the elephants back to the forests, at an expenditure of Rs. 70 lakhs in 2010-11 (for 122 units) and Rs. 158 lakhs in 2011-12 (for 157 units). The KETF members visited one camp with trained men of Rapid Force with a vehicle stationed at Hediyala Range of Bandipur tiger reserve during our field visits. Rapid response "flying squads" have also been established in the state. Under this programme the KFD has

[65]Chelliah, K., Kannan, G., Kundu, S., Abilash, N., Madhusudan, A., Baskaran, N. and Sukumar, R. 2010. Testing the efficacy of a chilli-tobacco rope fence as a deterrent against crop raiding elephants. *Current Science* 99:1239-1243.

added a number of vehicles under different schemes such as Project Elephant, Compensatory Afforestation (CAMPA) and Integrated Development of Wildlife Habitats for movements of squads engaged in anti-depredation work at Bannerghatta, Mysore, Virajpet, Hassan, Ramanagara, Mysore Wildlife and Madikeri forest divisions. Members of the KETF did not have the opportunity to observe the Flying Squads in action as the field visits were made during the dry season when cereal crops were not cultivated.

Conclusions

The department can bring into force the above recommendations, with modifications if any, depending on local conditions with the approval of Chief Wildlife Warden, by incorporating them in departmental code. It should be made mandatory for the anti-depredation measures to be monitor regularly by a state-level committee comprising forest officials, elephant biologist, social scientist, and people's representatives. The important thing to remember is that 1-2 years is too short a time period for an objective assessment of the efficacy of the anti-depredation measures, and that the real picture would emerge only after about 5 years after the barriers have been put in place and flying squads have been in operation.

Public hearing on 18/06/2012 at Aranya Bhavan, Bangalore

Deputy Conservator of Forests, Bangalore Rural Division, welcomed the gathering and requested the Chairman, Karnataka Elephant Task Force, to conduct the proceedings.

Following suggestions were received:-

1. Sri Ramachandraiah

Main reasons for elephant straying out of forests and entering in to farmlands.

a. Loss of forest by fire – resulting in non-availability of fodder and water.

b. Absence of barriers on the boundary of forests.

c. Lack of training to front line staff and shortage of staff (vacant posts should be filled up)

d. Non co-ordination between forest staff and local public (meeting to be conducted at least once in a month)

e. To overcome the communication problems, provide wireless sets to the staff in the interior forest areas.

f. Night vision binoculars should be provided to the staff.

2. Sri K.A.Chinnappa, Pollibetta, Kodagu

The applicant has submitted that their plantation is existing since 1932 and they have not encroached any elephant habitat. The reason for HEC is forest degradation and monoculture teak plantation by the forest department (as it is a source of revenue). Therefore he requested to encourage natural regeneration in forests and also for excavation of deep trenches, to prevent elephants from straying out of forest.

3. Sri K.C. Medappa, Sadashivanagar, Bangalore

The applicant has submitted the following reasons and suggestions for HEC mitigation.

a) Non availability of enough food/fodder/bamboo within the forest range. This is largely because the forest department has cultivated teak in the forest area replacing the indigenous plants which were sustaining the animals in the forest range. It is suggested that bamboo is planted periodically in the forest range and nursed in the initial

period to ensure that it grows interspersed with other plants, bearing fruits relished by the elephants.

b) The penalty for cutting and selling/buying tender bamboo shoots and other prohibited forest products to be made very sever to discourage destruction of bamboo groves.

c) Non availability of adequate water in the forest range. Bore wells should be sunk at the periphery with the lines drawn to the existing tanks to pump water during summer, to meet water requirement.

d) Prevent the jungle lodges coming up with in and on the periphery of the forest. These lodges encroach upon the forests, reducing the already threatened/degraded forest area. Most often these lodges are located in very critical points where the frequency of the movement of the elephants/animals is high. The presence of such lodges cause disturbance to elephant movements.

e) All encroachment of forest land should be evicted to enable the animals to have adequate space to live within the forests.

f) Discourage industries being established on the periphery of the forest, particularly those industries which obtain the raw material from the forest and pollute the water bodies.

g) To check the conversion of existing *kuccha* roads inside the forest to *pucca* roads for vehicular movements.

h) Strictly limit the number of visitors to reserved forest and enforce the timing strictly.

i) Educate the people about the precautionary measures to be taken when the elephants straying out in the plantations and stay for a short duration there.

j) Do not allow the unscientifically planned electric fences by the private owners of estates. Make sure that the electric fences are planned scientifically and they do not hinder the normal migratory routes of elephants. Strict action to be taken on people harming the elephant by shooting them. These are the elephants who mostly go berserk and attack people. Any shooting in self defense should be reported immediately to the forest department.

k) Make available 24 hour helpline, dedicated to elephant people conflict.

l) Make a scientific study and monitor the movement of the elephant herds and map their path and the season etc and make it available to the local people.

m) Educate the people to understand that elephants are not encroaching into our land but we are encroaching into theirs.

n) Appoint honorary wardens from local population who are genuinely interested in protecting the wildlife and preventing man-animal conflict.

o) Set apart fund for rehabilitation of people injure in elephant attack and keep 24 hour ambulance service to shift seriously injured to hospitals in the shortest time possible and take responsibility of their medical treatment.

p) Have MOU with well equipped hospital for free treatment which may be directly reimbursed by forest department.

4. Jeevan Mandana, Pollibetta, Kodagu

The applicant has given the following suggestions for mitigation of elephant-human conflicts.

a) Stop allotting lands in the forest to tribes.

b) Build permanent barriers using railway rails, as has been done in South Africa.

c) Trenching and solar fencing are inadequate as there is no regular maintenance.

d) Stop planting saplings, and wastage of public money. Instead build larger tanks and irrigate the surrounding area so that the flora do not wilt and die in summer.

e) Lastly ensure us, safety during the day time.

5. Watchers India Trust, Bangalore

The watchers India trust says that there is no co-ordination between the department and the local community. The trust is offering to take up this issue as a responsibility if the department shows interest in their project. They claim that their team will create a bridge between the villagers and forest department. They say that their initiative towards man-animal conflict to control the elephants from crop raid and to prevent the elephant attack and electrocution.

6. Villagers of Agani-Sakaleshpur *taluk*

A person by name Karthik from Tamil Nadu has encroached 200 acres of forest land and threatening the villagers. Requested to take action for the eviction of encroachment.

7. Dr. T.R. Shankar Raman, Nature Conservation Foundation

1. Adopt proactive, preventive and participatory methods of elephant-human conflict management involving local people. Capacity building among people to deal with conflict themselves rather than always depending upon the government.

2. Record conflict incident with date, time and spatial location which will help in planning strategy for conflict 'hotspot' and to alert/take preventive measures at peak conflict periods.

3. Such information should be made public and constitute a conflict management task force, at local level comprising local people, officials of Karnataka Forest Department and conservation scientists. These groups should meet frequently and examine the available inputs on a continuous basis and arrive at rational decisions.

4. Fencing should be restricted to susceptible agriculture fields and large areas should be left open for animal's movement.

5. Translocation is not advisable, it is only waste of funds as wildlife research has proved the ineffectiveness of such efforts.

6. As elephants are social, sentimental, intelligent and sensitive, any planned management must pay due attention to the ethics and ethical implications of the action.

8. Kodava Sangha, Hosur, Virajpet

Villagers are facing lots of problems due to wild elephant menace and requested the department to find some permanent solution in the lines of African Countries.

9. Sri K.G. Muddappa and two others

The applicants have requested the department to buy their land (about 113.55 acres) at a cost of 20 lakhs per acre and extend the forest area as they are facing lots of problem due to elephant throughout the year.

10. Villagers of forest fringe-Nagarahole National Park, Virajpet

Requested to increase the size of elephant proof trench from 3 1/2 mtrs to 4 mtrs and stone pitching to inner wall toward the village.

Solar fence is not useful as there will not be any proper maintenance after the installation. This will help only the solar fence supplying agency and some officers of the department.

11. K.N.Parashivamurthy, Yeslur, Sakaleshpura, Hassan

The applicants have requested that either entire elephant population may be translocated from Hassan or the farmers land may be purchased to make elephant sanctuary. Don't make a futile effort to drive away the elephants.

12. Sri D.H. Satheesh, President, Janatha Dal (U), Hassan

Sri Satheesh has given the following suggestions to overcome the elephant-human conflict problems.

a) Forest boundaries should be jointly surveyed and on the forest boundary 3 mtrs wide and 3 mtrs deep trenches should be excavated.

b) Identify the location from where the elephants are crossing and excavate deep trenches in such stretches.

c) Grow more and more bamboos inside the forest.

d) Poachers fire gun shots inside the forest resulting straying out of wild elephants (due to fear) from forest. So arrest these forest offenders.

e) Take action to stop illicit distillation of liquor inside the forest.

f) Constitute Rapid Response Team (R.R.T) and train them properly.

g) Excavate 3x3 metres percolation tanks and cover them with bamboo and mud and spread grass on them so that the elephants fall in to it just like the *kheddah*.

h) Stop noise pollution by avoiding issuing of permits, for any non forestry activities inside the forest.

i) Grow more bamboo near the water bodies.

j) Construct 'V' shaped wall as constructed in Tibetan settlement near Kushalnagar.

k) Funds should be kept reserved, for payment of ex-gratia both in state and central budget.

l) Proposal for acquiring 23000 acres of revenue land to forest is not proper. E.g. rehabilitation of tribal families in Nagarahole Tiger Reserve is not fruitful and the funds earmarked did not reach the actual beneficiaries.

13. Vanyajeevi JagruthaNisarga – Tumkur

The organization has given the following suggestions for mitigation of elephant-human conflicts.

a) Constitution of permanent task force with trained personal and provide necessary equipment.

b) Each district should have one veterinary doctor to treat wild-animal and proper training should be given to them.

c) Each district should have a tranquilizing gun, medicine and accessories. Proper training should be given to use the tranquilizing equipment.

d) Toll free phone number should be created like police, fire and ambulance etc. so that the public can approach the department easily. Maintenance of wireless sets and supply of new sets will help for better communication.

e) Invention of new siren to caution the public about elephant's entry into human habitat or farmlands.

f) Declare corridors and stop all kinds of non-forest activities.

14. Villagers of Hosadurga, Santhekodihalli, Kanakapura

In the villagers have strong opinion that instead of paying crores of rupees ex-gratia, the department should find a permanent solution by excavating proper EPT and erection of solar fence at the forest boundary of Bannerghatta National Park. CAMPA funds should be properly utilized for development of forest and grow sufficient fodder inside the forest to prevent elephants straying out of forests as the elephant population has increased.

15. Karnataka Rajya Raitha Sangha and Hasiru Sene

Karnataka Rajya Raitha Sangha has suggested that the manpower should be increased in the department and also they should adopt scientific methods to create barriers to elephant movement out of the forest.

16. Villagers of Kutta, Badaga, Nalkeri, Kothur and Manchalli

The residents of the above village have submitted the following suggestion in order to control and avoid elephant-human conflicts.

a) There has been a steady and relentless increase in the frequency and extent of elephant incursions into private farms and plantations during the last 3-4 decades. At present elephants roam around in these villages on a daily basis and have established total dominance over man, making it difficult for people to carry on their lives and agricultural operations.

b) Earlier, elephant menace was a seasonal problem when they attacked paddy field before harvest; now-a-days, they attack all crops throughout the year.

c) Elephant take refuge in the National Park or sanctuaries during the day and cross over into private lands at night, looking for food and water. This is confirmed by the pattern of damage caused by elephant to crops, fruit bearing trees and tanks. The root cause of man-elephant conflict is, therefore the lack of sustenance within the National Park and Sanctuaries for the growing number of elephants.

d) A false impression is being created that the elephant menace in certain areas is due to blockage of their migratory paths or corridors. Elephants, which can cover long distance at night, can easily bypass such blockages and cross over from one forest to another neighbouring forest, even if they are separated by a small stretch of private land.

e) The flowering and death of bamboo which started in 2010 has covered most forests of South India by 2012, depriving wild elephant their most important source of food. This phenomenon, which occurs once in 50 to 60 years, was not an unforeseen event and the authorities should have been ready with contingency plans to face this situation.

f) The Elephant Proof Trenches (EPT) dug around the National Park/Sanctuaries are not effective as-

    a. They are too small in dimension (6′ x 6′)

b. Get covered in places after monsoon rains; and

c. Leave openings in rocky stretches and stream crossings.

d. To be effective, the trenches have to be enlarged to about 10' x 10' size and renovated after each monsoon, with suitable barriers around rocks and streams.

g) Solar electric fences, along with EPT, can be an effective barrier against elephants, provided they are of standard quality and proper care is taken for their maintenance. The tendering process for installation of solar electric fences is done at higher official levels without involving the village level Eco-Development committees. Nor are the EDCs involved in supervision of the works, leading to very poor execution. Proper maintenance of solar electric fence and EPT requires provision of a patrolling road on the outer boundary of the forest all along the length of these structures.

h) The local villagers are very willing to offer their full co-operation for construction and maintenance of the elephant proof barriers, if such co-operation is sought by the Forest Department. The people of our villages have shown exemplary respect for wildlife conservation laws, by completely giving up sending cattle into the forests for grazing or entering the forests for firewood and other forest produce.

i) There has been no shrinkage of wildlife habitat in Kodagu District in recent decades as no large industry, mining or hydro-electric project has come up in the forest areas of the district. The shrinkage of forest area in Mysore and Chamarajanagar Districts around 40-50 years ago, because of hydro-electric projects and diversion of forest land to other uses, cannot be the reason for the recent gradual increase in elephant menace.

j) Our observation over the years leads to the inescapable conclusion that there has been a substantial increase in elephant population in Karnataka in recent years exceeding the holding capacity of the state forest area. This would have happened because of stoppage of *kheddah* operation since the 1970s, control of poaching after elimination of the Veerappan gang and the natural increase in numbers due to effective conservation measures.

k) The root causes of the elephant menace are therefore the steady growth of the elephant population and the deterioration of conditions within the wildlife reserves large parts of which are now covered by mature teak plantations. Elephants would find the reserved forests a more hospitable environment if the mature teak plantations are replaced by natural forests and sufficient numbers of water bodies are created within the forests.

l) The stubborn refusal of the Forest Department and wildlife enthusiasts to accept these basic facts prevents us from arriving at a reasonable solution to man-elephant conflict. The approach of the Forest/ Environment Ministries and wildlife enthusiasts to the issue is irrational, sentimental and one-sided. A technocratic solution to the problem of man-elephant conflict cannot succeed if it ignores the human and socio-economic aspects of the situation.

m) Comprehensive studies under scientific method have not been conducted to draw reliable conclusions about population growth, migratory patterns and living habits of elephant populations. Instead, fragmentary data is used selectively by Forest Department officials and wildlife enthusiasts to support their pre-conceived ideas. The vast traditional knowledge of local people is ignored and policies are formulated with utter disregard to the needs and aspirations of local people. Instead of romantic vision of unrestricted wildlife paradise, what is needed is a scientific approach to the problem balancing the needs of wildlife versus those of local population and of wildlife numbers vis-a-vis available habitat in a thickly populated country like ours.

17. Nagabhushan Rao, K.R.Mohalla, Mysore

The applicant submitted the following suggestions.

a) To grow more and more leafy tress such as *ala, arali, bevu* and also bamboo etc.,

b) To de-silt the tanks inside the forest during summer so that rainwater can be stored during monsoon.

c) Do not allow solar/power fence on farmlands situated near the forest boundary.

d) Excavate 20 feet deep trenches to prevent elephants straying out of forest.

Besides this several people especially from Hassan district spoke about the serious human-elephant conflict issues/problems and also about their safety in the region. They requested removal of all the elephants from Alur-Arkalgud *taluks*. It was also suggested to make the '*Anedhama*' in a suitable place in Hassan district by bringing these elephants to captivity (as on the one hand it will help in HEC mitigation and on the other hand it will promote tourism in the area). Public hearing ended with a vote of thanks by Principal Chief Conservator of Forests (Wildlife) to the Chairman, the members of KETF and the public who attended the programme.

Representations received during KETF visits to Hassan and Kodagu

Representation No.1

Sri C.A.Subbaiah (Nanda) and others

Sri C.A.Subbaiah (Nanda) in his memorandum highlighted about the HEC in Coorg district, the reasons for the problem and has also given some suggestions for the mitigation. He said in his memorandum that Coorg has 1200 sq km of reserved forest and protected areas. How will the forest department account for depletion of green cover in these tracts under their control? Instead efforts are on to deprive the people of Kodagu, their centuries old ownership and rights over bane lands. Coffee is cultivated under shade and needs encouragement and support as it is environment friendly and helps bio-diversity. Instead of trifling the rights and livelihood of people in this district, the department should make serious efforts to improve habitat in reserved forests and protected areas.

Monoculture of teak in reserved forests and protected areas is one of the important causes for HEC, as nothing grows under teak plantation. The dried leaves cause wildfire. The unabated spread of invasive weeds like lantana and eupatorium drastically reduces the folder in reserved forests and protected areas.

The applicant suggests capturing at least identified rogue elephants. He states that their domestication would go a long way, as translocation is not effective. Besides this speedy settlement of claims for damages and payment of market value is a must. Continuous loss of productions in coffee and other plantation should be compensated. A comprehensive insurance plan for life, property and crop, completely paid by the government is needed

as the population here bears the brunt of the cost of conservation. EPT and solar fence should not be on piecemeal basis and maintenance of these assets should be made part of the APO of the department. It would be better if NGO's are kept out of these activities.

Representation No.2

Doddabetageri villagers of Guddehosur Gram Panchayath

The villagers said that there is a gap between Doddabetageri colony and Madikeri-Kushalnagar highway from where the elephants are straying out of forest and raid the crops. Therefore they requested the department to excavate EPT in the gap area of 1 km so that the villagers can get relief from the elephant menace.

Representation Nos.3 to 6

Sri. I.K. Thimmaiah of Doddabettageri village and others

Sri. I. K. Thimmaiah of Doddabettageri village and others wrote that they had lost 15 coconut trees, 3 arecanut trees in their lands situated in survey number-128 of the above village. The applicant stressed the need of creating barriers like EPT or solar fence in the gap from where the elephants are straying out of forest.

Representation Nos.7 to 10

Sri Atthihally Devaraju, President, Hassan Wildlife Society

Sri Atthihally Devaraju submits that a multi-pronged approach to conserve elephants and reduce man-animal conflict is required. Here there is un-ending confrontation between people and animals for survival. So many people and as well as animals, like elephants, tigers, bison, have died in this struggle for existence. Elephants destroy the crops grown by the farmers, also attack and kill people. Elephant also have been killed in the confrontations with human beings. The bisons (Gaur), wild boars, follow elephants and destroy the crops. In these years, because of anthropogenic pressures, like mini-hydel projects, construction of dam, oil and gas pipe line, roads mining activities etc., animals are facing severe disturbances. Farmers in these deep forest areas cannot cultivate their lands due to the fear of animals and workers do not to come for their regular work. In this heavy forest area, the presence of elephants will not be known and possibilities of attacks have increased. He further writes that though the price of cardamom is high due to fear, the farmers have stopped cultivation. Wild elephants have killed people, attacked houses and damaged crops. The compensation paid by the government is very meagre. The barriers created by the department found to be wasteful. Therefore he submitted that they have understood the problems of both the sides. Hassan Wildlife Society had discussion with the farmers and jurisdictional departmental officers and has felt that the only feasible solution would be that the government should purchase/acquire the lands from farmers (which are near to dense forest and elephant corridor).

In view of the above facts the society makes the following recommendations.

a) Formulate a scheme in the form of a recommendation to the respondent State Government for implementation of the scheme in the manner mentioned above by giving necessary liberty to the respondent State Government to incorporate any modifications if needed and submit the said recommendation report before the Honourable High Court of Karnataka in W.P.No.14029/2008.

b) To pass such other order/s or any other feasible scheme that may be deemed necessary and fit in the circumstances narrated above to safeguard the life and liberty guaranteed to the citizens who are residing in the said forest area adjacent to the Western Ghats.

Representation No.11

Sri Patel Shivram, MLC

Sri Patel Shivram, MLC has written that the farmers of Alur, Arkalgud and Sakaleshpur *taluks* of Hassan district are suffering from the non-stop elephant menace. The issue has been discussed in the legislative council and government was pressurized to take appropriate action. But the government has not fulfilled assurances given in this regard. Therefore the applicant has given the following opinion-

a) Translocation of wild elephants from Alur and Arkalgud to some other forest area and creation of barriers like EPT and solar fence.

b) Since the elephant infested areas of Sakaleshpur *taluk* is falling under the Western Ghats, the government can purchase the lands from the farmers and establish elephant corridor.

c) The ex-gratia being given by the government for the loss of life, property and crop is very meagre. This should be enhanced and the proper arrangement should be made that it should reach to the beneficiaries.

Representation No.12

Farmers, coffee growers, labourers, students and others

Farmers, coffee growers, labourers, students and other people of Alur *taluk* submitted that they are suffering mentally, financially and socially due to continued attacks by wild elephants. In the past 20 years more than 70 elephants have been seen in this *taluk*. Lot of damage is caused due to the elephants attack. The compensation being paid by the government is only 4% which is very meagre. Due to the elephant attacks more than 80 people have died and more than 100 were injured. People of these areas made all the efforts to draw the attention of government as well as the concerned departments by way of submitting memorandums, strikes, *gherao*, blocking roads and blocking the highways etc. But nothing has given any fruitful result. They further wrote that if nothing comes out positively by the task force visit, then the people are ready to approach the court for justice and requested for the translocation of all the elephants from Alur *taluk*.

Representation No.13

Alur Coffee growers association, Rayarakoppal and others

Alur Coffee growers association, Rayarakoppal and others submitted that damages caused by elephants are increasing these days and people of this region are migrating, leaving their village due to fear. Students are not going to schools and collages due to the fear of elephants. In view of these facts it is the duty of central and state governments to translocate all the elephants from Alur to have a permanent solution.

Representation No.14

Sri.N.C. Nagesh, Y.N.Pura, Hassan district

Sri.N.C. Nagesh, Y.N.Pura, Hassan district submitted that the electric lines behind the Rayarakoppal post office are sagging at low level which can be touched by stretching of hands. Wild animals are moving around in this area and requested to repair the same at the earliest to prevent impending dangers.

Representation No.15

H.K. Kumarswamy, MLA, Ex-Minister, Sakaleshpur taluk

H.K.Kumarswamy, MLA, ex-minister, Sakaleshpur *taluk* wrote that it is a problem of two decades where more than 35 people have died due to elephant attacks and more than 20 elephants were killed by electrocution and other reasons. Thousands of acres of land are damaged by elephants. In spite of several measures taken by the government the damage could not be averted. Translocation is the only remedy as since the central governments has also approved the proposal of translocation of elephants from Alur to help the people.

Representation No.16

Hassan District Planters Association

Hassan district planters association submitted that for the past few years elephant problem has increased in Alur and Sakaleshpur *taluks* of Hassan district. Elephant movements have been noticed in about 46 villages of these *taluks*. People are living in a state of fear and about 28 people were died due to elephant attack. Most of the people are depending upon the agriculture and no one is taking up agricultural activities properly due to fear of elephants. Therefore they requested to look in to the seriousness of the issue and find a permanent solution to this problem. Further the association has given the following suggestions-

a) Translocation of all the elephants from that region.

b) Rs10.00 lakhs should be given as compensation for loss of human life and an employment should be provided to family member of the victim.

c) Solar fence should be provided to the farmers in subsidized rates to prevent elephants entering into farmlands.

d) Issue of crop compensation should be assessed scientifically and payment should be remitted directly to the account of victim immediately.

e) Farmers of Western-Ghats region are voluntarily willing to give their lands to the government and the government should buy the land for a reasonable price and the same land can be used to for establishing elephant corridors.

f) Many mini-hydel power projects have come up in this region and hundreds of acres of forest land have been destroyed. These projects should be stopped forthwith.

Representation No.17

Kukke Sri Subramanya Temple

People living the surrounding areas of Kukke Sri Subramanya Temple wrote that the wild elephants are causing damage to all kinds of crops and also many people have lost their lives in that region. The compensation being paid by the government is very meagre and it should be increased 3 times to the existing rates. Farmers should get Rs. 15.0 lakhs per acre of land (those who voluntarily want to give their land).

Representation No.18

Sri H.K.Kumarswamy-MLA, Ex-Minister, Sakaleshpur taluk

In continuation of his previous memorandum Honourable MLA writes that in the areas of Hetturu, Vanagur, Mankanahalli, Bisile, Mayanur, Hongadahalla, Kagenahare, Attihalli and Jedigaddle there are nearly 2300 acres of private land growing coffee and cardamom where the people are ready to sell their lands for a good price. Also nearly 20,000

acres of forest, revenue and encroached lands are also available for elephant corridor. Hence requested to look in to the demands of people like prevention of loss of list and crop.

Representation No.19

Farmers of Atthihally, Hongadahalla, Bisle, Mavinur, Kaginere and others

Farmers of Atthihally, Hongadahalla, Bisle, Mavinur, Kaginere and others submitted that the people of that area are facing serious problem with elephant and other animals. The problem started only after construction of dams, railway line, highway roads, gas and pipe line, hydro electric power and mining etc. All the efforts made by forest department are found to be of no use. Therefore all the affected farmers are ready to give their lands if the government is ready to compensate the loss.

Representation No.20

Villagers of Mankanahalli, Vanagur and Magere

The resident of these villagers wrote that the wild elephants, wild boars and bisons are straying out of forests and damaging crops like paddy, cardamom, coffee, banana etc. Villagers are leading a fearful life, crop compensation is very meagre. If the government is acquiring the lands, they should be paid from 20 to 30 lakhs per acre. Each farmer family should be given a government job. This should be fulfilled within a year time. No conditions should be imposed on the farmers. If the government don't buy the farmers lands and do not declare the area as elephant corridor then permission should be given to the farmers for felling of trees. Solar fence and EPT should be provided up to the border of Kodagu district.

Representation No.21

Villagers of Patla, Mankanahalli of Sakaleshpur taluk

Villagers of Patla, Mankanahalli of Sakaleshpur *taluk* submitted that the people of this area are facing lots of problems. Loss of agriculture crops due to the regular attack by various wild animals like tiger, elephant and wild boars etc. many people have left their lands. They wrote that they are living in fearful situation. Therefore requested the department to buy the lands of the farmers (those who have come forward voluntarily to sell their lands) and till then the government should pay Rs50,000/- as compensation.

Representation No.22

Villagers of Mankanahalli and Boranamane:-

Villagers of Mankanahalli and Boranamane submitted that they are the residents of this place from a long time and depending upon agriculture only. They wrote that without proper information they have submitted applications to give their lands to the department along with RTC. But now they are not ready to part with their lands and requested the department to return the applications and RTC and also requested to protect their lands from wild animals.

MD Madhusudan