THE PROTECTED AREA

PART-II

(PROPOSED MANAGEMENT)

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CHAPTER – 10

VISIONS, GOALS, OBJECTIVES & PROBLEMS

10.1 Introduction:

The Core Zone of the Kanha Tiger Reserve has been part of an internationally renowned wilderness area for many decades, and been famous for its forest and wildlife wealth. In spite of ever-increasing signs of biotic pressure on and threats to the forest and wildlife of the country, the protected area still remains one of the few excellent and promising tiger habitats. Besides, the resurrection of the endemic hard ground barasingha over all these years, diverse vegetation types, and possible natural linkages of the Core Zone to some other potential protected areas add to its vision of being a conservation nucleus for the vast eco-region in future.

In spite of so much biotic pressure in the eco-region, the Core Zone still enjoys some ecological connectivity with a few wildlife protected areas in and around the state. While these corridors need to be strengthened and restored under a detailed and meticulous planning, the vision of successful wildlife conservation in such an ecologically well-linked protected area is achievable.

The Core Zone has ecological linkages with the Achanakmar Tiger Reserve (CG), Bandhavgarh & Pench Tiger Reserves (MP) and Nagzira & Pench Tiger Reserves (MH). While the linkages are fragmented and under biotic pressure in places, there is, however, still scope for ensuring gene-flow from the Core Zone to the above protected areas and vice-versa. In this way, the value of this protected area has grown manifold as an effective conservation unit that still affords opportunities for eco-regional development to complement wildlife conservation initiatives significantly.

10.2 Management Vision:

The Park Management has set the following vision for the management of the Core Zone:

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"The area may be envisioned as a natural ecosystem for the conservation of the tiger, and its safe dispersal in the Kanha landscape and beyond through ecologically functional corridors, with low impact tourism".

10.3 Management Goal:

The Park Management has set the following management goal for conservation:

"To conserve and enhance the biodiversity of the Core, with special focus on the conservation of large mammals, along with low-impact, dispersed and diversified ecotourism ensuring maximum economic benefits for local communities"

10.4 Management Objectives:

The Kanha Core Zone, part of the Kanha National Park, was among the first nine National Parks to be included in Project Tiger. The management objectives of this protected area are very broadly based on the objectives as envisaged under para 4.1 and 4.2 of the Project Report submitted by Task Force of the Indian Board for Wildlife, Govt. of India. These broad objectives are as under:

- To ensure the maintenance of a viable population of tiger for scientific, economic, aesthetic, cultural and ecological values.
- To preserve, for all times, areas of such biological importance as a national heritage for the benefit, education and enjoyment of the people.

Based on ground realities, opportunities as well as constraints, the specific objectives of the management of the Core Zone are as under:

- To manage the over-all diversity of wildlife habitats, including grasslands/ meadows for supporting a good prey base for carnivores.

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- To strengthen protection measures against all kinds of poaching, intrusion, illicit grazing and illicit collection of MFP.
- To increase tiger population during the plan period.
- To relocate forest villages from the critical tiger habitat.
- To increase the small population of the hard ground barasingha.
- To ensure low impact and ecologically sustainable wildlife tourism for the enjoyment of visitors and conservation awareness.
- To develop technical skills of the select staff for the translocation of various wildlife species to other protected areas under active wildlife management.
- To conduct research and monitoring activities for the technical support of the Park Management.
- To reintroduce a small population of blackbuck.
- To manage stray, problematic and orphaned wildlife, specially tigers and leopards, and make efforts for their rehabilitation.

10.5 Rationale for Management Objectives:

One of the finest wildlife ecosystems, the Core is comprised of mosaics of excellent wildlife habitats and has the potential to support huge populations of various ungulate species for a wide range of carnivores, specially the tiger, whose conservation has become a concern for national and international communities, and holds a tremendous scope for long term survival in this eco-region. The resurrection of the hard ground barasingha in the Core has been a tremendously inspiring conservation story so far and the small population needs to be increased. Besides, excellent wildlife habitats, moving tigers, thousands of grazing ungulates and an impressive interpretation complex in the protected area can give tremendous joy and inculcate effective awareness of forest and wildlife conservation in tourists, and this potential needs to be tapped. As the protected area has sizeable populations of several wildlife species, another consideration is to train select park staff for capture and translocation of founder animals to other wildlife protected areas. Applied wildlife research and monitoring activities in the Core, with a wide range of wildlife species and habitat and vegetal cover types, need to be brought

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into the management mainstream, and can contribute a lot to the Park Management. Another serious issue is the 17 forest villages inside the National Park (7 in the Core Zone), occupying areas and causing biotic pressure to some extent, and their relocation needs to be expedited to release additional habitat for wildlife.

10.6 Problems in Achieving Objectives:

The Park Management faces the following serious problems in achieving the above objectives of the management of the Core:

- Biotic pressure in the Buffer Zone, very close to the Core.
- False propaganda about the protected area, owing to its relocation history, by self-styled social activists and eco-illiterates craving for recognition at the cost of an internationally renowned protected area.
- Lack of special statutory protection to the frontline staff for acts done in good faith while discharging their duties, and delayed judicial proceedings.
- Habitation of around 8000 people and 7000 cattle in 17 forest villages in the protected area.
- The mushrooming of hotels/ resorts etc. very close to the boundary of the Core.

10.7 SWOT Analysis:

SWOT analysis is a strategic planning method employed to evaluate the strengths, weaknesses, opportunities, and threats involved in a project. The analysis involves specifying the objectives of the project in question and identifying the internal and external factors that are favourable and unfavorable to achieve these objectives.

10.7.1 **Strength:** These are the attributes of the Core that are helpful to achieving the stated objectives.

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- The entire Core Zone is a duly notified and undisputed Reserved Forest with clear boundaries.
- Duly notified critical tiger habitat within the National Park.
- Prides itself on having a tradition of very effective wildlife management.
- Adequate infrastructural inputs, with excellent forest road network, effective wireless communication network, buildings and civil works.
- Effective protection inputs, with strategically located patrolling camps, barriers, vehicular anti-poaching squads, and elephant patrol etc.
- Very effective fire protection strategy: firelines, prevention strategy, and control measures.
- Good database, research and monitoring inputs.
- Good interspersion/ juxtapositioning of welfare factors and animal abundance.
- Relocated village sites morphed into heterogeneous grasslands.
- Fully transparent and hassle free relocation of Jami village in 2010.
- All the rest of the 7 villages of the critical tiger habitat willing to be relocated outside.
- Ideal "doughnut" model with the Buffer Zone under unified control of the Tiger Reserve management with a separate establishment of officers and frontline staff.
- Linkages with other protected areas.
- No militant history of the indigenous people living in and around the Core.
- Presence of Phen Wildlife Sanctuary (Satellitic Micro Core).
- Income from tourists as Kanha *Vikas Nidhi*, and its recycling for the betterment of the local communities.
- Contractual appointment of a fulltime physician at the Mukki dispensary for the treatment of staff and villagers.
- Staff welfare initiatives under the *Kanha Workers Sahkari Sakh evam Kamgar Samiti Maryadit, Kisli*.
- A good network of information technology equipment, including Internet facilities at the Mandla headquarters and availability of computers at range level.

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10.7.2 **Weakness:** These are the features of the Core Zone which are harmful to achieving the stated objectives:

- Relocation history of forest villages tends to antagonize local communities.
- Illiteracy and lack of awareness in the indigenous communities and their reluctance to deviate from traditional occupation.
- Presence of 7 forest villages inside the Core Zone.
- Presence of MPSTDC complex inside the core at Kisli entry point.
- Presence of park interpretation complex in the Kanha range.
- Presence of villages close to the Core Zone boundary and lack of *nistar* area.

10.7.3 **Opportunities:** These are the external conditions that are helpful to achieving the stated objectives of the management of the Core Zone:

- Notification of the Critical Tiger Habitat.
- Planning for the relocation of the remaining 7 villages from the Critical Core or Critical Tiger Habitat.
- Proposal for declaring the areas close to the Core Zone as "eco-sensitive zone" with adequate provisions to regulate/ control the mushrooming of hotels/ resorts.
- Integrated Eco-regional Planning in the landscape to foster corridor connectivity
- Supporting problem solving field research.
- Introduction of new technique for the estimation of wildlife population.
- Promoting steps to enhance Kanha *Vikas Nidhi* and fostering local development through this fund.

10.7.4 **Threats:** These are the external conditions which could adversely affect the efforts to achieve the objectives:

- Biotic pressure close to the boundary of the Core Zone.
- Animosity/ acrimony against the Core Zone arising out of interface problems.
- Frequent crop raiding by ungulates.

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- Contamination of peripheral water points by village livestock with risks of disease transmission.
- Presence of the Chilpi-Mukki highway
- The Supkhar range forms boundary with the state of Chattisgarh.
- Traditional trails through the Core Zone.
- Manmade fires during summer owing to MFP collection close to the park boundary.
- Lack of MFP like mahul climbers, tendu in the peripheral areas luring villagers into the Core Zone.
- Proximity to cities like Nainpur, Gondia, Nagpur, Katni, Jabalpur increasing the risk of wildlife related crimes.
- Self-styled social activists inciting the local communities against the Core Zone.
- Extremist engineered disturbances in the adjoining district.

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CHAPTER – 11

MANAGEMENT STRATEGIES

11.1 Legal Status:

The total area of the Kanha National Park is 940 sq. km., and it incorporates 917.43 sq. km. of the Core Zone or Critical Tiger Habitat **(Appendix-33)**. The entire National Park is a Reserved Forest and derives its legal sanctity/ inviolability from Section-35 and 38 V (2) and (4) (i) of the Wildlife (Protection) Act, 1972 (as amended upto 2006). The Critical Tiger Habitat has been created as per provision envisaged under Section-38V (4) (i) of the Wildlife (Protection) Act, 1972. This has also been notified by the MP State Govt. No. F 15-31-2007-X-2 dated 24-12-2007.

11.2 Boundaries of the Core Zone:

The existing boundaries of the Core Zone within the Kanha National Park are described briefly as under:

- **North:** From village Bhimdongri the nala coming down from Katangidadar and forming common boundary between compartment No. 575 and 581 upto Kantangidadar, and thereafter a nala going down as common boundary between compartment No. 574 and 576 till it meets the Bahin nala and thereafter the Bahin nala forming compartment boundary between 573 and 578 and thereafter the boundary of Topla Reserved Forest Block forming the eastern boundary of compartment No. 147 and 146, thereafter the northern boundary of Topla Reserved Forest Block till it meets the Reserved Forest boundary of the Raigarh West Block near Forest Village Kadla, thereafter upto the eastern boundary of Forest Village Kadla and thereafter along the Forest Village Kadla boundary in compartment Nos. 157, 100, 104, 106 and 105, thereafter, the northern boundary of the Raigarh west Reserved Forest Block, upto the eastern boundary of Forest Village Dhaniajhor,

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thereafter Forest Village boundary in compartment Nos. 117 and 118 till it meets the inter-district boundary of Balaghat and Mandla, thereafter the eastern boundary of Banjar Valley Reserved Forest in compartment Nos. 734, 733, 731, 729, 726, 728, 727, 781 and 782 till it meets eastern boundary of Forest Village Kisli-Bhilwani cluster, thereafter the eastern, southern and western boundaries of Forest Village Kisli-Bhilwani cluster till it meets the northern boundary of compartment Nos. 677 and Nigga nala, thereafter Nigga nala till the trijunction of compartment Nos. 664, 670 and 671, thereafter the common boundaries between compartment Nos. 664 and 671 and 663 and 664 till it meets the northern boundary of Tendua Reserved Forest Block near village Mohgaon, and thereafter the continuation westwards of the boundary of Tendua Reserved Forest Block till it meets the nala flowing to Kariwah Revenue Village, forming the common boundary between compartment Nos. 659 and 660, thereafter the southern boundary of Kariwah Revenue Village upto the road connecting Forest Village Kariwah and Aurai, thereafter along the road southwards forming the eastern boundary of Forest Village Kariwah upto the river Surpan, thereafter along the boundary of compartment Nos. 655 and 657 formed by the river Surpan, thereafter the nala forming the common boundary between compartment Nos. 656 and 657, thereafter the northern boundary of compartment Nos. 655, 654, 653, 652 till it meets the nala forming western boundary of comartment No. 652 till village Batwar.

- **East:** From the eastern boundary of compartment No. 214 forming the inter-state boundary between Madhya Pradesh and Chhatisgarh upto the boundary of the Chhatarpur Forest Village, thereafter the southern and western boundary of Chhatarpur Forest Village which continuous northwards as the western boundary of the Patua Forest Village, thereafter the southwards along the eastern boundaries of Patua and Chhatarpur Forest Villages till it meets the inter-state boundary between Madhya Pradesh and Chhatisgarh, thereafter the inter-state boundary till it meets the western boundary of Ranwahi Forest Village, thereafter the north-western and north-eastern boundaries of Forest Village Ranwahi till it meets the interstate boundary between the Madhya Pradesh and Chhatisgarh States, thereafter along the inter-state boundary and continuing along the Bilaspur – Jabalpur road upto the eastern

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boundary of Forest Village Janglikheda and thereafter along the eastern, southern, and western boundaries of Forest Village Janglikheda upto till revenue village Bhimdongri in Mandla district.

- **West:** The eastern boundary of village Batwar and then the foot path Batwar to Chhapri forming compartment line between 630 and 644 till it meets Chhapri nala then Chapri nala forming compartment line between 631 and 643 till its origin in Lingadadar, then ridge of Lingadadar running north to south, then another nala forming compartment line between 631 and 632 till it meets the southern boundary of Tendua Reserved Forest Block at village Khatia – Narangi, thereafter the eastern boundary of village Khatia – Narangi till it meets the northern boundary of Reserved Forest compartment No. 691 and thereafter the northern and the western boundaries of Forest Village Indri till it meets the Baghmar nala forming the northern and western boundaries of the interstate boundary between Mandla and Balaghat districts, until revenue village Jhulup in Balaghat district, then eastern boundaries of village Jhulup and Sarekha till village Parsatola.
- **South:** Northern boundaries running eastwards of village Parsatola, Bhilewani, Kalegaon, Parrapur, Mohgaon, Malkhedi and thereafter eastern boundaries of village Malkhedi and Khapa till it meets river Banjar, thereafter river Banjar eastwards upto southern boundary of Forest Village Mukki, thereafter the western, northern and eastern boundaries of Mukki Forest Village in compartment No. 63 and 62, till it joints the western boundary of compartment No. 64 upto the Banjar river, thereafter Bhaisanghat Reserved Forest Block along village Samnapur, thereafter the cut line forming boundary of the Bhaisanghat Reserved Forest Block till the nala forming the south-eastern boundary of compartment No. 74, thereafter the southern boundaries of compartment Nos. 75, 103, 102 and thereafter the common boundary running west to east between Bhaisanghat and Raigarh west Reserved Forest Block, till it meets the inter-state border between Madhya Pradesh and Chhatisgarh in compartment No. 96, thereafter the continuation eastwards of the inter-state border between Madhya Pradesh and Chhatisgarh till Chhatarpur Forest Village in Balaghat district.

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11.2.1 **The Core Zone (CTH) & Inviolate Areas:** The floral, faunal and conservational significance of the Core Zone has already been discussed in the preceding chapters. Except for the 17 forest villages, the entire Kanha National Park supports critical habitats for well preserved umbrella wildlife species and a host of other life forms in general and endangered species such as the tiger and the hard ground barasingha in particular. Except for the total area of 10 villages, the entire National Park has been notified as the Critical Tiger Habitat. The Park Management has proposed to relocate 7 forest villages falling within the Critical Tiger Habitat and to excise 10 villages by redrawing the boundary of the National Park and keeping them in the Buffer Zone. If, however, funds are made available by the State/ Central Govt., the Park Management should relocate all the remaining 17 villages outside the National Park.

The forest villages located inside the National Park do exert biotic pressure around their peripheries, ultimately impacting the Core Zone to some extent. The cases of intrusion, illicit MFP collection, illicit grazing, illicit felling, several forms of poaching, and quarrels with park personnel are very common. The human population of these villages is showing a typical Indian decadal demographic growth. The same is also true of cattle population with most defective animal husbandry practices and their consequent dependence on the bio-resources of the Core Zone. Besides, the Park Management also appreciates the problems these villages have to face in the light of various Acts and Rules under enforcement for forest and wildlife conservation that may threaten their tendency to depend on bio-resources. Conservation Acts and Rules may also discourage any development activities that would otherwise be very important for the upliftment of these villagers. Therefore, such villages in the Kanha Core Zone are doomed to become islands, unfortunately, far away from the development of other villages located near the mainstream of progress. In this way, the existing park-people interface in Kanha actually drags rather uncomfortably at the cost of each other, which is very inconvenient to both.

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In view of the above, the park management has proposed to relocate 7 (Jami already relocated in June, 2010) forest villages outside the National Park, and to excise the remaining 10 forest villages by redrawing the park boundary line inside and keeping these villages in the Buffer Zone outside the National Park. Most of these 10 forest villages were already relocated in the past and it would be rather inhuman to suggest their relocation again. In case these villages agree on relocation in future under some attractive package offered by the govt., this can be arranged. The demographic and cattle population along with the number of families and area of the 10 forest villages proposed for excision is appended **(Appendix-34)**. The total area of these 10 villages is 2257.199 ha. (22.572 sq. km.). As stated above, the Park Management proposes to redraw the National Park boundary a little inside and keep these villages excised from the National Park. After this proposed excision these villages shall automatically fall within the Buffer Zone. The excision of these 10 forest villages from the National Park will reduce its area by 22.57 sq. km., making it 917.43 sq. km. or 917 sq. km.

The Park Management has also proposed to relocate the remaining 7 forest villages outside the Core Zone. Needless to add, the relocation programme will be undertaken on mutually agreed terms and conditions between the govt. and the villages regarding cash compensation per family and their choice of new sites for relocation etc. The total area of these remaining 7 forest villages proposed for relocation is 2116.288 ha. (21.162 sq. km.), and the total number of families is 1092. The demographic and cattle population along with the number of families and areas of these 7 forest villages is appended **(Appendix-35)**. Needless to add, only the excision, not the relocation of the forest villages, will affect the area of the National Park. The decadal growth of human and cattle population in the various forest villages is as under:

District	Name of Forest Village	No. of Families		Total Population		No. of Cattle	
		2000	2010	2000	2010	2000	2010
Mandla	Bhilwani Group	126	462	885	2016	877	1332

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Mandla	Jhapul	8	63	39	364	50	323
Mandla	Kariwah	10	25	40	107	45	68
Total:		**144**	**550**	**964**	**2487**	**972**	**1723**
Balaghat	Kadla	22	92	170	576	203	262
Balaghat	Jholar	19	90	120	468	185	477
Balaghat	Dhaniajhor	14	62	91	254	149	361
Balaghat	Ajanpur	72	87	492	579	1025	582
Balaghat	Sukdi	48	105	299	509	443	517
Balaghat	Mukki	33	87	275	582	252	395
Balaghat	Benda	22	24	136	175	118	169
Balaghat	Patua	72	78	531	642	532	438
Balaghat	Chhattarpur	36	46	318	439	320	284
Balaghat	Janglikheda	30	38	218	211	202	170
Balaghat	Rol	35	45	187	223	259	193
Balaghat	Linga	37	60	257	330	302	298
Balaghat	Bithli	33	38	187	202	231	202
Balaghat	Ranwahi	25	27	161	177	203	166
	Total:	**498**	**879**	**3442**	**5367**	**4424**	**4514**
	G Total:	**642**	**1429**	**4406**	**7854**	**5396**	**6237**

This is evident from the above table that the decadal growth of human population in these forest villages recorded an increase of 78.26%, while that of cattle population rose by 15.59%. In view of the above, the rate of decadal growth is all the more reason for the Park Management to relocate as many villages as possible by offering them an attractive package.

The Kanha Core Zone, has a long conservation history and is well known for the conservation of the tiger and endemic hard ground barasingha. To protect this unique wildlife area, lots of inputs have been given till date in the form of weed eradication, brushwood uprootal, water development and various other protection measures. The area around the existing 7 forest villages in the core area is rich in wildlife, therefore, the area occupied by these villages has been included in the Critical Tiger Habitat. In this way, the identification and notification of the Critical Tiger Habitat in the National Park is amply justified.

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11.3 Management Issues:

The significance of the protected area, past experience and the stated objectives of wildlife management give rise to the following major management issues:

11.3.1 **Village Relocation:** The importance of village relocation from the Core Zone has already been described in the preceding chapters. The results of past relocation have been very encouraging as far as the conservation of wildlife and its habitats is concerned. Now let the entire Core Zone be a real *sanctum sanctorum* with all the existing 7 forest villages relocated outside the protected area. Presently, there is an excellent opportunity in the form of an attractive package offered by the NTCA, New Delhi, and the Park Management has to ensure that as many forest villages as possible should avail of the same.

11.3.2 **Barasingha Conservation:** The central Indian barasingha (*Cervus duvauceli branderi*) is an endangered sub-species of the nominate swamp deer (*Cervus duvauceli duvauceli*). The cervid is endemic to the Core Zone, with its only world population. The species witnessed a steep decline in the population, and was almost on the brink of extinction during the early Seventies when a mere 66 animals survived in 1970. Due to special managerial efforts and a high degree of protection, the barasingha population was gradually restored to a relatively safer status. The conservation of this small population in the Kanha Core Zone requires species as well as habitat specific approaches.

11.3.3 **Tiger Conservation:** The tiger (*Panthera tigris tigris*) is also an endangered species in all of its range-countries in the world. The conservation of this species has attracted international attention, and even after almost four decades of the launch of the Project Tiger, it still remains a burning issue in wildlife conservation. The Core Zone fosters a typical representative of tiger habitat with all the intrinsic attributes required for a viable population of the species. Besides,

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the protection and scientific management afforded to the species have also led to a steadily upward trend of population. The tiger being a "flagship" species of the Project Tiger in the Tiger Reserve, the protected area requires specific approaches to facilitate its safe dispersal in large forested area under a Core-Buffer strategy, ensuring the survival of strayed transients from the natal area and free-ranging individuals within the contiguous forest.

11.3.4 **Management vis-à-vis Relevant Guidelines:** It has to be ensured that the Tiger Conservation Plan provides site-specific habitat inputs for a viable population of tigers, co-predators and prey, without distorting the natural prey-predator ecological cycle in the habitat. Besides, the Tiger Conservation Plan should also conform to the guidelines issued by the National Tiger Conservation Authority, New Delhi, and should also be in consonance with the following Acts/ Directives:

- Wildlife (Protection) Act, 1972
- The Biodiversity Act, 2002
- Forest (Conservation) Act, 1980
- Indian Forest Act, 1927
- Environment (Protection) Act, 2006
- Directives received from the Hon'ble Apex Court, from time to time on the subject

The Tiger Conservation Plan has also taken into consideration the mitigation of weaknesses of the Core i.e. critical core, large volume of tourism and stranglehold of resorts, degrading grasslands and conflicts as mentioned in the Management Effectiveness Evaluation (MEE) of Tiger Reserves in India Process and Outcomes (2010-11).

11.4 Zone & Theme Approaches to Management Strategies:

The zone and theme approaches have been adopted in the proposed management strategies of the Core Zone. A zone can be defined as an area of special management

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category with its own specific objectives. Sometimes separate zones have to be created so that compatible and related management objectives may be prescribed for different zones. A zone plan is self contained that identifies problems, develop strategies, and also relates realistically to the surrounding areas of the other zones.

A theme plan has to link all concerned zones for application of its prescriptions. In this way, several objectives and different problems created by a combination of factors are tackled by a theme strategy under which measures can be applied for the entire area.

11.4.1 **Zone Plans:** The following zones have been identified/ visualized for management in the Core Zone. Detailed zone plans would be discussed in the following chapters of this document. As the proposed conservation initiatives would also foster tiger population in the Core Zone in a concerted manner, no specific zone or theme is necessary for the tiger. The following zone plans are proposed, and will be discussed in the forthcoming chapters:

- Barasingha conservation.
- Eco-tourism and interpretation.

11.4.2 **Theme Plans:** The following themes have been identified in the Core Zone, which would be discussed in the forthcoming chapters:

- Habitat management:
  - Grassland management.
  - Water development.
  - Habitat manipulation and meadow restoration.
- Anti-poaching.
- Fire protection.
- Research, monitoring & upgradation of animal estimation techniques.

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CHAPTER – 12

HABITAT MANAGEMENT

12.1 Introduction:

Besides forest and wildlife protection in the wildlife protected area, habitat management is another conservation practice of vital importance. The management of habitats for wildlife chiefly involves influencing the successional stage and physical structure of vegetation to benefit major herbivore species and/ or any endangered species of high conservation or other intrinsic value, for instance the hard ground barasingha in the Core Zone. The Core Zone supports a wide range of ungulate species of different food habits and niches. The survival of these species depends solely on vegetation. Needless to add, the populations of tiger and co-predator in turn depend on a good prey base in the Core Zone. Interactions between vegetation and its herbivorous predators, specially larger species in the Core Zone, make up a plant-herbivore system. As stated above, this system commands a direct bearing on the next level system, herbivores and their predators, the carnivores. Though there are several types of wildlife habitats in the Core Zone as described in an earlier chapter, considering the importance of grasslands for major ungulate species, habitat management practices are mainly focused on the improvement/ manipulation of these grasslands and forest edges and water development.

12.2 Objectives:

As the grassland habitat forms the mainstay of all the ungulate species in the Core Zone, the specific objectives of habitat management are as under:

- To create new wildlife habitats, specially in the non-tourism forest ranges where animal density has been low.
- To improve the present conditions of grasslands for increasing the population of prey base species.

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12.3 Strategy & Management Prescriptions:

Based on the existing situations and current knowledge, the following broad prescriptions should be followed for the management of grasslands in the Core Zone depending upon financial allocations received from the state govt. and the National Tiger Conservation Authority, New Delhi. Needless to add, prime grasslands should be taken up on a priority basis:

12.3.1 **Burning:** As recommended at the workshop on grassland management, the Park Management should clearly identify and list out regressive and relatively normal grasslands in the protected area. Regressive grasslands should not be burnt in winters, specially in the Kanha range, and cool burning should be carried out in normal grasslands in alternate years. Large grasslands can also be divided into four sections to burn two sections alternatively. In the meantime, special research and monitoring projects should be taken up to determine fire regimes for important grasslands in the Core Zone. It has to be a long-term project under a good methodology whereby different plots should be monitored for species composition after each burning.

- **Francois de Wet's Perspectives:** Mr. Francois de Wet of South Africa, one of the participants at the Grassland Workshop, has also made his assessment of the grasslands of the Core Zone regarding responses of various grasses to fire (Wet, 2010). His perspectives are as under to help make decisions on the use of fires:

  Grassland condition can be interpreted by grouping the grass species into ecological categories or classes. Grass species are classified into three groups, as follows:

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i. Decreaser species (indicators of well managed grassland) – i.e. those which dominate in grassland which is in good condition and which decline in abundance when overgrazing or degradation takes place;

ii. Increaser I species (indicators of under-utilization) – i.e. those which are not abundant in grassland which is in good condition, but which increase when grassland is under-utilized (over-rested) or burnt on a overly low frequency;

iii. Increaser II species (indicators of degradation) – i.e. those which are not abundant in grassland which is in good condition, but which increase when grassland is over-utilized or degraded by too much burning. Tainton (1988) states the following: "If the decline in grassland condition over a period of time is the result of a increase in the proportion of Increaser I species, then it is clear that the area is being under-utilized and so stocking rate or burning frequency should be increased; If a decline in grassland condition is associated with a replacement of Decreaser species by Increaser II species, then the area has been over-utilized and the stocking rate or the burning frequency should be reduced and if possible longer resting periods should be applied; Therefore, in order to monitor the grassland condition trends, one needs to repeat the monitoring over a period of time.

Recommendations are based on the specific objectives and direction of trends in grassland condition, which in turn can be related to the management applied or impacts from grazing or to the type of fire management or combination of fire and grazing. However, generally management recommendations in South African Grasslands are based on two main aspects, namely:

- The trend in grass composition (i.e. following the condition of the grassland relating it to the Decreaser and Increaser components); and
- The accumulation of grazing volume (an accumulation of the grazing volume in relation to the burning threshold of 4 tons/ha).

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Burning and grazing should follow only if the Decreaser component in the grassland is dominant and if the threshold of 4 tons/ha is exceeded.

12.3.2 **Relief Exclosure:** Due to the surrounding topography, the Kanha meadows are under severe pressure of grazing herbivores, and need to be given relief for recuperation. Heavily grazed meadows should first be identified and earmarked for reducing the grazing pressure of wild ungulates. Keeping this in view, the Park Management should continue the ongoing practice of erecting chain link exclosures before the monsoon in some parts of the grasslands which require this treatment, and allow them to rejuvenate for 2-3 growing seasons, until they grow rich in the heterogeneous grass species. The area of these exclosures should not exceed 15 ha. The exclosures can later be opened up for animals. This operation should be carried out every year in different degraded grasslands.

12.3.3 **Treatment for Problematic Grasses:** Large chunks of the important grasslands of the Kanha range are infested with *Desmostachya bipinnata* and *Imperata cylindrica* and they need special initiatives. The sizes of these chunks are gradually expanding every year. The Park Management should first ensure to burn parts of these grasslands and have several 3 – 5 feet trenches/ strips dug along them. After the removal of the rhizomes of these grass species, each alternate strip should be filled with the lumps of *Saccharum spontaneum*. The suckers of *Saccharum spontaneum* may spread in due time and replace the two problematic grass species. The management should monitor and record the changes periodically. The year-wise area proposed for the treatment of problematic grass species is given in Chapter-24 of Organization, Administration & Budget.

12.3.4 **Restocking of Grasslands:** Severely grazed meadows would also require some special input such as introduction of indigenous grass slips or the sowing of grass seeds. The earmarked area should undergo ploughing/ harrowing to relieve the

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site from compaction, and the seeds/ slips of palatable annual or perennial grasses be introduced, and the entire area fenced in for 2-3 seasons. The existing grass associations should be taken into account before the restocking operation to avoid the site intolerance of the species. This operation should be carried out every year until the severely grazed grasslands are recovered.

12.3.5 **No Expansion of Grassland Area:** The existing area of grasslands accounts for around 8.0% of the Core. Considering the successional tendency of the grasslands and their gradual degradation due to severe grazing pressure, the Park Management should also undertake grassland improvement practices. As clearly articulated at para 6.14 of Part-I of this document, there is no need for any drastic expansion of grassland area in the Core Zone for increasing ungulate population. It is repeated here that this should be done only after computing the existing carrying capacity in the context of tiger, using the computed prey density (chital, sambar, gaur, wild pig) in the 2010 country level assessment of NTCA / WII, with the equation of Hayward et.al. (2007):

y	=	-1.363 + 0.152x
where y	=	$\log_{10}$ of maximum carrying capacity of predator density for the available prey
x	=	$\log_{10}$ of prey biomass per unit area per sq. km.

The tiger density so computed per 100 sq. km. can be used for guidance. This density is an outcome of the existing prey base, and the latter is in turn an outcome of the prevailing habitat conditions. Further alteration of the habitat, specially grassland expansion, has to depend on whether the core habitat would be in a position to support more tigers vis-à-vis the 800-1200 sq. km. inviolate space requirement as envisaged for a viable population. Therefore, if the present tiger density is less than the said area requirement (for 20 breeding tigresses), then habitat interventions can be prescribed for its expansion/ enhancement.

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As far as the expansion of grassland area in the Core Zone is concerned, voluntary relocation of forest villages from the Critical Tiger Habitat would automatically contribute to the existing grassland area. Alternatively, around 2 to 3 ha. area of old clearings, which have been gregariously recolonized by woody species, should be discontinuously cleared of brushwood, shrubs and weeds in such pockets/ clearings in the Core Zone that can be manipulated to serve as small grasslands. These open pockets would also serve as effective corridors to facilitate future dispersal of the increasing ungulate populations. This should be done by identifying and mapping such new clearings and patches that are invaded/ infested by brushy growth of *Shorea robusta*, *Butea monosperma*, *Lagerstroemia parviflora*, *Diospyros melanoxylon*, *Bombax malabaricum*, *Cordia myxa* and *Bauhinia* spp. and other shrub species in the Kanha, Sarhi, Kisli and Supkhar ranges, and removing them exclusively under this improvement programme. No forest crops should be removed in this operation. Besides increasing the quality area of grasslands in the Core Zone, this programme would also counter the gradual reduction of meadows by brushwood species. Such areas are listed in **Appendix-36.** While doing this operation, care should be taken to ensure the clearings as small isolated patches. Large clearings at a stretch may foster a rapid increase in ungulate population (especially the spotted deer), which might render the entire exercise counterproductive. The cleared woody material should be allowed to remain on the forest floor for recycling of nutrients.

12.3.6 **Weed Eradication:** Weeds are obnoxious plant species, which are unpalatable and invade grasslands and compete with grasses resulting in the degradation of this habitat type. The main weed species in the grasslands of the Core Zone are *Cassia tora*, *Lantana camara, Woodfordia fructicosa, Parthenium hysterophorus, pogostemon benghalense, Hyptis sauveolens, and Sida spinosa.* etc. These species mushroom very rapidly and if not controlled in a systematic and phased manner, may pose a serious threat to grassland habitat. Weed eradication practice should be done preferably with the onset of the rains, taking advantage of the already wet and soft ground to manually uproot the species. The eradicated biomass should

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be dumped in heaps and burnt before the fire season. The practice has to be carried out under a well-chalked out project mode for habitat improvement in all the forest ranges harbouring the barasingha metapopulations. The management has to ensure that the next year a thorough weeding is also undertaken in the same areas for effective eradication. Considering the juxtaposition of forest and grasslands, connectivity among grasslands should also be ensured by eradicating weed and unpalatable species. The year-wise area proposed for the eradication of weed species is given in Chapter-24 of Organization, Administration & Budget.

12.3.7 **Eradication of Woody Species:** The management should identify such grasslands threatened by the invasion of gregarious woody species such as *Butea monosperma*, *Lagerstroemia parviflora*, *Shorea robusta, Bombax ceiba, Cassia fistula, Cordia myxa* and *Diospyros melanoxylon* etc. *Phoenix acaulis* has also been mushrooming for the past several years in several prominent grasslands. These woody species tend to encroach into the grasslands from the periphery and gradually grow in size and area, thereby not only reducing the extent of the grassland habitat but also creating obstruction to the foraging animal population. All these woody species and their associates have to be uprooted before the end of the monsoon. If the grassland is large, a few small grooves of tree should be retained to provide the much-needed shelter to the animals in the late morning and afterwards. Prominent grasslands should be first considered for this uprootal programme, followed by the adjoining large clearings **(Appendices-73 & 74)**. The year-wise area proposed for the eradication of woody species is given in Chapter-24 of Organization, Administration & Budget.

12.3.8 **Prescriptions for Bamboo:** It is also an important cover type in the Kanha habitat, and is a common under storey (specially *Dendrocalamus strictus*). Bamboos display the phenomenon of “gregarious” as well as “sporadic” flowering. While no special intervention is normally required in the latter, the former may warrant some site-specific action. The bamboo regeneration in gregariously flowered areas hamper the growth of other forage as well as browse

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species, since the roots of bamboo seedlings are closely matted, thereby preventing the growth of other species. In such situations, over a limited area (in irregular patches) spacing may be created to facilitate the growth of other species and also clump formation. Dead, fallen bamboo clumps on the forest floor are used by ground nesting birds, sambar and chital for shelter. The standing growth facilitates perching of birds, arboreal species, apart from having a food value.

12.4 Water Development:

Water development is a very important conservation input, and in the present context includes the distribution and quantity of water, not only in the dry regions, but also where it is plentiful. This includes, besides the construction of new water bodies, the maintenance of the old ones by deepening, desilting and reshaping them.

Park Management should have the park area surveyed regularly for natural and artificial water sources of seasonal and perennial nature. This information should also be complemented by the names of wildlife species utilizing a particular habitat, and be collected at the compartment level to ensure that no water source was missed during the water survey. It is very important for the Management to know as to when a water body dries up significantly during the pinch period. On the basis of this information, the latest water-maps should be prepared for reference. Such water-maps provide very important insights into the current status of the water distribution and the requirement of artificial water sources vis-a-vis the species using the target area. On the basis of these surveys and water-maps, the feasibility and suitability of an engineering structure for artificial water impoundment should be decided for construction.

Except in the pinch period, the availability of water in the Core Zone at present is satisfactory. Besides, the water table along the dried up streams/ nullahs are reasonably high facilitating easy digging up as and when necessary. Therefore, there is no further need of the construction of water impoundment structures in the Core Zone.

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The saucers made here and there in the Core Zone to make water available during the pinch period should be recharged with the help of solar systems rather than supplying water by tankers driven by a truck or a tractor. This would ensure avoidance of noise pollution in the protected area.

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CHAPTER – 13

BARASINGHA CONSERVATION

13.1 Introduction:

The significance of the conservation of the hard ground barasingha, being an endangered sub-species and the only world population in the protected area, has already been discussed in a preceding chapter. This small population of the cervid has recorded an increase of around 38% in the past ten years, with 343 in 2001 to 475 in 2010. As the Park Management has learnt many a lesson in the conservation of this species in the past so many years, it must build further on the technical expertise and successes to improve the status of the cervid in the Core Zone.

13.2 Objectives:

The specific objectives of the conservation of the hard ground barasingha in the Core Zone are as under:

- To facilitate viable population growth for the hard ground barasingha within the habitat – prey – predator dynamics
- To develop new habitats and connectivity between habitats to expand the dispersal of these animals
- To introduce a new founder population into the Kanha enclosure, and manage it for multiplication and future release into the wild

13.3 Proposed Management Strategy & Prescriptions:

The conservation of the hard ground barasingha in the Core Zone requires a long-term strategy based on the past and present experiences and observations recorded by the Management. Empirical data relating to the ecology of this endemic sub-species needs to be kept in mind before taking up any major habitat interventions vis-à-vis its present

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status and distribution within the Tiger Reserve. In view of the stated objectives, the following management strategy and prescriptions are proposed for the conservation of this sub-species:

13.3.1 **Grassland Management:** The barasingha, being a food specialist and total graminivore, survives on a narrow range of grass species. Consequently, the small population needs special managerial inputs involving both the species-specific as well as the habitat-specific approaches for the management of grasslands, so crucial for its survival. Though the barasingha feeds upon several types of grass species, it suffers from sympatric competition with a considerable large population of the chital. And the situation worsens for the barasingha in high summer when the dried-up habitat turns unfavourable for the species having hardly any other alternative diet for sustenance. Grassland management should include the following amelioratory practices:

13.3.1.1 **Weed Eradication:** This has already been discussed in the Chapter of Habitat Management. The prime habitats of this deer species is being invaded by many unpalatable grass and weed species. In the recent past, the menace of *Pogostemon benghalense* has been reported in these grasslands. Besides, the growth of *Cassia tora, , Hyptis sauveolens, Malvasterum* and *Sida* spp. has also become very conspicuous. Therefore, as proposed earlier, weed eradication programme should be taken up during the monsoon in all the four forest ranges supporting the meta-populations. The year-wise area proposed for weed eradication is given in Chapter-24 of Organization, Administration & Budget.

13.3.1.2 **Eradication of Woody Species:** This prescription has already been proposed for the management of habitat in a previous chapter. The same prescription also holds good for the habitats of barasingha. The prime habitats of the barasingha should be prioritized for the eradication of woody species. The year-wise area proposed for eradication of woody species is given in Chapter-24 of Organization, Administration & Budget.

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13.3.1.3 **Maintenance of Tall Grasses:** The Kanha grasslands are getting devoid of tall grass cover, very essential for the fawning of the barasingha and post-natal care by females. The fawning cover protects newborns from scavengers and predators, ensuring a good recruitment to the population. Though there are several patches of *Saccharum spontaneum* and *Bothriochloa odorata*, most of the other grass species are either short annuals or perennials. Efforts should be made by the Park Management for the sowing and planting of species of tall grasses such as *Heteropogon contortus*, *Bothriochloa odorata*, *Themeda triandra*, *Saccharum spontaneum* and *Iseilema prostratum* and their associates in the areas of the metapopulations. These operations should be carried out during the monsoon, and later such fields should be fenced in properly. After monitoring the progress for 2 or 3 seasons, such enclosures can be opened up. These maintenance practices should be continued to restore the habitat for the barasingha.

13.3.1.4 **Exclosures for Relieving Pressure:** Due to the surrounding topography, the Kanha meadows are under severe pressure of grazing herbivores, and need to be given relief for recuperation. Keeping this in view, the Park Management should continue the ongoing practice of erecting chain link enclosures before the monsoon in some parts of the grasslands which require this treatment, and allow them to rejuvenate for 2-3 seasons, until they grow rich in the heterogeneous grass species. These exclosures can later be opened up for the species. This operation should be carried out every year in different degraded grasslands.

13.3.1.5 **Connectivity between Habitats:** Over the years, many open areas in the park have been recolonized by woody species, including dense shrubs. Several such areas also lie in the vicinity of some of the prime habitats of the hard ground barasingha in Sonf, Ronda and Sondar**.** The recently abandoned site of Jami village may also prove to be an excellent habitat for this cervid in the Supkhar range. A probable route for the barasingha from Bithli to Jami would be through

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grasslands and the Lodhabarra beat, which needs to be clearly identified. The management should undertake habitat improvement works in these areas to facilitate connectivity between grasslands and also enlarge their total area. The Park Management should also introduce special conservation measures in the abandoned site of Jami village as discussed in this chapter.

Probable Sites for Creating Connectivity between Grasslands

Probable Corridor Between Grasslands	Main Shrub Species in the Corridor	Length of Corridor (m.)/ Area (ha.)
SARHI RANGE		
Ronda meadow to Kalorbehera (Compt. No. 638)	*Lantana camara, Colebrookia oppositifolia, Flemingia semialata, Pogostemon benghalense, Phoenix acaulis*	600
Kalorbehera to Natwaware meadow (Comptt. No. 671)	*Lantana camara, Colebrookia oppositifolia, Flemingia semialata, Pogostemon benghalense, Phoenix acaulis*	450
Natwaware to Timkiware meadow (Comptt. No. 671)	*Colebrookia oppositifolia, Flemingia semialata, Phoenix acaulis*	300
Timkiware to Mahuadabari meadow (Comptt. No. 671)	*Lantana camara, Colebrookia oppositifolia*	300
Ronda-Mahaudabari to Harraware meadow (Comptt. No. 671)	*Lantana camara, Colebrookia oppositifolia*	750
Harraware to Gadabehera meadow (Comptt. No. 638)	*Lantana camara, Colebrookia oppositifolia*	1250
Fasitanga to Udnakhera-Karatidabara meadow (Comptt. Nos. 706 & 705)	*Pogostemon benghalense, Lantana camara, Flemingia semialata*	1000
Udnakhera to Gharghundi meadow (Comptt. Nos. 706 & 718)	*Pogostemon benghalense, Lantana camara, Flemingia semialata*	550
Gharghundi meadow to Khutapadhar (Comptt. Nos. 720 & 718)	*Pogostemon benghalense, Dendrocalamus strictus, Lantana camara, Flemingia semialata*	2200
Bijatek to Piparware-Jariaware meadow (Comptt. No. 717)	*Pogostemon benghalense, Dendrocalamus strictus, Lantana camara, Flemingia semialata*	600
Kanha Range		
Mirchaware to Bakrabehera meadow (Comptt. No. 707)	*Flemingia semialata, Pogostemon benghalense*	325
Bakrabehera to Parsatola meadow (Comptt. No. 709)	*Flemingia semialata, Pogostemon benghalense*	1175
Parsatola to Bodamaria meadow (Comptt. No. 713)	*Flemingia semialata, Pogostemon benghalense*	795
Bodamaria to Baghdadha meadow (Comptt. No. 710)	*Flemingia semialata, Pogostemon benghalense*	1320
Baghdadha meadow to Kanhari Beat old machan (Comptt. No. 711)	*Pogostemon benghalense, Lantana camara, Flemingia semialata*	650
Sonf-Fasitanga nullah to Dhobgatta line (Comptt. No. 705)	*Lantana camara, Butea monosperma, Lagerstroemia parviflora*	1100
Fasitanga meadow-Karondakachhar-Kokarra nullah to Kuajhil (Comptt. No. 636)	*Lantana camara, Butea monosperma, Lagerstroemia parviflora, Pogostemon benghalense*	40 ha.

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Sonfnala-Bertalab to Silyarikona (Comptt. No. 704)	*Lantana camara, Butea monosperma, Lagerstroemia parviflora, Pogostemon benghalense*	35 ha.
Gidhasarai-Kikarranala-Sonf diversion to Silyarinala (Comptt. No. 636)	*Lantana camara, Butea monosperma, Lagerstroemia parviflora*	40 ha.
Gadabahera-Village line-Jhiria-Bortiraha-Imalikhero-Linga-Sangam to Gadabahera nullah (Comptt. No. 638)	*Lantana camara. Butea monosperma, Lagerstroemia parviflora, Pogostemon benghalense*	50 ha.
Ronda tank-Koyalighondi-Jamghundi-Kurmahi chhapar-Ronda nursery to Ronda tank (Comptt. Nos. 637 & 638)	*Lantana camara. Butea monosperma, Lagerstroemia parviflora, Pogostemon benghalense*	50 ha.

13.3.2 **Swamp/ Marsh Creation:** Despite adaptations to the hard ground conditions, the ontogenic instincts of a swamp deer still remain with this sub-species. Therefore, the creation and manipulation of low-level temporary water bodies and swamps serve as welfare factors for this cervid. The hard ground barasingha readily feeds upon aquatic plants by entering the water bodies, and this affinity automatically reduces the competition with the chital that always avoids such ventures. In this way, the creation of small swampy and marshy habitats would provide an added advantage to the species over its sympatric competitor.

13.3.3 **Wallows:** In winters, during the rutting season, wallows play a very important role in the courtship behaviour of the barasingha. Stags display a strong liking for muddy sites, and wallowing is a common sight in this season. The management has to ensure availability of such muddy areas for better courtship.

13.3.4 **Management of Metapopulations:** As discussed earlier, three geographically and reproductively isolated metapopulation groups of the branderi barasingha have been identified in the Core Zone. The movement patterns and periodic distribution of the sub-patches of these metapopulations depend upon the availability of food and water, breeding season and parturition and postnatal care by the females in suitable areas. The habitats and routes of these small sub-

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patches of the metapopulations are vitally important and require habitat improvement interventions.

13.3.5 **Reclamation of Additional Habitat:** In the backdrop of increasing barasingha population and its narrow niche, and sympatric competition with chital, the Tiger Reserve Management needs to reclaim additional habitat in the Core Zone. As already discussed in the Part-I, animals from the Supkhar population have also been reported foraging at Lanjhiabehra, and in areas near the Balda patrolling camp and in the Ronda clearings of the Bhaisanghat range. The relocation of Sukdi, Ajanpur and Jholar forest villages will morph into excellent grassland for these cervids and will also facilitate the dispersal of the Supkhar population. Similarly, the abandoned site of Jami forest village should also be developed to attract barasingha from the nearby populations.

13.3.6 **Translocation to Historical Range:** As already mentioned above, the presence of barasinghas was recorded in the Kusera maidan of the Supkhar area in the Halon Valley, and this used to be a historical range of this sub-species until the late 1950s when the cervid went locally extinct in this range. The translocation of barasingha into Supkhar started from 1981 (Kotwal, 1993), and currently around 40 animals thrive in the valley as a viable sub-population. This is also a most suitable alternate habitat for the subspecies at present in the Core Zone. In future also, the Park Management can think of translocating some more animals into the Supkhar range that has a number of interconnected grasslands such as Piperwara, Jatadabra, Baspehra, Gaidhar, Ladua, Otesarra, Silpura, Chakarwah, Kusera and Supkhar. These meadows abound in tall grass and water points.

13.3.7 **Maintenance & Monitoring of In-Situ Enclosure:** The Park Management had already released all the 81 barasingha of *in-site* enclosure into the wild last year. After carrying out a thorough habitat improvement programme, including reshaping and desilting of water bodies, a new founder population of 7 barasingha (2 males & 5 females) along with several chital have also been introduced into the

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enclosure recently. This is a historic *in-situ* enclosure, and has contributed immensely to the conservation of barasingha in the Core Zone. As the total area of enclosure is around 50 ha., there should not be any difficulty for the Park Management to maintain the entire structure throughout as well as to introduce all the required conservation initiatives essential for the survival of barasingha. Pythons may turn out to be the only predators for these cervids inside the enclosure. Therefore, the enclosure should be checked daily by watchers, and pythons should be physically removed out of it. Besides basic monitoring of age and sex class structures of this growing population, the health of these animals should also be monitored periodically, specially for the infestation of ectoparasites.

13.3.8 **Daily Monitoring:** Continuous monitoring forms a very important aspect of the conservation of small populations. Central meadows of Kanha has presently all the released animals from the *in-situ* enclosure. All the three metapopulation structures of the barasingha should be monitored daily in the Core Zone. The Park Management must ensure that the entire structures of all the populations should be reported to the head office at Mandla in the prescribed format **(Appendix-37)**. This should include all possible age and sex classes of the individuals. Such continuous monitoring of the population would facilitate effective management of this species.

13.3.9 **Mortality Survey:** Mortality and survival rates are two very important characteristics of animal populations. The patterns of mortality and survival within a population suggest a great deal about the population's strategy for survival. As far as small population is concerned, mortality, irrespective of its nature, is a serious issue from the management point of view. This calls for regular mortality surveys in the Core Zone. The postmortem of each dead animal must be conducted, and as per protocol bio-samples should be sent to the Wildlife Disease Diagnostic & Research Centre, Jabalpur. The Park Management has to ensure that the information on the mortality of the barasingha is accurate as far as

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the cause of death is concerned. These mortality surveys, incorporating various information such as the name of predator, disease, season and place along with the age class and sex class of the barasingha, may also suggest about the predatory regulation of the population, and help the management work out new strategies. The collection of skulls, including jaws should also be ensured for determination of the age of the dead animal.

13.4 Surveillance of Epidemics:

Though no major epidemic has been reported so far in the Core Zone, the management should ensure a constant vigil, since the grasslands occupied by the population at present have a long pastoral history, and 28 forest villages along with cattle have been relocated outside the National Park. Some of the causative factors of pastoral diseases are known to remain dormant for many years before recurring again. Further, since ungulates frequent the village cultivation sites on the periphery of the park, mutual disease transmission cannot be ruled out. Also, owing to the deciduous nature of the valley forests, the sylvatic cycle of the landscape may also foster disease transmission through vectors, by blending with the pastoral cycle. Therefore, prophylaxis of the village cattle surrounding the park should be done regularly, and detailed veterinary/ pathological research on the disease aspects be called for to adopt suitable preventive measures.

13.5 Alternative Areas for the Barasingha:

The problems of small populations have already been described in detail. The present population of the barasingha in the Core Zone has grown out of only 60 – 70 animals, and can safely be considered as thoroughly inbred. Geneticists suggest that the genetic health of a population or its ability to adapt to environmental conditions depends solely upon the maintenance of genetic diversity within the population, and a loss of genetic diversity may have extremely harmful effects on the existence of this population.

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The genetic load of a population refers to the amount of deleterious recessive alleles in that population. Most mammals have recessive deleterious alleles present in their genome (Wright 1977, Charlesworth and Charlesworth, 1987, Ralls *et al.* 1988). These alleles have little to no effect on an individual when present in a heterozygous state. Inbreeding is thought to have a negative effect on the fitness of individuals by increasing the number of loci at which an individual is homozygous for these deleterious alleles. As inbreeding increases, so does the probability that the two alleles an individual has at a locus will be identical by descent (i.e. derived from an ancestor common to both sides of the pedigree), and therefore homozygous (Lacy, 1997).

The negative effects of inbreeding on an individual's fitness have long been known. Charles Darwin was among the first to write about a link between the level of inbreeding in domesticated individuals, and the health of these individuals. The negative effects of inbreeding include high mortality, reduced competitive ability, and greater susceptibility to disease, and lower fecundity etc. However, it is only recently that the negative effects of inbreeding have been documented in wild mammalian populations.

In view of the above, it is important that a few founder populations of the barasingha should be translocated from the Core Zone to good alternative areas within the State. These founders will establish large populations in the new areas, and will in long-term become new genotypes with better allelic diversity. The exchange of animals between these three or four populations will also ensure fresh blood line and robustness of the cervid. The following alternative areas for establishing the founder populations are proposed:

- Phen Wildlife Sanctuary.
- Satpura Tiger Reserve.
- Van Vihar National Park.

One such proposed area is the Phen Wildlife Sanctuary, regarded as a historic range of this deer species. The Wildlife Sanctuary is now completely free from the biotic pressure of cattle camps. The Park Management should also think of translocating some

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barasingha to this satellite micro core. As the sanctuary has currently very low pressure of carnivores, the founder population of barasingha may thrive here more comfortably. The management however, has to introduce some special conservation measures such as shallow water bodies and grasslands of preferred species before translocating these animals. The translocated founder populations should first be kept in an *in-situ* enclosure specially prepared for the needs of the barasingha. After suitable multiplication, the animals can be released into the wild.

While Prater (1948) and Schaller (1967) did not write anything specifically about the distribution of the barasingha in the Satpuras, Forsyth (1889) ascertained the existence of this sub-species in the sal forest of the Denwa valley of Delakhari lying east of Pachmari. He himself shot two does, and also heard of a fine stag being shot down by a railway engineer. He also noted that barasingha were not very numerous and were confined to a small area. Brander (1923) quoted Forsyth (1889) as having seen barasingha in the outlier of sal forest around Pachmari. He noted that when he made enquiries about this sub-species it was extinct in these parts. Finn (1929) wrote that these animals existed in Pachmarhi and later died out. According to Mukherjee (1974), the species was common in Pachmari.

The Satpura Tiger Reserve harbours hills, valleys, plateaus, perennial waterlines, and the expanse of the Tawa reservoir (204 sq. km.). The protected area conserves a wide range of the typical floral and faunal attributes of central Indian highlands. The sal in the higher elevation and teak and its associates form the main vegetation, while the western slopes limit the sal. The protected area may not have large grassy expanses like those in Kanha, it does have many small grasslands with a good moisture regime, as the Tiger Reserve receives annual precipitation of around 1400 mm. Some of the lower elevations of the Tiger Reserve also have good teak forests with usual associates. The barasingha had a far and wide distribution in the past, which also included several teak forests, specially Chanda in Maharashtra. This information suggests that the species can also survive in teak forests, provided its other habitat requirements are fulfilled.

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The Van Vihar National Park is also an area of *in-situ* conservation where a founder population can be kept for multiplication and future release into the wild.

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CHAPTER – 14

ECOTOURISM & INTERPRETATION

14.1 Introduction:

Ecotourism is always sustainable and respects nature conservation and the culture of local communities credited with protecting such areas. In a way, it also resists environmental degradation, encourage nature conservation and also sustain traditional communities. As per the government policies and opinions of conservationists, most protected areas of our country can only sustain low impact tourism. The Kanha Core Zone, not a large protected area by international standards, is one of the finest wildlife protected areas of the country, and offers excellent opportunities to the visitors for enjoying tremendous floral, faunal and natural attributes of pristine wilderness. Needless to add, protected areas like Kanha is also credited with the responsibility of generating positive public opinion about nature conservation. In view of the above, it is important that the sustainability of tourism vis-à-vis satisfaction of national and international visitors and message of conservation awareness is ensured by the Park Management.

14.2 Notified Guidelines for Tourism by NTCA:

The Supreme Court of India, while hearing the Special Leave Petition (Civil) 21339 of 2011 Ajay Dubey Vs. National Tiger Conservation Authority & others, had directed the Ministry of Environment & Forests and National Tiger Conservation Authority, Govt. of India to prepare effective guidelines for tourism in and around tiger reserves. Accordingly, the NTCA has duly submitted and notified the above comprehensive guidelines vide No./15-31/2012-NTCA dated 15 October, 2012 in the Gazette of India, Extraordinary, Part-III, Section-4. Part-B of the above document deals exclusively with tourism in and around tiger reserves (**Appendix-64**).

The guidelines also envisage that the State shall ensure that each Tiger Reserve prepares a tourism plan, as part of the Tiger Conservation Plan vis-à-vis the technical Guidelines

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of the National Tiger Conservation Authority. The plan shall inter alia, include identification of corridor connectivity and important wildlife habitats and mechanisms to secure them. This site-specific tourism plan forming part of the Tiger Conservation Plan shall be approved as per the provisions of the Wildlife (Protection) Act, 1972. Prior to this approval, no new infrastructure for tourism (except for minor alterations in existing modest home stays) shall be allowed to be developed in and around Tiger Reserves. The ecotourism and interpretation sub-plan contained in this chapter is prescribed in the backdrop of the above guidelines issued by the NTCA, New Delhi.

14.3 Objectives:

The specific objectives of ecotourism management in the core area are as under:

- To develop facilities for promoting safe, restful and enjoyable tourism, and enhance the quality of visitors' experience.
- To complement the economy of the local people living mainly around the Core Zone.
- To develop/ maintain park interpretation facilities for creating conservation awareness.
- To ensure light tourism and minimize its impact on the resources of the core area.

14.4 Strategies & Management Prescriptions:

The following strategies and management prescriptions are proposed for conducting ecotourism in the Core Zone under various components:

14.4.1 **Principles of Tourism Management:** The Park Management has to ensure that ecotourism in the core area is managed on some broad principles based on the NTCA tourism guidelines, government's intents, professionalism, island nature of the protected area, and tourists' interest/ aspirations. These are intended to provide a principled stand for tourism management in the Core Zone. Explanations and examples are also given to illustrate how best these principles can be put into practice.

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14.4.2 **Preservation of Natural Values & Promotion of Wildlife Conservation:**

- Nature/ wildlife being important reasons for tourists.
- Offering opportunities to learn about nature/ wildlife and conservation.
- No disturbance to nature.
- All areas not suited to tourism.
- Tourism permitted into areas with suitable facilities.
- Facilities designed to blend with the surroundings.
- Impacts monitored, with corrective measures taken as needed.

14.4.3 **Minimum Pressure on the Tourism Zone:**

- Respect for the tranquility of wilderness.
- Complete avoidance of damage or disturbance.
- No traces of tourists to be left.

14.4.4 **Opportunities to Increase Understanding & Appreciation:**

- Information/ knowledge through interpretation setup.
- Attractive presentation of information.
- Excellent interpreters.
- Well trained route guides.

14.4.5 **Production of Excellent Publicity Material:**

- Updated and reliable information.
- Attractive printing and publications.
- Availability of all publications.

14.4.6 **Enhanced Recreational Facilities:**

- Need to divert tourists from “centric” mindset.
- Preferably outside the Core Zone.

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- Visitors' needs taken into account.
- World class recreational facilities.

14.4.7 **Respect for Local Traditions & Cultures:**

- Visitors encouraged to learn about local cultures.
- Guides to be familiar with local conditions.

14.4.8 **Promotion of Local Economies & Employment:**

- Local businesses relating to tourism to be supported.
- Employment opportunities exclusively for local communities.

14.4.9 **Visitors' Feedback:**

- Visitors' opinions important.
- Provision for receiving suggestions/ opinions/ complaints.
- Timely review and redressal/ action.

14.4.10**Coordination among Stakeholders:**

- Initiatives expected from the Park Management.
- Regular meetings and healthy discussions.
- Receptivity to other stakeholders' genuine problems.

14.5 Development of Participatory Ecotourism & Visitor Strategy:

The following planning imperatives have to be undertaken for the development of an overall eco-tourism strategy, and will incorporate:

- Participation of local communities.
- Sound environmental design.

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- Visitor management.
- Conservation education.
- Training.
- Financial sustainability.
- Monitoring and evaluation.

The following issues have to be assessed:

- The existing tourism situation and potential.
- The desirable tourism situation and identify steps to attain the same.

The preparation of a participatory community based ecotourism strategy for the project area, involving the stakeholders through meetings and workshops, and it should address the following:

- Development of monitoring mechanisms for ecological impact of eco-tourism.
- Visitor information and levels.
- Development of guidelines for visitors/ staff viz., visitor centre, orientation centre, brochures, handbook, signages.
- Development of mechanisms to collate visitation data for management.
- Development of guidelines/ building code for environmentally acceptable and culturally appropriate designs.
- Identification of staffing levels for tourism, future requirements & training needs.
- Identifying: institutional arrangement for eco-tourism management, mechanisms to increase long-term local participation in benefit sharing and decision-making, local training needs.
- Developing, monitoring & evaluation of plans to assess local participation & benefit sharing.
- Evolving legal framework for eco-tourism activities.

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- Establishing administration and legal requirements for: zoning, entry fees, revenue-sharing with indigenous people.

14.5.1 **Rules & Regulations:** The National Park has been conducting tourism activities for a very long time, and the Management already has clear code/ set of rules and regulations for the guidance of staff and tourists and to deal with any eventuality. While some of these rules have emanated from legal obligations, others have been framed by the Park Management to control and regulate tourist influx in the Core Zone. These rules and regulations should be widely publicized through every possible way.

14.5.2 **Broad Guidelines for Stakeholders:** While some specific guidelines are being proposed separately under various tourism components in the Core Zone, some broad operational guidelines for tourism management relating to the Park Management, stakeholders, visitors and local community in the backdrop of some important considerations are proposed as follows:

Points for Consideration:

- The tourism plan should be consistent with the State Tourism and Ecotourism Strategy.
- As envisaged in the NTCA tourism guidelines, the Reserve Management shall take initiatives to constitute a Local Advisory Committee (LAC) for the Kanha Tiger Reserve. The LAC is supposed to discharge functions for tourism management as prescribed in the NTCA tourism guidelines.
- Tourism activities in the Tiger Reserve shall be under the overall guidance of the Madhya Pradesh Tiger Foundation Society and the LAC.

14.5.2.1 **For the Reserve Management:**

14.5.2.1.1 **Identification of Ecologically Sensitive Areas:** The following ecologically sensitive areas in and around the Tiger Reserve has been identified for

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monitoring to ensure the ecological integrity of corridor and Buffer areas and prevent corridor encroachment. The Reserve Management, however, shall evolve mechanism in consultation with the relevant forest divisions to achieve these objectives:

- The eastern most boundary of the Core Zone is not surrounded by the Buffer Zone as it lies in the Chhatisgarh State.
- The Kanha-Achanakmar forest corridor is contiguous almost throughout. However, at several places the connectivity is extremely thin and degraded, and in between there are several relatively good blocks.
- The Kanha-Pench corridor on the western side is probably the most promising connectivity. Though fragmented in between, this is reported to be used by tigers frequently. The following 22 compartments, with a total area of 2268.97 ha., at the Kanha end of this corridor have been identified as ecologically sensitive:

Range	Compartment No.	Area
Khatia	310	394.51
Khatia	308	370.1
Khatia	307	346.61
Khatia	282	111.57
Khatia	283	36.18
Khatia	O-284	9.67
Khatia	O-278	34.2
Khatia	286	355
Khatia	291	68.63
Khatia	305	185.37
Khatia	306	160.9
Khatia	O-285	5.4
Khatia	O-298	57.5
Khatia	O-300	2.4
Khatia	O-299	8.5
Khatia	O-301	8.33
Khatia	O-304	11.25
Khatia	O-303	76.05
Khatia	O-277	9.9
Khatia	O-279	7.12

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Khatia	O-280	4.6
Khatia	O-281	5.18
Total:		**2268.97**

- On the northern side, the Buffer Zone borders the East Mandla (T) Division, and the region harbours many weak links.
- Parts of the North Balaghat (T) Division bordering the southern boundary of the Buffer Zone also harbour many weak links in ecological passages.

14.5.2.1.2 **Eco-Tourism Zone & Carrying Capacity:**

- In the backdrop of the NTCA tourism guidelines, the total ecotourism zone in the core shall now be reduced to 184.74 sq. km. This ecotourism zone, in this way, shall constitute around 20.0% of the core/ critical tiger habitat area, and shall encompass a total road length of 239.99 or 240 km.
- The carrying capacities of the core area has been determined at the physical, real and effective and permissible levels, and are as under:

Physical Carrying Capacity (PCC): 1248 visits / day
Real Carrying Capacity (RCC): 315 visits / day
Effective & Permissible Carrying Capacity (EPCC): 140 vehicles / day

Needless to add, the carrying capacity of 140 vehicles per day has been determined for the standard type of vehicles approved by the Reserve Management for safari purpose. As there is no provision for tourist visitation involving elephant, boat and foot travel in the core area, no such carrying capacity has been assessed. The detailed calculation of the carrying capacity is appended (**Appendix-65**).

- The Carrying Capacity of 140 vehicles shall be further d

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- ivided for entry in the morning and evening sessions. The ceilings of maximum numbers of vehicles in the morning and evening sessions are fixed at 90 and 50 respectively and must not be exceeded.
- The ecotourism zone has been subdivided into the following sub-zones for the purpose of maintaining low impact tourism throughout the tourism season. Unless unavoidable, the areas of sub-zones should not be changed.

Ecotourism Sub-zones	Road Length (km.)	Area (sq. km.)
Kisli	59.50	66.12
Kanha	61.70	40.62
Mukki	77.83	40.19
Sarhi	40.96	37.81
Total:	**239.99 or 240**	**184.74 or 185**

- The carrying capacity for each ecotourism sub-zones in the morning and evening sessions along with eligibility of entry against online and current bookings has been fixed as under and should be strictly adhered to:

Ecotourism Sub-zones	Total Carrying Capacity/ Day	Eligibility of Entry as per Carrying Capacity			
		Morning		Evening	
		Online Booking	Current Booking	Online Booking	Current Booking
Kisli	20	10	2	6	2
Kanha	45	25	3	15	2
Mukki	45	23	5	12	5
Sarhi	30	10	5	10	5
Total:	**140**	**68**	**15**	**43**	**14**

- The Reserve Management shall continue refining the existing online booking system to avoid number of visitors and vehicles exceeding the carrying capacity and to control tourist and vehicle numbers. Rules of booking shall be transparent to avoid harassment to the visitors.

14.5.2.1.3 **Tourism in the Park:** All tourism activities shall take place only in delineated 'tourism zones' indicated in the tourism plan. Currently, tourism in

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the core area consists of stay facilities along with related services, interpretive facilities through which nature/ wildlife can be enjoyed and awareness gained, and interesting natural features having significant tourism values. The following generic guidelines have to be followed:

- The Park Management has to ensure that tourism facilities, including all types of accommodations, until moved out of the core area, are maintained properly and upgraded/ updated periodically.
- All automatic/ computerized programmes installed in the museum complex and orientation centres have to be checked frequently for their optimum performance in consultation with the Centre for Environment Education, Ahmedabad.
- There is already an excellent forest road network in the ecotourism zone. The road network needs to be maintained properly.
- There is no need of constructing any more forest road, concretized culvert or causeway in the tourism zone. While too many forest roads give rise to fragmentation, concretized structures obstruct natural movements of tigers.
- The nature trails should be inspected frequently to ensure there is no defacement of signages, footpath and towers etc.
- Various signages and their inscriptions have to be inspected periodically for animal damage or weather related defacement.
- Proper cleanliness/ hygiene should be maintained in the forest canteen.
- Cleanliness and hygiene must also be ensured in and around the forest canteen to reduce the nuisance of crows attracted by foods.
- Toilets should also always remain clean with proper use of antifouling/ deodorants etc.

14.5.2.1.4 Vehicular Excursion: To ensure that tourists enjoy these excursions/ safaris to the fullest and appreciate moving/ grazing wildlife species and panoramic vistas in the Core Zone, the following guidelines are proposed to regulate and control vehicular excursions in the protected area:

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- There shall be no special management of habitat with a view to inflating animal abundance for tourism purposes. Visitors shall keep a minimum distance of 20 meter from all wildlife; cordoning, luring or feeding of any wildlife shall be prohibited. Minimum distance between vehicles while viewing/ spotting wildlife shall be maintained at 50 meters. Vehicles shall not monopolize a wildlife sighting for more than 15 minutes.
- Only well-inspected registered vehicles with an authorized guide should be allowed inside for excursion.
- Only registered drivers should drive the vehicles throughout the tourism season.
- No intoxicated drivers/ guides should be allowed in tourist vehicles.
- There should be a well-planned route chart at the Kisli and Mukki gate to divert tourist vehicles and avoid crowding on a particular road.
- Ensure a minimum distance of 500 meters between two moving tourist vehicles.
- Tourist vehicles must not exceed the prescribed limit of their capacity of 6 persons excluding the guide and the driver.
- Vehicles must not exceed the prescribed speed limit of 20 kmph.
- It should be ensured that each tourist vehicle has a clear and legible code number written on them. This provision will help apprehend the vehicle in case of any tourism offence committed in the Core Zone.
- Tiger reserve authorities shall delineate an adequate and appropriate area for the visitor facility outside the protected area.

14.5.2.1.5 Vigilance: It is very important for the park staff to be vigilant and to keep an eye on tourists and their vehicles so that no tourist offence may go unnoticed and the offender is dealt with accordingly. In view of the above, the Park Management should engage a few mobile forest guards in the tourism zone to ensure vigilance on tourism in the Core Zone to ensure the following guidelines:

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- Enforce dos and don'ts of tourism as far as possible.
- Ensure control over the speed of tourist vehicles.
- If a tourist vehicle stops somewhere to watch wildlife, the back vehicle has to cross over and maintain the distance of 500 meters.
- Ensure that polythene bags are not taken inside the Core Zone.
- No garbage/ pouch should be thrown out of tourist vehicles.
- Keeping the number of elephants in mind, the tourist vehicles should be allowed to go to the tiger spot.
- Tourist vehicles must never surround any wild animal, specially a tiger, giving it the right of way.
- Ensure that guides accompany the tourist vehicles assigned to them.
- The tourist vehicles must follow the route allotted to them.
- Ensure randomly that the identities of the tourists are the same as have been registered at the entry gates and in online bookings.

14.5.2.1.6 Requirement of Staff for Tourism: The Reserve Management may require additional staff for tourism management, with ecotourism in full swing in the Buffer Zone. Besides ACFs, Range Officers, and Range Assistants for discharging supervisory duties, some computer programmers and interpreters may also be required for effective tourist management.

Most visitors generally do not know much about the importance of wildlife conservation and protected areas. If visitors are explained interestingly about the history of the protected area and the importance of wildlife conservation and its contribution to biodiversity conservation, tangible and intangible benefits of wildlife reserves, not only will it create awareness about conservation among visitors, but will also lessen their disappointments about not having seen tigers during their excursion. This interpretation programme will require interpreters well-versed in nature education/ conservation with a

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training background from premier institutions. The main duties of these park interpreters will be:

- To welcome the visitors and interpret the history of the Core Zone, ethnography, local culture, goals and objectives of conservation, conservation of endangered species, and wildlife management practices in the Core Zone.
- To answer the questions of visitors emerging out of his brief/ address on the Core Zone.
- To interpret the museum complex of Kanha and interact with visitors.
- To give the tourists relevant and interesting PowerPoint presentations in the evening.
- To educate the students of nature camps organized in the Buffer Zone.

14.5.2.1.7 Maintenance of Interpretation Package: The maintenance of interpretation package must include the following:

- Periodic assessment of existing infrastructure, road, electricity, water supply, law and order situation.
- The Kanha eco-tourism package should invariably include:
    - Online booking for jungle excursion.
    - Simple, adequate boarding and lodging facilities, in tune with the environment and the general setting of the landscape.
    - Good road network within the identified tourism zone.
    - Self - guided nature trails.
    - Convenient transportation.
    - Canteen for refreshment.
    - Impressive interpretation centres.
    - Professional interpreters.
    - Way-side exhibits.
    - Signages.
    - Clean public conveniences.

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- Garbage disposal facility.
- Living quarters for staff/ personnel.

- Structures with an exotic look causing visual pollution and non-compatible and unaesthetic architecture should be avoided.
- Provide visitor information and interpretation services (bilingual), including rules and regulations of tourism, tourism facilities, and places of tourist interest etc.

14.5.2.1.8 **Creation of Wild Safari:** The pressure of tourists, specially in the Kanha Zone, is becoming very high. Therefore, to divert this pressure the creation of a world class wild safari just outside the Core Zone in the Buffer Zone would be a very good idea. There are many such outstanding models to choose from renowned wildlife protected areas of the world. Being an *in-situ* preservation area, the safari, basically, will harbour everything the Core Zone is famous for. Needless to add, these biotic attributes can easily be arranged from the Core Zone itself. A well stocked library along with a reading room can also be provided in the vicinity.

14.5.2.1.9 **Shift of the Present Interpretation Complex:** The entire interpretation complex, including canteen, located at Kanha should be relocated to just outside Kisli. The entire package has to be upgraded excellently, made high-tech and more interactive for entertainment-cum-education. This relocation will not only reclaim some more area for the zone of tranquility, it will also put an end to the daily crowding of hundreds of tourists at Kanha. This will also encourage more tourists to visit the centre and they would get ample time to make use of the facility and get benefited.

14.5.2.1.10 **Management of the *Vikas Nidhi*:** It is imperative to send periodic proposals to the government for enhancing the entry fee and tariff rates for tourism in the Core Zone to build up the *Vikas Nidhi*, so that tourism may become a self-

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supporting activity without causing financial stress to the Park Management. Further, a certain percentage of the *Vikas Nidhi* can also be used for developing roads, elephant maintenance and improvement of accommodation facilities in tourism management, and for the basic community needs of the relocated villages. The proposals should be prepared with due deliberations and sent to the PCCF (WL), for discussions/ revision and approval by the concerned committee.

14.5.2.2 For Tour Operators:

- The Reserve Management shall develop suitable curricula for training of park guides and drivers. The curricula should include, besides art, craft and ethics of wildlife tourism, the history and evolution of the Tiger Reserve, basic ethnographic and cultural attributes of the Mandla and Balaghat districts, and information on the wildlife species occurring in the core area. Such trainings should be conducted during the non-tourism season and must result in adequate certification.
- It has to be ensured that all guides and drivers compulsorily undergo a short course in park interpretation and rules and regulations for effective tourism management in the core area. This course should conclude in an oral examination, with all successful candidates being certified by the Madhya Pradesh Tiger Foundation Society.
- The Reserve Management shall arrange, before the tourism season, a refresher course/ workshop for all certified guides and drivers to build up their capacity to identify birds and provide natural history information on other species, to slowly dissuade them from tiger-centrism. A periodic assessment of their performance shall be reviewed by the Local Advisory Committee (LAC) before reissuing their licenses.
- All certified guides shall wear uniforms as prescribed by the Reserve Management. They must also have their name-tags and the Kanha logos and badges pinned to the shirts/ sweaters/ jackets.

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- All certified drivers shall wear uniforms as prescribed by the Reserve Management. They must also have their name tags and the Kanha logos and badges pinned to the shirts/ sweaters/ jackets.
- The use of battery operated vehicles shall be encouraged to minimize pollution on suitable terrains in the tourism area.

14.5.2.3 **For the Visitors:** The Reserve Management shall create awareness in visitors by circulating adequate pamphlets/ erecting sign boards to the following effects:

- Abiding by the rules and regulations of the Core Zone.
- Helping conservation and protecting all natural and cultural sites.
- Avoiding wastage of resources.
- Avoiding littering & carrying back all non-degradable litter.
- Avoiding removal of plants, seeds, drift-wood from the Core Zone.
- Respecting local culture/ customs.
- Respecting holy places.
- Strictly adhering to the safety precautions.
- Dos and Don'ts as prescribed by the Park Management.

14.5.2.4 **For the Host Community:** The Reserve Management shall create awareness in host communities to the following effects by interacting with them:

- Respect the value of environment, conservation and cultural heritage.
- Avoid overusing the area.
- Co-operate with the authorities in ensuring healthy eco-tourism.
- Realize and react to the threat of investors against exploitation.
- Be friendly with the visitors as effective "nature guides" & "conservationists".
- Develop a participatory community-based tourism strategy, in collaboration with local communities, to ensure long-term local community benefit-sharing, and promotion of activities run by local communities

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- Forest dwellers who have been relocated from core or critical tiger habitat to the Buffer shall be given priority in terms of livelihood generation activities related to community-based ecotourism in the Tiger Reserve. The Reserve Management shall make a special effort in this regard, besides a periodic review to ensure its compliance.
- Ensuring training programme to the host community in:

    - Lodge ownership/ management.
    - Basic education and awareness.
    - Health and sanitation.
    - Skill development for preparation of local souvenirs as appropriate.
    - Codes of conduct.
    - Forest and wildlife conservation.
    - Litter control.
    - Forging partnerships with tourists & tourism industry.
    - Environmental management.

14.5.2.5 **Temple & Pilgrimage Boards:** As there is no temple/ pilgrim site located inside the core area of the Tiger Reserve, there is no need for any prescription. However, the comprehensive guidelines for tiger conservation and tourism as proposed by the National Tiger Conservation Authority, New Delhi and approved by the Hon'ble Supreme Court contains some prescriptions to deal with temple and pilgrim tourism inside the core areas.

14.5.3 Miscellaneous Prescriptions:

- No new tourism infrastructure shall be created in the core areas. Existing residential infrastructure inside core or critical tiger habitats shall be strictly regulated to adhere to low ecological impacts as decided by the Local Advisory Committee on a site specific basis.
- Any core area in a tiger reserve from which relocation has been carried out, shall not be used for tourism infrastructure.

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- While the transfer of the Khatia hutments to the MPSTDC is already in process, it will also be in the fitness of things to relocate the Bagheera Log Hut (MPSTDC) outside the Core Zone as soon as possible.
- At least 20% of *Vikas Nidhi* should be diverted annually for the development of the villages within Tiger Reserve.
- A provision needs to be made for the recruitment of 90% of the staff of hotels/ resorts from local communities.
- Introduction of special economy tourist vehicles (mini-buses/ canters with 15-20 seats) for day-tourists and school kids to reduce vehicular pressure in the Core Zone. This should be started with 5 vehicles.
- The Core Zone should be opened from 1st November as used to be the practice till a few years back.
- The Reserve Management shall, as far as possible, provide for subsidized visits of students for excursions in the core area and while fostering educational extension activities.
- The Reserve Management shall carefully monitor and record the impact of tourism activities on the wildlife and its habitat. Consultants/ experts from premier institutes/ organizations can also be hired for the assessment of tourism impact. Some indications are suggested as under:

    - Deposition of dust on both sides of the roads
    - Damage to wildlife habitats/ sites
    - Disturbance to animals, specially endangered ones, in breeding season
    - Changes in the behaviour of animals
    - Significant shift in home ranges

- To expedite the notification of eco-sensitive zone around the Core Zone and its strict implementation.
- Site-specific micro–planning for community based eco-tourism.
- Recognition of ecotourism operators and provision of awards/ incentives to deserving cases.

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- Periodic training programmes on eco-tourism should be conducted for tourism administration, planners, operators and general public.

14.6 Visitors' Feedback and Action:

The Management should also regularly monitor and evaluate the impact of tourism on the Core Zone, and visitors' reactions to and feedback on tourism management. However uncomplimentary the remarks may sometimes seem, they help to minimize the shortcomings of the Management and improve upon its functioning. Visitors' books kept at different forest rest houses, hutments, dormitory, and interpretation complex, letters, and emails should form a good basis for such evaluation.

If any provision/ conditions of these guidelines is contravened in the core area of the Tiger Reserve by any person or organization, the same shall be liable of an offence under subsection (2) of 38-O of the Wildlife (Protection) Act, 1972.

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CHAPTER – 15

WILDLIFE HEALTH MANAGEMENT

15.1 Introduction:

The importance of wildlife health management in the Core Zone has already been discussed in a previous chapter. As conservation in the protected area also involves the management of two endangered species–the tiger and the hard ground barasingha, wildlife health management becomes all the more important. Effective long-term management involves very clear objectives, meticulous planning and timely action. Besides, routine wildlife health contingencies have also to be dealt with under the prescribed guidelines issued by the Principal Chief Conservator of Forests (Wildlife), Madhya Pradesh and the National Tiger Conservation Authority, New Delhi.

15.2 Objectives:

While the broad objective of this chapter is to manage general health status of wild animals and departmental elephants in the Core Zone, the specific objectives are as under:

- To prevent the occurrence of serious diseases, specially epidemics in the Core Zone, and ensure prophylaxis by vaccinating the cattle of villages in and around the Core Zone.
- To conduct postmortems of wild animals, specially endangered species, under a comprehensive protocol, and draw inferences about the cause of death.
- Treatment and management of problematic as well as distressed wild animals.

15.3 Strategy & Management Prescriptions:

The following broad prescriptions are proposed for wildlife health management in the protected area:

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15.3.1 **Detection of Illness:** The wildlife health staff of the Core Zone should periodically monitor the grazing herds of various ungulate species throughout the Core Zone for signs and symptoms of any disease. While it is very difficult to notice any illness in the field until an animal is too weak, the wildlife health staff should constantly look for the following signs and symptoms in free moving wild animals:

- Isolation of the sick animal from the herd.
- Suspension of grazing/ browsing and rumination among wild ruminants.
- Less inclined to move or difficulty in movement.
- Soiled hind quarters indicating diarrhea.
- Salivation from mouth and lethargy.

As these are easily understandable signs/ symptoms, they can also be reported by the field staff to the wildlife veterinarian as soon as possible. In this way, necessary prevention measure can be taken in time.

15.3.2 **Diagnosis of Disease:** Free living wild animals are generally found dead without showing any earlier signs and symptoms. Therefore, diagnosis mostly depends on necropsy coupled with laboratory findings of preserved material. Postmortem examinations should be performed by the wildlife veterinarian and the details of postmortems be kept in the prescribed proforma **(Appendix-38)**. The history of the incidence of disease such as area and place, affected species, sex and age groups of the affected animals and birds, number of deaths, period of death, pattern of death, signs and symptoms of dying animals, if observed, definitely help in proper diagnosis. It is proposed that the postmortem protocol for mortalities in wildlife be prepared, and the required examination should be conducted by the wildlife veterinarian. The postmortem kit and preservatives for collection of samples should be kept ready at the Kanha laboratory so that proper diagnosis of disease can be made to control the magnitude of infection **(Appendix-39)**.

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15.3.3 **Body Condition Evaluation:** The health monitoring procedure of wild animals should be a regular exercise in the Core Zone. The commonest method of monitoring the appearance of free living mammals is by the Body Condition Evaluation (BCE). The BCE is generally expressed in the form of indices, referred to here as Body Condition Index (BCI). The index can be employed to compare the mean body condition of two populations of the same species, amongst different individuals of any particular age and sex category of a population, and between populations of many sympatric species. The BCE involves judging the physical conditions of live animals, based on the visual estimation as the degree of pro-tuberance of body processes and the body surface. Instead of a mere subjective assessment of body conditions as good, fair, poor or as class-I, class-II, class-III and so on **(Appendix-40)**, a value of BCI can be obtained by giving scores for different body parts. The records of BCI of different species should be maintained in the specific format.

15.3.4 **Fat Preserve Estimation:** Estimating fat reserves of naturally dead animals may not always serve the purpose of relating body condition to habitat quality, as death might have occurred due to a disease. It can, however, reveal the overall health condition of the dead animals. Fat deposits in body can be classified as subcutaneous (below the skin), perinephric (around the kidney), mesenteric (in the omentum), pericardial (around the heart) and bone marrow fat.

The wildlife veterinarian should examine the condition of the bone marrow in ungulates and other large mammals where the marrow can be sufficiently exposed for evaluation. The femur and humerous are regarded as the bones of choice for examining marrow conditions. It is also proposed that the frontline staff of the Core Zone should be trained by the veterinary surgeon and other experts for the health monitoring of wild animals so that whenever any mortality of wild animals occurs, very basic and simple examination can be done and recorded for any emergence of epidemics or unwanted mortality in a particular area.

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15.3.5 **Tiger Mortality:** The mortality of a tiger, whether natural or unnatural, in the Core Zone is of serious concern to the Park Management. Postmortem should be conducted compulsorily on each tiger mortality. The Park Management should ensure that the postmortem examinations are conducted as per the guidelines issued by the Principal Chief Conservator of Forests (Wildlife), MP and National Tiger Conservation Authority, New Delhi. Care should be taken that the carcass of the dead tiger is not deteriorated or decomposed at the time of postmortem due to delay. As per the instructions of the NTCA, New Delhi, the carcass of the tiger should be kept in a deep-freezer to avoid further decomposition, and a proper postmortem should be conducted by the wildlife veterinarian, in presence of two representatives nominated by the State Govt. and the NTCA, New Delhi. The postmortem protocol for tiger is appended **(Appendix-41)**. It is also mandatory to send the visceral samples to the State Forensic Laboratory, Sagar for chemical/ toxicological examination, as well as to the Wildlife Disease Diagnostic & Research Centre, Jabalpur for histo-pathological and other required examinations. Detailed information on the mortality of tigers should be reported to the Principal Chief Conservator of Forests (Wildlife), Madhya Pradesh in the prescribed format within 12 hours of death **(Appendix-42)**.

15.3.6 **Treatment of Wild Animals:** The Core Zone supports a huge number of wild animals, both herbivores and carnivores. Wild animals often sustain injuries in sparring and serious infighting. While minor injuries/ wounds heal up on their own with time, major injuries need proper veterinary attention. The case becomes all the more important if a tiger or any other major carnivore species is involved. Infighting is very common in a high density tiger population, and leads to serious infectious wounds on the bodies of tigers. The Park Management should ensure that such wounded, emaciated or weak tigers are closely monitored and the supplementation of diet is followed as prescribed by the wildlife veterinarian. The wounds/ injuries of such tigers should be treated with long-acting antibiotics along with inflammatory drugs and suitable liver tonics. Needless to add, the

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medicine should be administered by projectile equipment operated from an elephant back or a vehicle. It is also proposed that the Core Zone should construct a treatment enclosure attached with a squeeze cage for the treatment of large carnivores. This arrangement would facilitate the capture and shifting of debilitated animals into the enclosure where proper treatment can be administered until the full recovery of animals. The herbivore population in the Core Zone includes the spotted deer, barasingha, and sambar etc. Sometimes these animals are also found injured due to collisions against chain-link fences, infighting, and road accidents, predation by carnivore or street dogs near the periphery of the Core Zone **(Appendix-69)**. It is also proposed that the Park Management should construct a treatment-cum-rehabilitation enclosure for injured ungulates so that proper treatment and follow-up may be ensured to save such animals.

15.3.7 **Transportation of Wild Animals:** As mentioned earlier, the Kanha Tiger Reserve also has a Wildlife Rescue Squad to deal with various emergencies related to wild animals in and around the protected area. The Park Management should ensure that the Wildlife Rescue Squad has suitable transportation-cages for various species of animals, specially for the tiger, leopard, deer, monkey and snake. The Wildlife Rescue Squad should also be equipped with various physical capture devices such as nets, snares, and the latest chemical capture devices. The Squad also needs suitable trap-cages for tigers and leopards. Besides, a follow-up vehicle for the transportation of wild animals should also be made available. The indicative size of cages should be as per the transportation rules under the Prevention of Cruelty to Animal Act, 1960 **(Appendix-43)**.

15.3.8 **Establishment of Forensic Laboratory:** It is also imperative that a modest forensic laboratory be established in the protected area. The need of such laboratory has been felt for quite some time. Generally, wildlife cases in the state are referred to the Wildlife Veterinarian of the Kanha Tiger Reserve for the identification of and expert opinions on various body parts/ articles of wild animals. These opinions are considered as evidence on behalf of the prosecuting

agency, the MP Forest Department. Therefore, it is proposed that a collection of different body parts like skin, antler, bone, teeth, hair, meat, etc. of different species of wild animals found in the state should be prepared. The physical attributes of these parts, which may serve as standard samples, should be used for diagnosis whenever any seizure is made in the Core Zone or in other parts of the state. The seized samples can also be later sent to the Wildlife Institute of India, Dehradun and the Centre for Cellular & Molecular Biology, Hyderabad for further investigations **(Appendix-44)**.

15.3.9 **Disease Surveillance:** As many species of wildlife are zoologically related to cattle, they are most likely to suffer from almost the same ailments of their domestic counterparts. Therefore, the Park Management should ensure that a regular disease surveillance programme is adopted in the Core Zone so that the prognosis of any epidemic can be timely ascertained. It is also suggested that the population of adjacent cattle should be regularly screened for parasitological, hameotological, and serological examinations so that the transmission of pathogenic diseases may be checked and the wild population can be kept healthy. Besides, a research project on the existing prevalence of infectious diseases in the cattle as well as wildlife should also be taken up. The Park Management should also establish an excellent laboratory support system in the Core Zone for conducting disease surveillance, and this laboratory should also coordinate with other research institutes like Wildlife Disease Diagnostic & Research Centre, Jabalpur and Indian Veterinary Research Institute, Izzatnagar.

15.3.10 **Nutritional Analysis of Fodder of Wild Animal:** The determination of fodder quality and its nutrition value has also become a common practice in good ranches in developed countries where the main objective is to raise a huge number of cattle on grass and browse. Likewise, to monitor mineral deficiency and malnutrition in wildlife population of the Core Zone, it is also proposed that the staple feed of each wildlife species, containing grasses, leaves, brushes, and barks etc. should be collected and preserved at the Kanha laboratory. The feed along with soil samples should be got analyzed from a reputed nutrition laboratory to

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develop a baseline data for the wildlife species of the protected area. The data can be used for the changing patterns of feed and feeding habits of wild animals, and can also complement managerial interventions for the future.

15.3.11 **Vaccination:** The cattle of the forest villages of the Core Zone and those of the peripheral villages intermingle with the wild population, and there is always a chance of the transmission of infectious diseases from cattle to wild population and vice-versa. Presently, there are 7843 cattle in the 17 forest villages of National Park. The list of various types of cattle diseases are given in Chapter-9. Needless to add, a sudden breakout of any epidemic may play havoc with the lives of thousands of ungulates in a matter of only a few days. In view of the above, the Park Management should ensure regular immunization programmes for the surrounding cattle population of these forest villages and the villages within the periphery of the 5 km. of park boundary. The Wildlife (Protection) Act, 1972 (as amended upto 2006) also makes a provision in this regard. Besides, the Supreme Court of India has also given a very important directive related to the vaccination of the cattle of the surrounding areas of protected areas.

The Park Management should ensure that the veterinary department of the Mandla and Balaghat districts be assigned total responsibility of vaccination programme. Their teams of veterinary field staff, including *gau sewak*, should work under the concerned veterinary surgeons of their respective blocks. The *gau sewak* should be given incentive or honorarium allowance for their support in the vaccination programme. Presently, each village has 1-2 *gau sewak* trained by veterinary department. These *gau sewak* should be given hands-on training during the vaccination programme, and special training programmes also be arranged for their experience and to raise their skill levels. The Park Management should be responsible for providing necessary vehicles, vaccination doses, and other logistics at the time of immunization. The immunization work should be completed before the onset of monsoon. The Park Management should ensure that the mixed polyvalent vaccine is used for immunization. The vaccine should be maintained under suitable cold chain at the Kanha laboratory or at the

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concerned range office in deep-freezers. At present Raksha Trivac vaccine (HS, FMD, BQ) is available in the market, and the vaccine is manufactured by the Indian Immunological Pharmauctical Company. The vaccine is effective against three major infectious diseases i.e. Hemorrhagic Septicemia, Foot and Mouth Disease, and Black Quarter. This vaccine provides immunity for a period of one year. In case of an outbreak, booster inoculation is recommended for effective development of immunity.

As a sporadic case of Anthrax was also reported on the periphery of the Core Zone, it is of vital importance that an epidemiological survey should be conducted and a blue print of this disease should be prepared in consultation with the concerned veterinary surgeons to undertake future effective control measures. The soil work of that area should be discouraged due to the long survival of spores of bacteria in the soil, and yearly vaccination of Anthrax spore vaccine should be administered with the help of the veterinary department. Rinderpest, a viral disease, has been totally eradicated from the country on account of the availability of one-time lifelong immunity vaccine. The protected area does have a past history of Rinderpest outbreak in the mid-1970s resulting in the death of a large number of gaur. Wild animals act as a reservoir of Rabies, and it was also reported in the cattle as well as human population on the periphery of the Core Zone due to bites of the canids such as the jackal and wolf. The Park Management should ensure a full course of post-bite immunization programme to be followed in the cattle as well as human population. The animals affected with Rabies should be closely monitored and killed as per the guidelines prescribed by the wildlife veterinarian. A wild animal showing the tendency of frequently biting an animated or a moving object should be closely monitored, and if suspected for Rabies, the animal should be dealt with as per the guidelines prescribed by the wildlife veterinarian. The occurrence of any infectious disease should be promptly reported to the higher authority so that an early attempt to control the magnitude of disease can be taken.

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CHAPTER – 16

MANAGEMENT OF DEPARTMENTAL ELEPHANTS

16.1 Introduction:

The management of departmental elephants in the Core Zone is also of vital importance. While on the one hand these gracefully mammoth creatures are part of our mythology and religion, on the other, their services are immensely important to the protected area. As these captive elephants are found in a very small number in the state, their housekeeping and health management are not part of academic curriculum in veterinary colleges. The Park Management has been performing the management of these elephants for many years, and their upkeep, medical supervision and treatment etc. are gradually learnt from experience and from the elephant experts of the north-east and south India.

16.2 Objectives:

The specific objectives of elephant housekeeping are as under:

- To optimize the use of elephant in tourism and patrolling while ensuring good health and humane treatment.
- To ensure recommended daily diets, and standard upkeep.

16.3 Strategy & Management Prescriptions:

The following broad prescriptions are proposed for the health and dietary management and working of departmental elephants in the protected area:

16.3.1 **Recent Background of Elephant Health Management:** Unlike domesticated elephants in India, the departmental elephants of the Core Zone do have a good veterinary support. The veterinary care of these elephants and their housekeeping are very specialized jobs and require dedicated service and serious attention of the

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concerned staff of the protected area. As no special training has been imparted to the wildlife veterinarian and the housekeeping staff, it is more or less adaptive management whereby skills and knowledge are gained by experience, discussions with experts, literature etc.

While semi-captive elephants tend to lose their inherent disease resistance owing to substantial change in their feeding habits, they are also found exposed to several diseases. Many diseases like Anthrax, Blue Tongue, TB, Pasteurellosis, Trypanosomiasis etc. have been reported in captive elephants (Mikota et al., 1994). Though the information regarding susceptibility and prevalence of diseases is meager, the diseases like Anthrax and BQ are very common. Semi-captive elephants are also prone to parasitic infections of alimentary tract.

16.3.2 **Visit of Elephant Experts:** While the elephants have been managed by the Park Management for a long time, the inspection/ examination of these elephants by the scientists/ experts of the Indian Veterinary Research Institute, Izzatnagar, and also by Dr. SSMS Khadri, Assistant Director, Mysore Zoo have also added to the basic guidelines of the elephant management in the Core Zone.

Dr. Khadri visited the Core Zone, and the officers/ staff of the Kanha Tiger Reserve and the wildlife veterinarians of the Kanha, Pench, Bandhavgarh and Satpura Tiger Reserves also attended a training programme/ workshop on the health and management of the elephant stock at Kanha.

The participating veterinary veterinarians also joined Dr. Khadri in the examination of the park elephants and relevant discussion, and shared their experiences of treatment and health surveillance. After the conclusion of this workshop, Dr. Khadri along with the above wildlife veterinarians jointly submitted their recommendations for the health management of Kanha's elephants.

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A detailed discussion was also held at the Field Director's office at the Mandla. Dr. Kahadri briefed on the health check-up and his impressions of the management of the park elephants vis-à-vis the practices prevalent in his state, Karnataka. Information and some photographic evidence on the mortalities of elephants in all the Tiger Reserves of Madhya Pradesh in the past 5 years were discussed at length. The service conditions of the characutters, specially safety measures, in both the states, were also discussed, and the Kanha Management recalled the recent killing of a characutter by a tigress in Kanha. In general, Kanha matches the elephant management practices in Karnataka as far as diet, vaccination, treatment, foraging in the wild, labour, rest and care/ grooming are concerned.

16.3.3 **Visit of the IVRI, Izatnagar Team:** The scientists/ experts of the IVRI, Izatnagar visited the Core Zone and examined all the elephants and also collected necessary samples for detailed investigation of parasitic infection, microbial infection, blood profile, besides urinal analysis, biochemical analysis, and nutritional analysis of feeds and fodder. While the detailed report is appended **(Appendix-45),** general recommendations for elephant management in the Core Zone are as under:

- Deworming should be done at quarterly interval by changing the type of antihelmintic.
- All the elephants should be vaccinated for HS, BQ, Anthrax and FMD.
- The prescribed dietary schedule for the elephants may be followed. Mineral mixture must be supplemented to ensure proper nutrition.
- It is emphasized that minor injuries, foot cracks, wounds, and abrasions should be noticed early and treated promptly. Once unattended, such problems may become serious and unmanageable.

16.4 General Health/ Dietary Guidelines:

In the above background, there are, however, some practices that need to be refined and fine-tuned to further improve the elephant management. The same need to be

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implemented as soon as possible to strengthen the health management and upkeep of the Kanha elephants. The recommendations are as under:

- Elephant dung should be disposed of by dumping it into a pit some distance away and later burning it.
- Storages of elephant ration must be made rodent proof so as to avoid infection arising out of their urine and feces.
- Elephants should be given the diet in the way as prescribed by Dr. Khadri.
- A wooden platform to be provided for arranging elephants' cooked food for feeding.
- Regular massage of castor oil on the heads of elephants to be ensured.
- Regular application of the neem oil on the feet and toes of elephants.
- Regular spray of Charmill on the interdigits and cracks in the feet to prevent fungal infection.
- Clean drinking water of upstream and the bathing of elephants in downstream to be ensured near elephant camps.
- In spite of timely vaccination against HS, photographic evidence suggests that some calves might have died of it. Therefore, all the vaccines must be of high quality and specially purchased.
- Elephant calves below 5 years are very susceptible to various infectious diseases. So special care and attention for drinking water and ration should be ensured.
- Regular trimming of nails and overgrown cuticle over feet should be ensured.
- An elephant undergoing musth should be tied with a chain, and regular fresh drinking water and fodder should be provided at the site. Timely disposal of the dung of such elephants should also be ensured.
- As suggested by Dr. Khadri, annual elephant rejuvenation camp should be held for at least 15 days in the monsoon.

Dr. SSMS Khadri and the wildlife veterinarians of the Tiger Reserves of Madhya Pradesh proposed the following recommendations for the health management of the elephants of the Core Zone:

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- Previous exposure to infectious agents may be demonstrated by PCR (Polymerase Chain Reaction) by applying DNA segments upto 1 million times and this can be utilized to identify the presence of viral and bacterial organisms in faces, blood and tissues, enabling retrospective monitoring of historic disease incidence to be conducted of Endotheliotrophic Herpes Virus Infection and encephalomyocarditis viral infections.
- Evaluation of a multiple antigen Enzyme Linked Immunosorbent Assay (ELISA) for detection of Mycobacterium Tuberculosis infection in captive elephants.
- Haematological and serological examination of all camp elephants may be conducted on annual basis.
- Serum prolactin level may be examined to diagnose pregnancy in Asiatic Elephants (normal range 6.9 $\pm$ 0.7 ng/ ml) increases to (50 $\pm$ 7 ng/ ml) in pregnancy.
- It is recommended that the actual body weight of all the camp elephants be measured by taking them to the weighing bridge.
- On inspecting the health conditions of elephants at Gaidhar camp it is recommended to undertake Haematological and serological examination for providing necessary treatment. It is also recommended to provide prophylactic treatment for blood protozoan with injection Berenil deep I/M with supportive treatment of IV fluid with injection Tribivet, injection Optineuron, injection Livibex I/M and injection Feltas (iron preparation) I/M and to keep the animals under observation.
- Annual elephant rejuvenation camp for 45 days may be arranged at the Kiwardabra elephant camp providing all facilities for treatment, supplementation of vitamins and minerals, deworming, foot care, nutritious food with plenty of branch fodder, seasonal fruits, sugarcane and other herbal and allopathic medication necessary for the rejuvenation of captive elephants' health.
- The elephant staff of the Core Zone should be provided a basic training at least once in 3 years.
- Annual medical screening of elephant staff to rule out Mycobactrium Tuberculosis infections.
- The display of the feeding schedule of camp elephants at feeding points to be ensured.

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- Avoidance of contamination of food through rodents.

16.4.1 **Annual Physical Examination:** All the elephants of the Core Zone must be examined thoroughly at least once a year by the wildlife veterinarian. The following physical parameters have been decided in consultation with Dr. SSMS Khadri:

- **Actual weight** – The actual body weights of all the elephants should be measured by taking them to a weighing bridge. As presently there is no such provision, the Park Management should establish a weighing platform of 5 tons near the Kanha laboratory. These annual weight records should be carefully maintained for each elephant to monitor any significant decrease or increase in the weight.
- **Pulse & Respiration –** The examination for body temperature, and pulse and respiration rates should also be conducted and meticulously recorded in the prescribed proforma **(Appendix-46)**.
- **Blood Profile –** Each elephant should be examined for blood profile and it should necessarily include hematology, serum chemistries and serum banking. At the time of annual physical examination, 10-20 ml. of whole blood should be collected and direct blood examination should be carried out at the Kanha laboratory. Further, the blood and its serum should also be sent to the Wildlife Disease Diagnostic & Research Centre, Jabalpur for detailed examination.
- **Intradermal Tuberculin Test –** This test should also be conducted for each elephant. For this, administer 0.1 ml. of bovine purified protein derivative tuberculin (containing 5000 tuberculin units in the caudal fold). Evaluate by palpation at 24, 48 and 72 hours. Any evidence of swelling or induration should be considered suspect and the case should be consulted with a wildlife expert for further opinion.

16.4.2 **Routine Health Check-up:** The wildlife veterinarian should ensure that the following health conditions of the body parts of each elephant are observed

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carefully at least three times a month, and his findings/ prescriptions are duly recorded in the prescribed proforma **(Appendix-47)**:

- **Skin:** Warts/ Fungus/ Infection/ Ventral oedema.
- **External Parasites:** Flies/ Fleas/ Ticks/ Lice/ Mites.
- **Eyes:** Conjunctivitis/ Infected cornea (Keratitis)/ Infected eyelids/ Cataracts.
- **Ear (External):** Infection/ Lice/ Ticks/ Fungus/ Swelling/ Pus/ Smell/ Maggots.
- **Ear (Internal):** Smell/ Pus.
- **Trunk:** Warts/ Wounds/ Injury.
- **Tusk:** Cracks/ Wobbling/ Infection/ Smell/ Pus from the base/ Socket pus.
- **Leg:** Cripples/ Stiffness/ Sprains/ Twist/ Abnormal posture.
- **Feet:** Cracks in footpads/ Peeling off.
- **Nails:** Breaking/ Splitting/ Falling off.
- **Genitals/ Rectum:** Infection/ Wounds/ Other abnormalities.
- **Bath for Management of Ticks:** As suggested by the IVRI team.
- **Wound Management:** As suggested by the IVRI team.
- **Corneal opacity:** As suggested by the IVRI team.
- **Enema:** As and when necessary.
- **Cleaning, Grooming & Personal Care:** As suggested by the IVRI team.
- **Physiological Status:** Pregnancy/ Musth.

16.4.3 **Vaccination:** The importance of the vaccination of departmental elephants needs no elaboration. The Park Management should ensure that all the elephants are appropriately and timely vaccinated for major and fatal diseases. The following schedule of the vaccination should be strictly adhered to by the Park Management:

Disease	Dose of Vaccine	Proposed Date of Vaccination	Repetition of Vaccination
Anthrax	5 ml. spore vaccine - s/c at the root of tail or between the folds of hind legs and abdomen	Every year before the onset of monsoon, in the month of May or June	Every year

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HS	5 to 10 ml. alum precipitated vaccine - s/c at the root of tail or between the folds of hind legs and abdomen	Every six months before the onset of the monsoon, in the month of May or June, and in December or January	Every six months
Tetanus	6 to 10 ml. tetanus toxoid vaccine - i/m at the gluteal or rump region as a prophylactic	At the time of the transportation of elephant by a vehicle or at the time of a surgery	-

16.4.4 **Fecal Examination for Parasites & Deworming:** The Park Management should ensure that fecal examination and medical intervention for deworming are carried out at least once in six months for all the elephants. However, as per the technical report of the Indian Veterinary Research Institute, Izzatnagar, the deworming schedule should be repeated every three months. Every year the deworming medicine should be changed as per the prescription of the wildlife veterinarians to avoid the development of resistance.

Name of Deworming Medicine/ Dose	**Month of Deworming**				**Remark**
	January	**March**	**June**	**September**	
Oxyclozanide (Distodin) @5-7.5 mg/km. body weight	First week	First week	First week	First week	This medicine should be used against flukes
Albenazole (Analgone) 3-5 mg./kg.	Second week	Second week	Second week	Second week	This medicine should be used against round worms

16.4.5 **Foot Care:** Routine foot trimming of these elephants is also very essential. The mahout of each elephant should be instructed for routine trimming of over-grown cuticles, nails, and skin to maintain good health of the feet. This intervention helps avoid the diseases of foot such as cracked soles, over-worn sole, overgrown sole, cracked heel, overgrown nails, split nails, ingrown nails, overgrown cuticle, and penetrating injuries etc. It is suggested that elephants should not be made to walk over hard rocky areas, and daily movements of elephants must be restricted to less than 30 km. per day. The mahout of each elephant should be trained for

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trimming the skin, toes and be equipped with a trimming knife and a heavy wood rasp with changeable blades, and a drawknife for shaping and trimming the cuticles and pads. It is also suggested that routine footbath should also be carried out under the supervision of the wildlife veterinarian. The elephants should be kept in dry places with good sanitation.

16.4.6 **Trimming of Tusk:** The elephant tusks are actually modified incisors, and are ever-growing structures. The Park Management has to ensure that the tips of tusks are trimmed annually beyond a measured distance from its base, which is equivalent to the distance between the inner canthus of the eye and the base of tusks of the respective side, maximum 1/3rd of the distal length of the tusk seen outside. However, the management has also to be careful that these tusks should not be pointed/ sharp enough to injure other elephants at the time of infighting and musth. Accordingly, these tusks have to be trimmed form time to time as and when necessary. The records of trimmings should be kept in the prescribed format.

16.4.7 **Feeding/ Diet Schedule:** The diet of each elephant should be followed as per the prescription given by Dr. SSMS Khadri and the Scientists of IVRI, Izzatnagar as under:

Age of Animal	Sex	Physiological Status	Wheat Floor	Rice Floor	Pulses Floor	Soya Floor	Jaggery	Salt	Mineral Mixture
Adult	M/F	Working	4 kg.	5 kg.	0.5 kg.	0.5 kg.	0.5 to 1 kg.	-	-
Adult	M/F	Resting	3 kg.	4 kg.	0.2 kg.	0.1 kg.	0.5 kg.	50 gm.	-
Lactating	F	-	4 kg.	5 kg.	1 kg.	0.5 kg.	1 kg.	50 gm.	-
Calves (3 to 5 yrs.)	-	-	1.5 kg.	2 kg.	0.2 kg.	0.2 kg.	0.3 kg.	20 gm.	-
Calves (1 to 3 yrs.)	-	-	1 kg.	1.5 kg.	0.2 kg.	0.1 kg.	0.3 kg.	10 gm.	-
Infants (6 months to 1 yr.)	-	-	0.75 kg.	1 kg.	0.1 kg.	0.1 kg.	0.1 kg.	5 gm.	-

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16.4.8 **Rejuvenation Camp:** As per the suggestion of Dr. SSMS Khadri, an elephant rejuvenation camp should be arranged every year in the rains. A large and flowing water body should be close by where the camp is being arranged. An annual rejuvenation camp is very important for the physical, psychological and social health of these animals. The Park Management has already arranged such camps during the monsoon of 2008, 2009 and 2010. If a rejuvenation camp of a longer duration is not possible, at least a-week long camp must be arranged. The following initiatives are proposed for this rejuvenation camp:

- All the mahouts and characutters along with their elephants should be instructed to assemble at a pre-decided camp.
- As stated above, there should be a large and flowing water body close to this rejuvenation camp.
- Temporary shelter should be erected to ensure the safe storage of elephant ration and cooking for the elephants.
- Duty assignment of officers should be preplanned so that each day at least 3-4 officers may attend the seven-day rejuvenation camp.
- The wildlife veterinarian should examine each elephant carefully and administer/ prescribe necessary medicines. All the elephants should also be dewormed.
- The feet of each elephant should be thoroughly examined for injuries/ cuts/ wounds and treated accordingly.
- Special and healthful diets should be given to the elephants during the rejuvenation camp, and the following diets of food and fruits are proposed:

    - Wheat flour.
    - Soyabean flour.
    - Gram flour (*Channa*).
    - Bananas.
    - Sugar cane.
    - Corn or *Bhutta*.

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- Raw coconuts (with water).
- Jaggery (G*ud*).
- Papayas.
- Pineapples.

- Each elephant should be thoroughly massaged with castor oil (50 gm.) and neem oil (250 gm.) every day by mahouts and characutters under the supervision of officers and mahouts.
- During the rejuvenation camp the Park Management should ensure that the elephants follow the following daily routine: Every day the respective mahouts/ characutters should bring back their free-ranging elephants from the forest and give them a thorough and enjoyable bath. Elephants should then be massaged properly with oils and given a diet of fruits and corn at the camp, and released into the forest. Again in the afternoon, the elephant should be brought back, bathed and given a diet of cereals and fruits, and be released into the forest for overnight foraging.
- It is very important that during the course of the elephant rejuvenation camp, all the officers should interact among themselves and with the mahouts and characutters every day to discuss the problems of elephant management and new suggestions/ ideas to strengthen and improve the present system. The Park Management should ensure that all these discussions should be properly documented, reviewed, and if found suitable, implemented.

16.4.9 **Benefits of the Rejuvenation Camp:** The following benefits are derived from the elephant rejuvenation camp:

- All elephants are given a special diet that is good for their health.
- They are daily examined very closely by the wildlife veterinarian.
- Daily massage and enjoyable bath are very beneficial for their physical and mental health.

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- It is well known that elephants are wise and social animals, and this rejuvenation camp is an excellent opportunity for them to feed and live together and interact among themselves. This is psychologically very beneficial.
- Elephants are completely relaxed during this period, and this also gives them a good opportunity for mating.
- This is also a good opportunity for the mahouts and characutters to know and understand other elephants and to control them later in emergencies.
- Discussions among mahaouts and characutters also increase their knowledge and understanding about elephants.
- This is also a good opportunity for the park officials to interact closely with the mahouts and characutters and know about their problems and intricacies of their profession.

16.4.10 **Staff Health Monitoring:** The staff responsible for elephant management, including mahouts and characutters, are regarded as prone to contracting various zoonotic infections, including tuberculosis. Therefore, the Park Management should ensure that the staff is periodically tested for tuberculosis.

16.4.11 **First-aid/ Treatment Kit for Elephants:** The Park Management should also ensure that each elephant is equipped with a first-aid kit for routine and general treatment of wounds, cuts, minor injuries etc. The elephant mahout/ characutter should be trained for routine dressing and care of elephants. The kit should contain antiseptic lotion, ointment, spray, tinctures etc. It should also include a trimming knife, rasp and dressing material. The medicines of the kit should be routinely inspected and maintained by the wildlife surgeon **(Appendix-48)**.

16.4.12 **Elephant Hospital & Primary Laboratory:** The Park Management should also establish a full-fledged elephant hospital with necessary trained veterinary staff under the wildlife veterinarian in the Core Zone. The hospital should include the latest surgical diagnostic equipment and sufficient availability of medicine. It is proposed that an elephant treatment enclosure be erected near the elephant

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hospital so that the administration of medicine may be carried out as and when required. The establishment of a primary laboratory for the collection and preservation of various body samples and primary hematological and parasitological examination is also very important **(Appendix-49)**.

16.4.13 **Management of Musth:** Adult male Asian elephants annually manifest a physiological and behavioural phenomenon known as musth. This condition is characterized by the enlargement of temporal glands with copious flow of secretion and aggressive mood swings. Presently, the Park Management is maintaining 8 different male elephants, and the manifestation of musth is very common in them. Therefore, the Park Management must be well prepared for the control of aggressive elephants. The musth elephant should be kept isolated from the other camp elephants and restrained with a strong chain. The feeding should be reduced gradually and provided at the site. The provision of *ad libitum* watering should also be made at the restraining site. The mahouts and charactutters should be instructed to keep vigil and watch over the behaviour and body conditions of the musth elephant till it becomes normal.

16.5 General Elephant Working Guidelines:

Some practices need to be refined and fine-tuned to further improve the working of departmental elephants. Broad guidelines are as under:

- In the light of the recent death of a characutter in Kanha, they should not be allowed to go into the forest before daybreak for searching their elephants.
- The characutters should be provided with electrically charged staffs for minimum self defense against carnivores.
- Preferably more than three elephants should be kept at one camp so that the characutters can move around in a group.
- The duration of work for working elephant should not be more than 6 hours / day, and at least one day a week rest should be given.
- Only two persons should be allowed to ride the elephants below 20 years.

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- Mahouts/ characutters should be imparted training in the upkeep of elephants at least once in 3 years.

16.5.1 **Work Schedule of Elephants:** In the Core Zone, elephants are used mainly for tourism and patrolling purposes. The Park Management should ensure that these elephants, specially the aged ones, should not be overworked. The following work schedule is proposed:

- Generally, the animals should be put to work only during the cool hours of the day.
- In the summer, the elephants should be used for tourism from 6 am to 10 am. and in the winter, from 6 am to 11 am.
- The aged elephant should not be carrying more than two persons (around 150 kg. load) while working for tourism activities.
- Animals should not be made to walk more than 3 hours continuously. Every elephant should be given a rest for one day in a week during the tourism season.
- The elephant should be given as much rest as possible during non-tourism season or should not be used for carrying load during patrolling.

16.5.2 **Record Keeping:** The Park Management has to ensure that a separate and permanent record of vaccination, disease, treatment, movement, and feeding is also maintained for each elephant. The record has to be kept at each elephant camp and produced as and when demanded by the wildlife veterinarian for inspection **(Appendix-50)**.

16.5.3 **Service Book of Elephant:** Each elephant must have a separate service book. The service book contains, among other details, the history of the elephant, physical characters, body measurements, record of diet charts, medical summery, movements of elephant, and its accouterments etc. The service book must be annually updated by the wildlife veterinarian and verified by the Field Director/ Deputy Director. **(Appendix-51).**

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16.5.4 **Elephant Mortality:** It should also be ensured that the postmortem record of each mortality should be maintained in the prescribed format. Necessary tissue samples should be collected and preserved in suitable preservatives. The samples should be sent to the Wildlife Disease Diagnostic & Research Centre, Jabalpur for disease diagnosis and to the State Forensic Laboratory, Sagar for toxicological investigations. The postmortem kit should be well-maintained for all emergencies. A person should also be trained to open the carcass of elephant under the supervision of the wildlife veterinarian. The cause of the mortality should be established and preventive measures adopted to control the mortality in elephants. In case of complicated disease conditions, the elephant experts of Assam/ South India should be consulted immediately. The carcass of elephant should be deeply buried or burnt as per the prescribed rule. Necessary permission should also be obtained from the concerned authority for the collection of bones for scientific and educational purposes. The management may also think of preserving and displaying full skeletons of elephants.

16.5.5 **Elephant Movement:** The Park Management should ensure that whenever an elephant is shifted from one camp site to another or to another Tiger Reserve of Madhya Pradesh, the concerned mahout/ characutter also takes all the relevant records, first-aid treatment kit along with accouterments along with the elephant. The health examination of the elephant should also be conducted before allowing it to leave for another destination, and all precautions should also be taken as prescribed by the wildlife veterinarian.

16.5.6 **Rotational Grazing of Camp Elephants:** Presently, the elephants are kept in the Kanha, Kisli and Mukki ranges. As elephant need very large volume of fodder for their maintenance, the forest area begins to show signs of over-grazing and degradation. Therefore, the foraging sites of elephants should be changed every two months as per the availability of fodder so that degradation of forest may be avoided.

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16.5.7 **Disposal of Elephant Dung:** The construction of several gobar-gas plants for the adequate disposal of elephant dung in the Kanha, Kisli and Mukki ranges are also proposed.

16.5.8 **Retirement Age of Elephant:** The age of elephant should be verified on the basis of available records. Physical health status should also be taken into consideration while deciding on the age of retirement. The Park Management should fix the age of retirement for elephants at 65 years, and retired animals should be given very light work.

16.5.9 **Chaining:** It is a useful tool in the management of captive elephants. Chaining can facilitate foot work, feedings, veterinary procedures, animal introductions, and scientific investigations. The elephant should be chained by one front leg and one rear leg or by one front leg only. The chain should be alternated every other night to prevent injury to the leg. The chains must be long enough to allow the animal to lie down and get to its feet easily.

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CHAPTER – 17

TIGER, CO-PREDATOR & UNGULATE POPULATIONS & HABITAT ASSESSMENT

17.1 Introduction:

The periodic monitoring of wildlife and assessment of habitats are of vital importance in a wildlife protected area. A standardized monitoring protocol can help the management understand the reason of a certain trend of wildlife population and habitat conditions in the protected area, and the factors responsible for good or bad changes. There is, however, no substitute for an objective-oriented, well designed, and an easy to understand monitoring programme that defines in advance the exact standard methods for data collection and record keeping. It should be ensured that the interval between monitoring exercises should not be either too long or too short, and staff should be properly trained to observe and write things exactly as they see them during the monitoring exercise.

17.2 Objectives:

The specific objectives of the assessment of tigers, co-predators, ungulate populations and habitat conditions in the Core Zone are as under:

- To estimate population densities of tigers, leopards, wild dogs and principal prey species and monitor trends in their populations.
- To monitor wildlife habitats and trends in vegetation.
- To monitor biotic pressure on the protected area, including natural mortality of wild animals and illegal activities.

17.3 Strategy & Management Prescriptions:

The following broad prescriptions are proposed for the assessment of tigers, co-predators, ungulate populations and habitat conditions in the protected area:

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17.3.1 Phase IV - Tiger Monitoring and Patrolling Strategy: The IV Phase will be undertaken for intensive annual monitoring of the source population of predators and prey base using the existing methodology which requires data collection from transects and camera traps. Specially, the source populations of tigers in the Core Zone will be monitored intensively. The following methodology for this monitoring is proposed: *Photo registration of tigers:* Pictures of individual tigers obtained by camera traps or by regular cameras should be maintained in the form of a photo identity album. Records should be kept on the location, condition (breeding status, injury, etc) and associated tigers whenever a tiger is sighted. This will provide crude data on ranging patterns, demography and mortality. *Tiger pugmark and other signs:* Regular monitoring of tiger signs (pugmark tracings, plaster casts, etc) should be undertaken in every beat at a weekly interval with monthly compilation of data. With experience and exposure to the resident tigers and their pugmarks, the forest staff may be able to identify individual tigers from their track set characteristics. Sign surveys and individual tiger monitoring should become a regular task for every guard as was the practice some years ago and is currently practised in some tiger reserves. The monthly data should be mapped and maintained to analyze trends. *Monitoring by telemetry in select areas:* Use modern technology of VHF, GPS and satellite telemetry to study and monitor aspects of demography, metapopulation dynamics (dispersal, ranging patterns), mortality, predation ecology and behaviour. In all source populations, tiger abundance and density should be estimated using camera traps, digital images of pugmarks and/or DNA profile from non-invasive methods biannually.

17.3.2 **Daily Monitoring & Forecasting:** As already described in an earlier chapter, the old methodology of estimating the populations of the tiger, co-predator and ungulate species has been replaced with a comprehensive monitoring protocol, known as Monitoring Tigers, Co-predators, Prey and their Habitats. The proposed new technique was tested in a pilot project of the National Tiger Conservation Authority, New Delhi, MP Forest Department and Wildlife Institute

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of India, Dehradun for monitoring and evaluating tiger habitats in the Satpuda-Maikal landscape of Madhya Pradesh.

A major requirement for conserving wild tigers is to first safe-guard existing source populations from further depletion (Walston *et al.* 2010). An important conservation strategy to address the threats would be to implement a technology aided patrolling system and an ecological monitoring system that would inform and guide park management of major trends in wildlife populations, illegal activities, human pressures and habitat status so as to result in adaptive management.

Since 2005, India has conducted a country wide assessment of tigers, co-predators, prey and their habitat once every four years (Narain *et al.* 2005). This monitoring, though important at the country level in understanding trends at large spatial scales of landscapes, is not sufficient for monitoring tiger source population sites. Single episodes of poaching can deplete source sites within months (Check 2006; Gopal *et al.* 2010) and a four-year monitoring interval is too long a period to detect trends and react with appropriate management intervention for effective conservation of these critical sites. Besides, the current patrolling regime of Tiger Reserves, that hold the major source populations of tigers, is archaic. There is no system in place by which the park manager can ascertain if his guard has actually patrolled an area, or assist in planning the spatial coverage of patrols based on field requirements and data generated by previous patrols.

The National Tiger Conservation Authority, Wildlife Institute of India and Zoological Society of London have jointly developed a customized application software, which is a computer programme tailored for generating specific information/ reports/ inferences/ maps on the basis of data inputs. This application software has been named M-STrIPES or Monitoring System for Tigers – Intensive Protection & Ecological Status. This programme has been standardized for the Tiger Reserves of entire country, and is based on different types of data collected in prescribed formats under the new monitoring protocol

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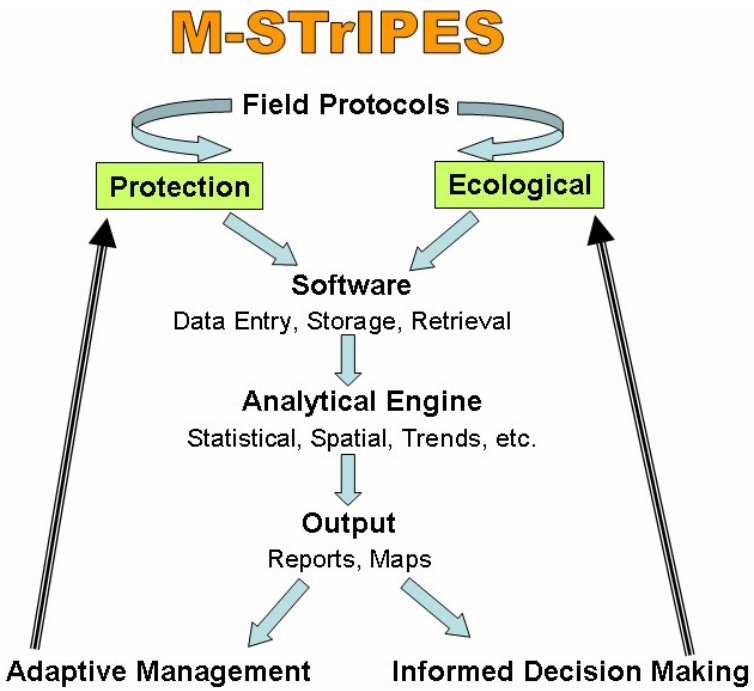
for monitoring tigers, co-predators, prey and their habitats in wildlife protected areas. Besides being most user-friendly and easy operatability, the software has proved reliable, robust, and efficient. The predictability, customizability and consistency of this computer programme are also satisfactory.

Implementation of monitoring (M-STrIPES) in Kanha will consist of five components:

- Field training
- Data generation through patrols and ecological monitoring
- Data entry and storage
- Analysis and interpretation at desired spatial and temporal scales
- Adaptive management. The system depends on good field implementation and data recording while the software is a small component that serves to store, analyze, and retrieve data at desired temporal and spatial scales. It is a cultural shift from ad-hoc patrolling and monitoring to systematically planned activities that result in better and informed management decisions.



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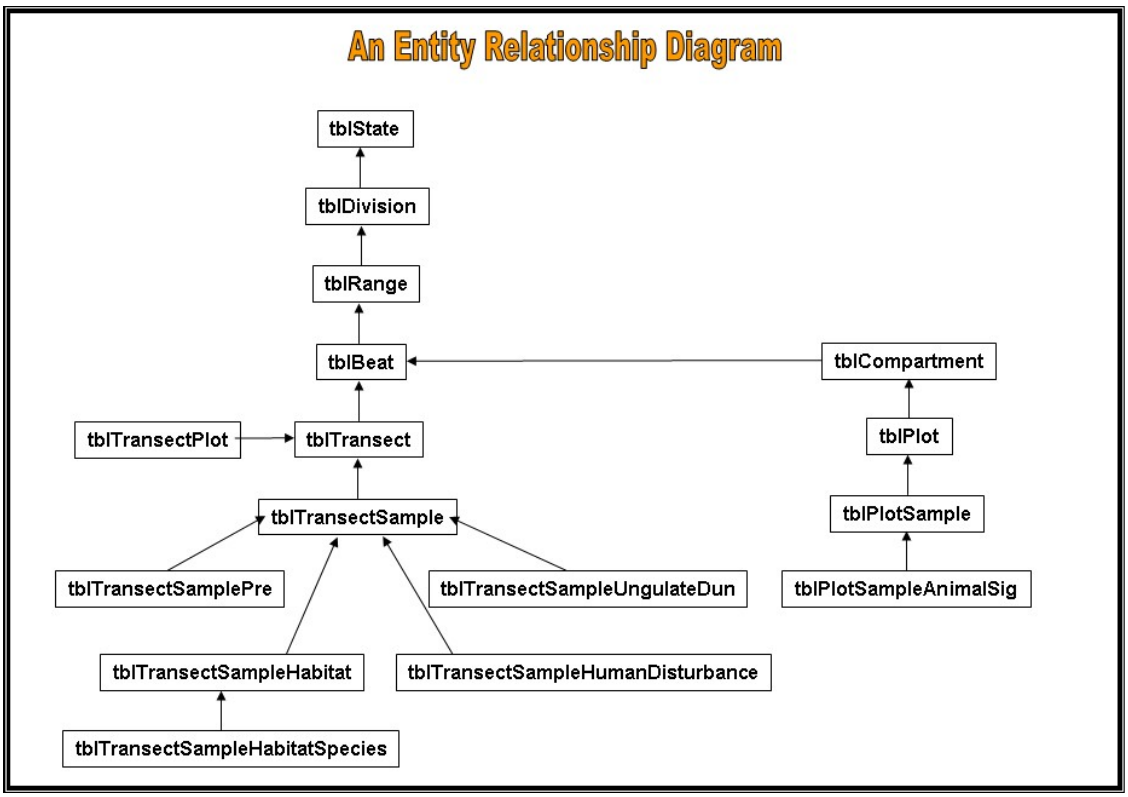

The system has been made field friendly, and it does not add more workload to the already over worked forest guards. This has been done by utilizing much of the routine tasks of patrolling for generating data needed for M-STrIPES. The equipment needed for implementing M-STrIPES consists of one Personal Data Assistant (PDA) for every guard (leader of the patrol) and a laptop computer for each range. The PDA contains an in-built GPS unit, a camera, a mobile phone, a long lasting battery, and the data forms required to be filled while on patrol or during ecological monitoring.

Further, data generated through M-STrIPES can be used to understand the relationship between patrolling intensity and illegal activity.

The above information permits to plan on the spatial coverage and intensity of patrols that are required to combat wildlife crime in an efficient and effective

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manner. The track logs define the patrol route photographs and way points with GPS time and date stamp which ensure that the patrol was actually conducted and the data forms not merely filled while at the base camp.

The basic information collection takes place at beat level during regular patrol done by guards. The information will be managed at Range and Head quarter level to assess weekly and monthly progress and effectiveness of patrol. Various components of the software are as under. Relevant formats for field data collection/ information are appended **(Appendix-52)**:

17.3.3 **Ecological Component:** All forest staff across have been trained in collecting Phase I data on 1) Tiger and other predator signs, 2) Ungulate encounter rates on line transects established permanently in every forest beat, 3) Human disturbance indices, 4) Habitat parameters and 5) Dung density. Further it is proposed to set up a minimum of five permanent pressure impression pads (PIP) in each forest beat. These PIP's will be in different compartment of a beat and minimum a km apart. These PIPs will be monitored once every month in summer and winter to record signs of all carnivores. Once the Phase I data collection is implemented once in summer and once in winter, the data will be exported to M-STrIPES software to analyze and provide easily interpretable reports and maps for the management.

- **Tiger & Other Predator Signs**: The data on tiger and co-predators will be collected as prescribed in Phase-I. Three trails of 5 km. each will be identified and permanently marked for this monitoring. Further it is proposed to set up a minimum of five permanent pressure impression pads (PIP) in each forest beat. These PIP's will be in different compartment of a beat and minimum 1 km. apart. These PIPs will be monitored once every month in summer and winter to record signs of all carnivores. Carnivore sign surveys are analyzed in an occupancy framework (MacKenzie *et al.* 2006) that takes into account imperfect detections at desired spatial and temporal scales. Naive estimates and detection bias corrected

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estimates are statistically compared between desired time scales using spatially paired comparisons and time series data analysis. Since line transects and PIPs are fixed in space data generated from each of them are compared using paired statistical tests that provide better power in detecting trends. M-STrIPRS alerts its users of declines that are greater than 20% over the desired time scale. It generates tabular reports as well as maps depicting status and change in status.

- **Ungulate Density:** The line transects are established permanently in every forest beat. These line transects will be maintained and monitored for ungulate density estimation. Reserve will procure range finder and compass for this work. Each transect will be walked five times in winter and five times in summer. Data will be analysed in M-STrIPES and Distance Software, to map encounter rates, compare trends and analyse density.

- **Human Disturbance Indices**: Information on anthropogenic disturbance will be collected as per Field Guide. This information will be analysed using M-STrIPES to monitor trends in disturbance and its correlation with ungulates and carnivores.

- **Habitat Monitoring:** The vegetation monitoring is important to understand the dynamics of succession specifically for Grassland. The grasslands in Kanha are arrested successional stage, they are in existence due to historical human activities and natural cycles of fire. The monitoring of Habitat will be done at two levels.

    - **Monitoring Vegetation Changes by Remote Sensing**: This will be done at five year interval using Indian Remote Sensing Satellite (LISS 3 and LISS 4) data. Time series analysis will be done to monitor trends in vegetation change.
    - **Grassland Monitoring:** Due to vulnerability of change in grassland condition (deterioration) and possibility of natural succession to woodland, a balanced approach and appropriate monitoring is needed. We propose to have one hectare plots to be laid in different grasslands i.e. mesic, dry and on plateau. In each grassland type 5 plots of a hectare each will be laid. These plots will be

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further monitored in ANOVA frame work to see the effect of Burning, over grazing, moisture and nutrient.

The grassland monitoring is crucial for maintaining high ungulate population and to sustain viable tiger and Co-predator population.

- **Dung density**: The dung density data of ungulates will be collected on transect as per the filed guide, every 400 m on ungulate transect 20X2 m plot will be laid for dung data collection. Data will be analysed using M-STrIPES software.

17.3.4 **Patrol Data:** This data set is to be collected while the forest staff is on routine patrol duty. The purpose of the data is to provide the wildlife manager with information on spatial coverage of patrols, locations of crimes and illegal activities, wildlife mortality and sightings (direct and indirect) of rare, threatened and indicator species. Once data are collected and entered in the software, spatial and temporal patterns and trends for the above mentioned parameters can be analysed for patrol effort in relation to comparable data on disturbance activity and animal abundance, and to incorporate the results of these analyses in the tactical planning for security and management purpose.

- While on a patrol (foot, vehicle, elephant etc.), use a hand hold GPS unit in "long track" mode to record the patrol route. Set GPS in WGS84 datum for data collection.
- If expertise on GPS use is not available then simply record the GPS coordinates every 30 minutes on a foot patrol. For vehicle based patrols the road travelled should also be marked on the park map using a GPS unit. This data should be downloaded onto a computer and recorded in the database with rest of the patrol information.
- Record (with coordinates) any illegal activity observed by you while on the patrol and also record approximately how long it has been since the illegal activity took place, and the action taken (if any).

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- Illegal activities can include signs of wood cutting, lopping of fodder branches, grass and bamboo cutting, livestock grazing, campsite, snare, trap, poacher seen, gunshots heard, fishing, fire, NTFP collection (NTFP specify what is collected in remarks).
- Record all wildlife mortality observed (with coordinates) along with probable cause of death.

Illegal Activities & their Codes

Poachers	P	**Fishing**	Fs	**Encroachment**	En
Suspected Criminal Campsite	SCC	**Poisoning**	Pg	**Wildlife Harassment**	WH
Snares	Sn	**Electric wire**	Ew	**Offroad Driving**	OD
Traps	Tp	**Illegal Fire**	Fr	**Livestock Grazing**	LG
Illegal Machan	IM	**Wood Cutting**	Wd	**Grass/ Bamboo Collection**	GBC
Gunshot	Gs	**Lopping**	Lp	**Human Presence (Signs)**	HP
Hunting Dogs	Dog	**NTFP Collection**	NTFP	**Excavation Marks**	EM
		Gravely Injured Animals	GIA		

Time	**Lat**			**Long**			**Animal Mortality/ Injury Records**					
	D	**M**	**S**	**D**	**M**	**S**	**Species**	**Gender (M/F/Un)**	**Age (Y/Ad/Un)**	**Carcass State/ or State of Injury**	**Probable Cause of Death/ Injury**	**Sample Taken**

M-Male, F-Female, Un-Unknown, Y-Young, Ad-Adult

17.4 Updation of Abundance Status:

The Park Management should update the abundance status of various wildlife species occurring in the Core Zone. Presently, there is a wide range of wildlife species, including

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some endangered and endemic such as the tiger and the hard ground barasingha. The abundance status can be recorded as standard terms such as critically endangered, vulnerable etc.

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CHAPTER – 18

PROTECTION & INTELLIGENCE GATHERING

18.1 Introduction:

Protection should always be assigned the topmost priority among all the conservation practices in the Core Zone. The Park Management should adopt a very stringent attitude towards protection of forest and wildlife in the protected area. The Core Zone faces tremendous biotic pressure along the periphery and only strict enforcement of various Acts/ Rules, effective protection strategies and the gathering of reliable intelligence throughout the year can protect the Core Zone for posterity. Besides the 17 forest villages inside the protected area with a total human and cattle population of around 7000 and 10000 respectively, a sea of humanity and livestock just outside the Core Zone is also proverbially waiting to engulf it. Needless to add, basking in the glories of the past and complacency on the part of the Park Management may prove appallingly costly as far as tiger conservation is concerned. Protection strategy also incorporates instructions/ advisories received from the Principal Chief Conservator of Forests (Wildlife), Madhya Pradesh and the National Tiger Conservation Authority, New Delhi.

18.2 Objectives:

The broad objective of protection and intelligence gathering in the Core Zone is to overall guard/ secure the entire wildlife ecosystem from forest and wildlife offenders. The specific objectives, however, are as under:

- To protect the Core Zone from all forms of poaching and illicit MFP collection.
- To control illicit grazing and protect wildlife habitats on the peripheral areas of the Core Zone.
- To protect wildlife habitats from wildlife hazards in the summer.

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18.3 Strategy & Management Prescriptions:

The following broad prescriptions are proposed for the protection of Core Zone and intelligence gathering:

18.3.1 **The Tiger Cell:** The Govt. of Madhya Pradesh has constituted district level Tiger Cells in the State. As the Tiger Reserve is situated administratively, in the Mandla and Balaghat districts, both the Deputy Directors of the Kanha Tiger Reserve are the Members of the Tiger Cells of Mandla and Balaghat districts. The Collectors, Superintendents of Police, Divisional Forest Officers, District Rural Development Officers and District Mining Officers of the Mandla and Balaghat districts are also the members of the respective Tiger Cells. The importance of the Kanha Tiger Reserve need not be emphasized for taking utmost interest and proper initiatives to ensure timely meetings and effective functioning of these Tiger Cells. Ideally, the Kanha Management should aim at achieving the following broad objectives:

- To take initiative for regular meetings and engage the members in wildlife conservation.
- To prevent and check poaching and illegal trade relating to tiger & other wildlife.
- Networking and information gathering to identify the criminals and their nexus.
- Ensuring coordination with other government agencies.
- Creating awareness in the society.
- Training of frontline staff.

The Park Management should basically focus on the following points while working through these Tiger Cells:

- Current status of intelligence network in the district.
- Information on apprehended poachers and smugglers.
- Status of surveillance on nomadic tribes/ pardhees/ bahelias.

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- Evolving strategies to apprehend poachers and control the smuggling of wildlife products/ trophies.
- Speedy trials of wildlife cases.
- Prohibitive actions against poachers/ smugglers.
- Pendency of wildlife cases and its disposal.
- Training of frontline staff with the police.

18.3.2 **Law Enforcement:** Considering the ever-increasing biotic pressures on wildlife protected areas, the Park Management should ensure a very close working relationship with the police and judiciary to put across the government's point of view more effectively. Besides, the law enforcing officers/ staff of the wildlife protected area have to be well-acquainted with and updated on the various forest and wildlife Acts, such as the Indian Forest Act, 1927; the Indian Wildlife (Protection) Act, 1972 (as amended upto 2006) and the Forest Conservation Act, 1980.

The government has empowered various ranks of frontline staff of the Core Zone to take cognizance of offences relating to forest and wildlife. The Park Management should also ensure that the frontline staff of Core Zone is always well-prepared with necessary documents/ proforma prescribed under the above Acts for taking appropriate actions and registering forest/ wildlife offences. The Park Management should ensure that the staff remains trained and updated on the latest amendments to the concerning Acts, and for this easy Hindi translation of the concerning Acts may be circulated down to the lowest level for a better understanding of the subject. Besides, periodic Legal Workshops and discussions should also be organized, involving resource persons from the judiciary and the police department to guide the staff in the proper investigation of forest offences, procedural norms, and to simplify the intricacies of the laws. The staff would be benefited by such arrangements, as these close interactions point out the various shortcomings/ mistakes in the entire procedure which render the cases weak, increasing the possibility of criminals going scot-free.

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The management of a Tiger Reserve is a great learning process, and the lesson learnt is that procedural flaws would help the offenders escape prosecution, and even the staff may find themselves facing legal proceedings for improper arrest or seizure.

In view of the above, it is all the more important for the frontline staff to attend internal periodic refresher courses and discussions, and acquire high levels of discipline and motivation. Such discussions and workshops would build the confidence of the staff in the following:

- Arrest or apprehension of persons/ offenders engaged in illegal acts inside the Tiger Reserve.
- Proper documentation of illegal activities for court proceedings, including evidence in the form of confiscated wildlife articles, relevant photographs, signed statements, and reports.
- Proper seizure of items prohibited under the Laws, or required as evidence to testify to an illegal act.
- Simple legal procedures in delivering the arrested offenders to the police/ court, and filing charges.

18.3.3 **Strike Force:** There should be at least two well-equipped strike forces in the Core Zone with adequate vehicular mobility. These well-staffed strike forces should look after their respective areas, and be provided with necessary route-chart and other logistics. Ideally, the Park Management should ensure that these strike forces are headquartered at Garhi and at Khatia, near the entry gate.

Detailed instructions have also been issued vide Govt. of M.P., Home (Police) Department's order No. F-16-266/ LIC/ 96-B (1) 2, dated 06/07/96, authorizing forest personnel (Forest Guard and above) to use firearms provided by the department for self-defense while protecting Govt. property. Instructions have

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been received in this regard from the Principal Chief Conservator of Forests vide Letter No. 1856, date 16/08/96.

The progress of these strike forces should be critically reviewed at monthly meetings. The Park Management should also ensure that these strike forces be entrusted with the following responsibilities.

- Ensuring an effective intelligence network to monitor, prevent and pre-empt illegal activities in the Core Zone.
- Undertaking intensive night patrols throughout the protected area, and the villages surrounding it.
- Raid and seizure of illegal wildlife products.
- Weekly market checking and general surveillance.
- Periodic checking of village level crime registers and updating crime maps.

The overall patrolling strategy in the Core Zone should include the following features:

- Staff/ camps listed with duty allocation and route chart.
- The teams are equipped with mobile wireless sets and firearms.
- The patrolling teams systematically cover the area allotted to them.
- Special instructions/ provisions for squads:

    - Surveillance: hotels, tourist points, vehicles, bus stands.
    - Surveillance: bahelias, traditional hunters etc.
    - Coordination with local police.
    - Labourers for patrolling.
    - Networking.
    - Issuance of special POR books.
    - Preparation of daily schedule.
    - Market checking.

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- Surprise checking of barriers.
- Preparation of "crime maps" with periodic updating.
- Monitoring cattle kill, human kill and injury incidences.
- Monitoring issues relating to compensation.
- Monitoring water points near habitation.
- Preparation of crime gang dossiers.
- Preparation of individual crime dossiers.
- Conveying progress to Field Director/ Dy. Director on a daily basis through wireless.
- Deviating from routine schedule during emergencies.
- Taking note of offences registered in local police station.
- Using tape recorder/ camera etc. to record evidences.

18.3.4 **Forensics Approach to Wildlife Crimes:** Wildlife forensics is a specialized and relatively new field of crime investigation. It employs scientific procedures to identify, examine, and compare evidence from crime scenes, and to link this evidence with a suspect and a victim. The victim always is an animal killed through various means of poaching in and around the protected area. The Management should ensure that forensic investigation of every wildlife crime in the protected area is carried out, specially in the case of tigers and leopards. A few years back a workshop on wildlife forensics was organized in the Core Zone and several forensics kits and a basic manual was also distributed by the resource persons. Each wildlife crime should be investigated forensically following normative guidelines for searches of crime scenes, required photography, collection of evidence, including poison, with its preservation and packing, and writing down various morphological and anatomical observations in standard formats. The wildlife veterinarian should be responsible for selecting and preparing suitable specimens and completing the required paper work for sending the same for analysis to different institutions. Initially, these forensics investigations can be based on Wildlife Forensic Basic Manual (Dr. DK Satpathy, Arvind Sharma and CS Dubey). The Park Management should also upgrade

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forensic investigative skills of the wildlife veterinarian and staff by organizing periodic training programmes/ workshops. Some prescribed formats for writing down reports on nature of crime, nature of examination and postmortem reports. After the forensic formalities, care should be taken that there is no disconnect/ gap in the investigation of the wildlife crime, and it reaches a logical conclusion. A good investigation of wildlife crime broadly includes meticulous collection of evidence, adequate sampling, proper documentation and legal paper work, effective corroboration, patient tracking of leads, arrest of offenders, and pursuance of court trials.

18.3.5 **Intensive Patrolling of Beats:** The Core Zone has a very effective network of 118 strategically located patrolling camps. A forest guard is in-charge of a patrolling camp, and is assisted by 1 or 2 camp watchers. This staff should be made responsible for patrolling their beat intensively and for round-the-clock alertness to deal with any eventuality. Each beat should be intensively patrolled daily for snares, traps, poisoning, intrusion, illicit felling, illicit grazing, and chances for electrocution etc. The description of daily patrols should be clearly entered into the prescribed camp registers and be checked by officers from time to time.

18.3.6 **Monsoon Strategy:** This special protection strategy should be adopted during the rainy season and its preparations, including the assignment of duties and a monsoon patrolling booklets with prescribed formats (**Appendix-53**) for the review of progress etc. should be completed by the end of June. During the rains most of the protected area is more or less rendered inaccessible for regular patrolling by vehicles. The people of the villages in and around the Core Zone know perfectly well about the difficulties of the Park Management. Besides, as the economic condition of the surrounding villages comes down, more or less, to the lowest ebb, the probability of intrusion/ pilferage in the peripheral areas increases manifold. The monsoon strategy should include the following:

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18.3.6.1 **Elephant Patrols:** Six headquarters in as many forest ranges have to be established for elephants in the Core Zone during the rains. Each elephant squad has to be comprised of, besides an elephant and Mahout, around 6 to 8 forest personnel and several labourers. Each elephant squad has to be equipped with mobile sets, GPS and arms etc. These squads are required to patrol designated vulnerable areas of the Core Zone frequently, and submit their progress in the prescribed format. The respective range officers should ensure that the elephants have to patrol the designated area intermittently at least 15 days a month. The Park Officers also join these squads from time-to-time.

18.3.6.2 **Surveillance of Footpaths & Sensitive Areas:** The intrusion of the people of the surrounding villages should be effectively controlled during the rains by the Park Management. Offenders/ criminals tend to use footpaths/ tracks to intrude into the Core Zone during the monsoon to spare themselves the difficulties of rain affected terrains and hindrances and obstructions of shrubs and bushes. Therefore, it is of vital importance that all these tracks and footpaths leading deep into the Core Zone are continually kept under surveillance. Besides, there are many identified sensitive areas that need special patrols by the frontline staff and labourers. These sensitive areas should be intensively patrolled at least 15 days a month. Besides, as appended, officers should also join these patrols every month, and the strategy is reviewed periodically under the prescribed format.

18.3.6.3 **Control on Illicit Grazing:** The availability of ample vegetative biomass in the Core Zone during the monsoon also attracts the cattle of the surrounding villages for grazing. Besides, the people of these villages also tend to drive their livestock into the Core Zone to make the most of this productive season. The Park Management should enforce strict control on illicit grazing by apprehending the cattle/ sending them to *kanji* houses and recovering penalties for illicit grazing. The Park Management should engage sufficient labourers to assist the frontline staff for the effective control of grazing by livestock.

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18.3.6.4 **Temporary Patrolling Camps:** The Park Management should identify such far-flung areas in the Core Zone that become sensitive due to their relative inaccessibility and resultant neglect in protection. Temporary patrolling camps should be established in such areas during the monsoon so that no major part of the Core Zone is left unpatrolled/ unprotected. The park officers should ensure to stay overnight at these camps monthly as prescribed in the booklet.

18.3.7 **Routine Foot Patrolling:** The importance of foot patrols in the Core Zone need not be emphasized. Regular foot patrols enable the frontline staff to stay close to ground realities. It is only during these foot patrols that the incidents of snaring, trapping, the poisoning of saltlicks and water pools and laying out of wires for electrocution come to light. The Park Management should also realize the importance of regular foot patrolling by officers in the Tiger Reserve in the light of the ever-increasing biotic pressure. Besides inspiring the patrolling staff, this also lends a psychological restraint over the surrounding villages. In view of the above, Forest Guards along with labourers should patrol their respective beats regularly. These patrols should also be joined by various ranks of officers from time to time.

18.3.8 **Night Patrolling:** The Park Management has also learnt from past experience that in spite of obvious dangers, offenders also sneak into the protected area at nights. Therefore, if patrols are not conducted at nights, the protected area may have to incur serious losses despite effective protection in the day time. The Park Management should ensure that the frontline staff including officers should also remain active for a few nights every month. Night patrols in the Core Zone should comprise the following:

- **On Foot:** At least 3 hours per night after 9:00 pm to check all the vulnerable spot/ sites/ activities.
- **By Vehicles:** At least 4 hours per night after 9:00 pm to check barriers, watch tower, foot paths and patrolling camps.

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- **Night Halt at Camps:** The Management should realize that night stays at patrolling camps not only lend confidence to the staff but also provide a chance to understand the protected area at night.
- This is monitored next day at the Mandla Head Office under a prescribed proforma (**Appendix-54**).

18.3.9 **Patrolling of Sensitive Areas:** The Park Management should also update the list of sensitive areas that need to be specially patrolled during the dry season. The identification of these areas should be based on old crime spots, problematic villages and knowledge/ experience of the frontline staff. These sensitive areas generally include natural saltlicks, areas below electric lines, shallow and small water pools and peripheral areas near problematic villages. The Park Management should ensure that these areas are mapped out, and special patrols are carried out by the frontline staff of the respective forest ranges to preempt and counter intrusions into the protected area **(Appendix-55)**.

18.3.10 **Prevention of Poaching by Iron Traps:** Though the use of iron traps (gin traps) is not common in and around the Tiger Reserve area, there is absolutely no scope for complacency. In December, 2006, a tiger was seen limping along a forest road with one of his legs caught in an iron trap in the Mukki range. Again in July, 2007, three iron traps were recovered in the Kisli range. These traps were very meticulously fixed to trap tigers. Fortunately, the staff found these traps during its routine patrol, and harm was averted.

The Park Management should ensure that poachers, particularly nomadic tribes/ *pardhees*, dare not sneak into the Core Zone and set gin traps for tigers and panthers. The following guidelines are suggested to prevent the poaching of tigers/ panthers by iron traps:

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- Range officers should always be in constant touch with the nearest police stations to have prior knowledge of the camp-site of nomadic tribes, the duration of stay, and total number of adult males and females etc.
- It also requires excellent coordination between the range officers of the Core Zone and the Buffer Zone Division, as the nomads will try to pitch their camps outside the Core Zone.
- These people should never be allowed to pitch their camps in the Buffer Zone area as well.
- Every forest guard should have good knowledge of forest roads, tracks, and dry nullah beds recording movements of tigers.
- Generally, poachers set these iron traps on the above areas of tiger movements in such a way that there is a maximum possibility of a tiger putting his foot on the iron trap. To ensure this possibility, the poachers create such obstructions (thorns and thorny bushes etc.) that tigers/ panthers have to avoid these paths and are automatically led onto the one where the iron trap has been fixed.
- These poachers have good knowledge about the length of the step and stride of animals, and they can even set 4-6 iron traps on a single path.
- Sometimes poachers may also place a kill at the head of a "V" area whose both arms are obstructed by thorny bushes. The tiger is attracted by the kill and is led towards the kill through these thorny arms and gets trapped in the iron trap.
- Every forest guard should very cautiously look for this iron trap continuously for two days in his beat at least once in fifteen days.
- If a forest guard ever comes upon an iron trap or the above signs of leading a tiger to a specific place, he should immediately inform his higher-ups, and watch over the iron trap so that no animal may be trapped.
- The Park Management should ensure that every forest range has an updated list of villagers whose occupation is iron-smithy.
- The Park Management should ensure a monthly review of the above strategy under the following prescribed format:

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Name of Range	Camp Site of Nomads	Date on which the Camp was Established	Probable Date of Wind-up	Type of Occupation	Date of Inspection by the Staff	Name of Beat	Dates of Checks of Tiger Tracks	Remarks
1	2	3	4	5	6	7	8	9

18.3.11 **Footpath Surveillance:** The footpaths and tracks in the protected area should also be kept under continual surveillance by the Park Management. The people of the surrounding villages tend to try their luck at sneaking into the protected area and grabbing their hands on any article/ produce of wildlife and forest saleable in the market to buy their petty requirements. Therefore, surveillance is conducted specially before the market days to discourage the tendency.

18.3.12 **Saltlick Checking:** The Park Management should also update the list of natural saltlick spots where herbivores aggregate frequently. Habitual poachers have very good knowledge of such spots. The poachers urinate over these spots to enhance their odour and attract wild ungulates. They also mix capsules of poison with soil. Wild ungulates either get killed by swallowing poisoned capsules or get trapped and are physically killed by poachers. Such spots should be very frequently checked by the frontline staff **(Appendix-66)**.

18.3.13 **Waterhole Checking:** As the water bodies of the Core Zone attract all types of animals, water samples should be frequently analyzed for poison and other fatal toxicities. The Park Management should always have an updated map and list of all such sensitive waterholes. All these sensitive waterholes should be frequently checked in the pinch period by the Park staff to prevent poaching and the poisoning of these restricted waters.

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18.3.14**Checking for Electrocution:** There are several areas in the protected area across which high voltage electricity line pass over. The total length of such electricity lines all over the Core Zone is around 25 km. with at least 14 identified sensitive areas. Experience poachers know about such areas where wild ungulates can be easily electrocuted. They use several methods to electrocute wild ungulates in these areas (**Appendix-56**). The Park Management should ensure that these areas are frequently patrolled so that the poachers may not kill the animals through electrocution. Besides, efforts should also be made at the government level to have the entire such lengths of electric line insulated.

18.3.15**Patrolling by Ex-army Men:** Ex-army personnel have also been deployed in the Core Zone for intensive patrolling. Presently, there are 31 such personnel, which include 1 Supervisor, 6 Gunmen, and 24 Jawans. They are accompanied by 60 local youths having good knowledge of the jungle. The Park Management should ensure that the entire patrolling force is divided into six units and based in respective forest ranges. Needless to add, without the support of local range assistants and forest guards the force will not be able to achieve much as far as protection is concerned. Therefore, patrolling should be undertaken on the basis of a well thought-out written strategy, and daily progress sought in a prescribed format for regular reviews (**Appendix-57**).

18.3.16**Patrolling by Special Tiger Protection Force (STPF):** As per the guidelines issued by the National Tiger Conservation Authority, New Delhi, a Special Tiger Protection Force has to be constituted to strengthen and give an effective thrust to overall protection in the protected area. The Tiger Reserve Management should ensure that the entire area should be divided into the following three STPF units:

Sl. No.	Name of Unit	Total Area (ha.)
1.	Khatia	728.00
2.	Sijhora	728.00
3.	Garhi	728.00
	Total:	**2184.00**

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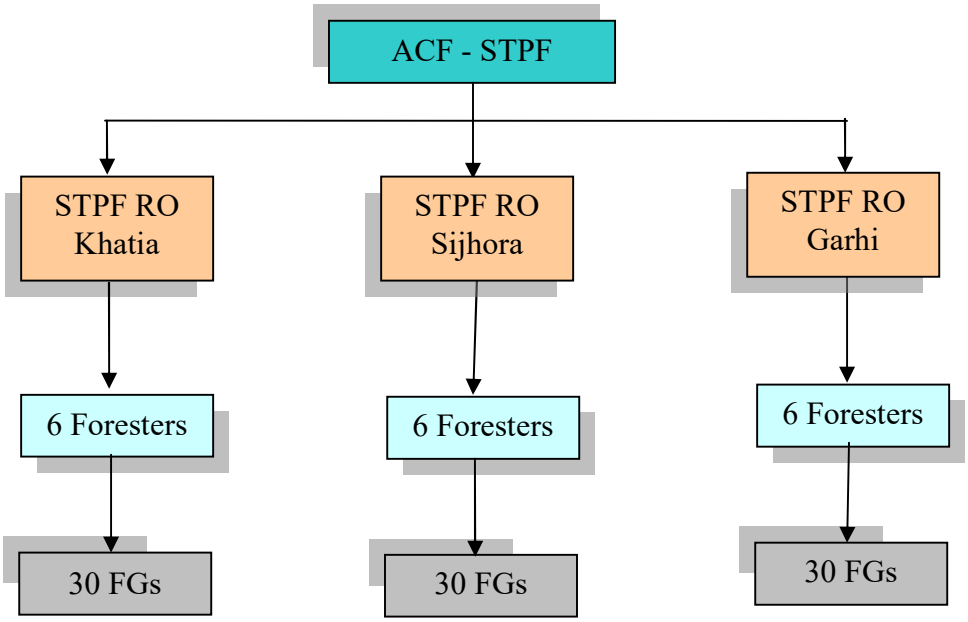
Each of the above three STPF units should consist of various range assistant circles of the respective forest ranges of the Core Zone, Buffer Zone and Phen Wildlife Sanctuary. The detailed composition of the three STPF units is appended (**Appendix-58**).

An ACF (Assistant Conservator of Forests) should be in-charge of the over all command of all the three STPF units. The ACF will have his headquarters at Garhi. Each STPF unit has to be headed by a Forest Ranger. The Forest Ranger will command a platoon of 6 Foresters and 30 Forest Guards. All the three Forest Rangers will be stationed at Garhi. The command structure of the STPF should be as under:



The Reserve Management should ensure that each STPF unit is provided with a truck and a bolero. While the units will be required to undertake foot patrolling in their respective areas, vehicles will be used to carry personnel, tents, mess items etc. and to reach distant places of their stay within their respective areas. The progress of the STPF should be critically reviewed regularly.

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18.3.17 **Special Protection along the Eastern Boundary:** The eastern boundary of the Core Zone is not surrounded by the Buffer Zone as it lies in the Chhatisgarh State. For the protection of wildlife in this part, the Chhatisgarh Forest Department should be persuaded to enhance the protection status in the area. There are some very good patches of forests that can serve as stepping stones for this linkage. Besides, the Park Management and the Kawardha Division (CG) should also make special arrangements for joint patrolling along this border and sharing of information on wildlife crimes/ intelligence.

18.3.18 **E-Eye Surveillance:** The Reserve Management may also think of installing a real time anti-poaching surveillance and wildlife tracking system in the Core Zone. The system basically consists of long range thermal, clear vision and Infrared cameras/ devises mounted on towers or stations for live, remote and 24x7 surveillance. These stations transmit live feed using WiMax, and can be controlled remotely from a centrally located control room.

18.3.19 **Fire Protection:** Fire protection is one of the many conservation initiatives carried out every year to protect the habitat within the Core Zone. The fire season sets in around mid-February and lasts until the area experiences the first showers of monsoon. During the fire season the temperature may go upto 46^{o}C in the last week of May, leaving the grasslands/ground flora completely dry and susceptible to fire. Dense ground flora and high grasses only add to the inflammability of the area.

No natural fires occur in the Core Zone, and it also does not experience fires by lightning. Only man-made fires occur during the season. The following reasons may be assigned to the occurrence of fire in the Park:

- Setting fire in the peripheral areas of the Core Zone by miscreants/ disgruntled elements nurturing a grudge against the Park Management.
- Accidental fires due to collection of mahua flowers by the forest villagers inside the Core Zone.

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18.3.19.1 **Fire Protection Measures:** In view of the incalculable damage which may be caused by the man-made fires, the Park Management should ensure to undertake and all-round prevention/ protection strategy well in advance, involving the local people, before the fire season actually sets in. The protection measures include the following steps:

18.3.19.1.1**Preventive:**

- The cutting and burning of specially created firelines (1569.18 km.) along with strips adjoining forest roads (867.51 km.), range boundary lines and compartment lines well before the fire season **(Appendices-59 to 60).**
- Creation of temporary fire watchtowers at strategic locations throughout the area.
- Early burning of grasslands on the basis of burning regime, and creation of firebreaks.
- Regular sweeping and removal of dry leaves from fire-lines throughout the fire season.
- Monitoring progress and occurrence of fire by fire watchers through round the clock wireless network.
- Deployment of fire extinguishing squads (vehicular and non-vehicular).
- Constant patrolling by the patrolling camp staff.

18.3.19.1.2**Control:**

- Strip clearance by the fire extinguishing squad.
- Manual putting out of fire by fire beaters.
- Counter firing by the squads.

The protected area has experienced extremist-engineered disturbances in the past, and under the prevailing sensitive situation, constant-patrolling in-groups should also be ensured. This should be in addition to the round the clock

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wireless facility and patrolling from the various patrolling camps. Regular foot patrols near the peripheral area of the Core Zone is also utmost important. The local villagers (predominantly tribals) should be deployed for this purpose through Kanha Workers' Society in "short term fire protection projects".

Effective wireless communication plays a very important role in the fire season. The Park Management should ensure that maximum number of fixed wireless sets remain operational throughout the fire season.

It is pertinent to point out that all the labourers in the fire season should be drawn from the indigenous communities of the peripheral villages, and this is a source of livelihood to them during the summer months, and hence also qualifies as an important eco-development intervention.

18.3.20 **Intelligence Gathering & Coordination:** The Park Management should ensure that there are six intelligence-gathering units in the Core Zone. The units have to be headed by the respective Range Officers. Smart foresters and forest guards should be given responsibility of gathering intelligence on wildlife offences and coordinating with reliable agents/ informers. Apart from building up an effective intelligence network to monitor, prevent and pre-empt illegal wildlife activities/ offences, these units should also raid and seize illegal wildlife products, and do market checking and general surveillance, including surprise checking of hotels, barriers, bus stands and tourist points **(Appendix-72)**. The Park Management should also judiciously and regularly spend funds received from the National Tiger Conservation Authority, New Delhi. A confidential dossier/ list of suspects/ old criminals with their photographs should also be meticulously prepared and regularly updated for continuous direct or indirect surveillance **(Appendix-61)**. Needless to add, the progress of these units should be regularly reviewed by the Park Management.

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CHAPTER – 19

ECODEVELOPMENT

19.1 Introduction:

Generally, people living inside the protected area want to be relocated outside with an attractive package. Forest villagers have shown considerable willingness for relocation under the options offered by the NTCA. The Park Management, however, feels that until the 7 forest villages of the Core Zone are relocated outside, they need ecodevelopment inputs for basic support. These initiatives shall further strengthen trust between the Management and the people, and help the Park Management gain their support to wildlife conservation.

19.2 Objectives:

The specific objectives of ecodevelopment in the Core Zone are as under:

- Garnering support of the local communities of the forest villages for wildlife conservation.
- Reducing dependence of local communities on natural resources of the Core Zone.
- Supporting the local communities with basic amenities till they are relocated outside.

19.3 Strategies & Management Prescriptions:

The strategies and management prescriptions for ecodevelopment in the Core Zone are as under:

19.3.1 **Essential Framework:** All forest villages, even those due for relocation, need to be included for ecodevelopment. As per section 18A (read with section 36A) of the Wildlife (Protection) Act, 1972, till the rights of affected persons are finally settled, the State Government should make alternative arrangements for making available fuel, fodder and other forest produce to affected persons in terms of their

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rights as per record. The strategy of micro planning should be adopted at village level apart from: creation of Ecodevelopment Committees with Panchayati Raj Institution representation confederating such EDCs, ensuring benefits to local people for protecting forests on a quid-pro-quo-basis etc. The agricultural practices, if intensive, require monitoring in the context of cropping patterns and ensuing change in cover values. Likewise, sale of agricultural land resulting change in land use pattern should also be monitored so that the corridor values are not affected. Since livelihood is a big concern and dependency of local people on forests is considerable, the district level welfare schemes should be factored in the ecodevelopment zone to benefit local people. Further, special programmes should be fostered through funding support from Finance Commission, State Plan etc., apart from Project Tiger.

19.3.2 **Constitution of District Coordination Committees:** The constitution of district level coordination committees at the Mandla and Balaghat districts for ensuring ecodevelopment interventions in the forest villages of the National Park is of utmost importance. As the area of the Core Zone falls into the Mandla and Balaghat districts, two such committees need to be constituted. There are a host of the State and Central Government's schemes for the development of villages, which are implemented through district administration. The constitution of these district level committees shall ensure required funds for ecodevelopment in the Core Zone. The proposed structure of the district level coordination committees is as under:

District Collector	Chairman
CEO	Member
Representative officials from PWD, Social Welfare, Tribal Department, Health Department, Agriculture Department, Education Department, Power & Irrigation Departments	Member
Representatives of various Government/ private production sectors	Member

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Deputy Director of the Core Zone	Member
Deputy Director of the Buffer Zone	Member Secretary

19.3.3 **Mechanism of Fund Raising:** The Deputy Director (Core Zone) shall be responsible for preparing the Annual Plan of Operations (APO) for various ecodevelopment works to be undertaken in the National Park under the guidance of Field Director, Kanha Tiger Reserve. The APO shall be strictly based on the proposals/ recommendations/ needs contained in the various microplans of the National Park. All the microplans have been revised for the entire plan period. Local communities attach much importance to several types of developmental works, and these initiatives should be prioritized in the microplans. The Deputy Director shall submit the APO to the District Coordination Committees and pursue the same to ensure the timely release of funds. Sometimes, it may not be possible to receive the entire fund from the Collector Sectors, and for the rest of the funds, a separate APO under the guidelines of the National Tiger Conservation Authority, New Delhi shall be prepared and submitted through the Principal Chief Conservator of Forests (Wildlife), Madhya Pradesh.

19.3.4 **Ecodevelopment Initiative:** On the basis of the funds received from the Collectors of Mandla and Balaghat districts and the NTCA, ecodevelopment initiatives shall be taken in all the 4 forest ranges of the Core Zone. The financial year-wise detailed proposal for ecodevelopment initiatives in different forest ranges has been prepared and presented in Chapter-24 of Organization, Administration & Budget. The proposed initiatives are high priority works for the local communities, and in the subsequent financial years, the same policy should be followed. The abstract of the required funds for ecodevelopment committees for the plan period is as under:

Range	No. of EDCs	Proposed Development Work Each Year	Average Required Amount (Rs.)
Sarhi	10	400000.00	4000000.00
Mukki	1	450000.00	450000.00

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Supkhar	10	400000.00	4000000.00
Bhaisanghat	4	435000.00	2610000.00
Total	**25**	**1685000.00**	**11060000.00**

Financial Year	Average Required Amount (Rs.)
2011-12	11060000.00
2012-13	12166000.00
2013-14	13382600.00
2014-15	14720860.00
2015-16	16192946.00
2016-17	17812241.00
2017-18	19593465.00
2018-19	21552811.00
2019-20	23708092.00
2020-21	26078901.00

19.3.5 **Provision of Soft-Loans:** There shall also be a provision of giving soft-loans to identified beneficiaries for the purchase of agricultural requirements, including implements, improved seeds, cattle etc. through the respective ecodevelopment committees.

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CHAPTER – 20

RESEARCH, MONITORING & TRAINING

20.1 Introduction:

Research and monitoring in the Core Zone are of vital importance. Considering the stature and importance of the Kanha Core Zone, research and monitoring activities are expected to generate sound information to help wildlife resource managers deal with increasingly serious and complex problems and threats, enhance public understanding, and encourage cooperation with scientists/ researchers of other institutions and organizations. Research studies are systematic and take time to reach logical conclusions, and should carry on continuously. Besides, they should not be expected to provide overnight solutions. In the early years of park management, many resources were damaged or lost simply because managers were unaware of their existence or did not know how to manage them (Allen et al., 1981). The Plan Outline of the Project Tiger document was prepared in 1972 and the document envisaged that the scientific staff of the reserves would undertake basic research programmes aimed at evaluating systematic factors and influences, for devising pragmatic management practices to cover specific populations and the entire ecosystems.

20.2 Objectives:

The specific objectives of wildlife research, monitoring and training in the Core Zone are as under:

- To undertake animal specific and habitat specific basic and applied research studies compatible with the goals and objectives of wildlife management in the protected area.
- To undertake basic monitoring of wildlife populations and vegetation, and prepare and update inventories of different wildlife resources.

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- To impart relevant professional training/ skill development to the staff for effective wildlife management.

20.3 Strategy & Management Prescriptions:

The following broad prescriptions are proposed for undertaking wildlife research and motoring activities and training in the protected area:

20.3.1 **Research & Monitoring Priorities:** Wildlife management is a mix of field craft and science based on field research. Research in the Core Zone should focus on the critical information needs of the Park Management. While the Park Management should take initiatives to identify and discuss the problems of the wildlife ecosystem and management with appropriate institutions and scientists, professional researchers working in isolation on topics or species relating to their field of interest can contribute very little for fostering wildlife management. Wildlife research should be problem solving studies, based on a consultative process involving protected area management, indigenous people and overall ground reality prevailing in our tropical setting.

In short, research and monitoring are needed for several purposes ranging from simply identifying resources to deciding on appropriate short and long-term management strategies. The following three broad purposes can highlight the importance of research and monitoring in the Core Zone:

- To determine presence of resources in order to protect, manage them and detect changes in them.
- To understand the natural dynamics and processes of populations, ecosystems, and other park resources.
- To assess the effects of specific threats and to devise and evaluate management responses.

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Some pressure points for protected area management are common to most of our protected areas, and in addition to the ongoing small term projects, wildlife research in Core Zone should preferably focus on these themes:

20.3.2 Ecological/ Eco-regional Landscape:

- Regional changes in species richness & diversity.
- Habitat ecology of ungulates.
- Population studies.
- Changes in species occurrence.
- Effect on water table.
- Habitat fragmentation.
- Endangered species: prey base, age/ sex ratio, biomass computation, life table computation.

20.3.3 Habitat Degradation:

- Types of exotic infestation.
- Control methods.

20.3.4 Livestock Depredation by Carnivores & Crop Damage by Wild Ungulates:

- Reasons for livestock depredation.
- Percentage of livestock in the food-spectrum of carnivores.
- Reasons for crop damage.

20.3.5 Habitat Management Practices:

- Study of aquatic plants.
- Biodiversity conservation vis-a-vis management practices in-vogue.

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20.3.6 **Poaching:**

- Magnitude.
- Modus operandi (variations).
- Wildlife crime intelligence and networking.
- Wildlife crime prevention.

20.3.7 **Wildlife Disease:**

- Compilation of database on wildlife diseases of different species.
- Study of zoonotic diseases.
- Compilation of a predator- disease database.

20.3.8 **Fire:**

- Nature and efficacy of existing preventive and control measures.
- Changes in the habitat due to fire.
- Changes in animal use pattern due to fire.

20.3.9 **Insects as Agents of Ecological Change:**

- Impact (magnitude).
- Ecological changes.
- Periodicity.

20.3.10***In-situ*** **Conservation:**

- Founder population size.
- Translocation Periodicity.

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20.3.11**Eco-tourism:**

- Impact of tourism on the Core Zone.
- Involvement of host-communities.
- Mechanism.

20.3.12**Jurisprudence:**

- Morphological studies.
- Biochemical studies.
- DNA fingerprinting.

20.3.13**Wildlife Disease:**

- Landscape epidemiology studies.
- Linkages between sylvatic & pastoral cycles.

20.3.14**Animal Monitoring & Estimation Techniques:**

- Effect of predation on prey population.
- Estimation procedures, indices for various species.
- Home range studies.

20.3.15**Vision beyond the PA:**

- Effect of existing land use.
- Mechanism/ strategy to mitigate ill effects.

20.3.16**Interface Problems:**

- Magnitude of crop damage outside protected areas.
- Methods for mitigation.
- Decadal population growth in impact zones outside protected areas (human/ cattle).

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- Resource use pattern of indigenous people.
- Impact of protected areas on indigenous people.
- Legal status of the impact zone & related problems.
- Community role in conservation.
- Levels of sustainable use.
- Grazing impact.
- Regeneration status in right burdened forests.
- Impact of rights and concessions on habitat quality.
- Socio-economics of indigenous community.
- Resource requirements of indigenous people & dependencies.
- Traditional knowledge & occupation of indigenous communities.

Apart from the above biological/ ecological researches, the Park Management should also encourage the collection of relevant information on the effects of the Core Zone on local economy and communities of the surrounding villages. Such social researches should also be developed into reports, status papers, microplans, and other documents resulting in the formation of effective policies for upliftment/ ecodevelopment of local communities. Although these social projects may sound purely academic or official, and may not have any immediate obvious management significance, they would prove to be of a great value later, as the present scenario of the park-people interface in the region is bound to go a very long way.

20.4 Monitoring Framework:

The importance of ecological monitoring in a world class protected areas such as the Kanha Core Zone has already been discussed. The Park Management should ensure that the monitoring of biological resources also form a basic routine activity in the protected area management, and it is the principal way in which the management can identify trends or changes, and so gauge the effectiveness of its managerial inputs. Though it may sound an unplanned and subjective procedure, it is easy to collect useful biological

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information in a simple, systematic and scientific manner. All such data should be incorporated in the MIS in a routine manner and be analyzed periodically.

The Core Zone should also continue with the present system of ecological monitoring of flora and fauna. As stated above, the protected area has a very good network of forest camps covering all vegetal cover types and habitats of wildlife. All these forest camps have been provided with specially designed camp registers containing prescribed formats for requisite information/ data relating to the broad phenology of the vegetation type, species-wise animal sighting with their age-class and sex-class structures, females with fawns, lactating females, and others etc. A prescribed format for recording indirect evidence of tiger and panther has also been included. As far as management is concerned, a useful inventory could be as simple as information on the distribution of important species, whose numbers reflect important ecological processes. Even crude indications of the numbers of these animal species would add to the value of inventory, and can also be corroborated/ compared with the results generated by the M-STrIPES (Monitoring System for Tigers–Intensive Protection & Ecological Status) software, prescribed by the National Conservation Authority, New Delhi.

The format of the above camp register is given below. Each Forest Guard in-charge of the respective camp must fill in the requisite information derived from the daylong patrolling of his beat. This would lead to the generation of a lot of data on the basic parameters required for managing a wildlife protected area. The data generated from such continuous monitoring should later be analyzed for trends, and bases for species-specific and habitat specific planning in the Core Zone. The format of patrolling camp register for routine ecological monitoring is as under:

Particulars of Patrolling			**Phenology**			
Date	**Place & Compartment No.**	**Time**	**Flowering trees/ Plants**	**Fruiting Trees/ Plants**	**Leaf Fall**	**New Leafs**
1	2	3	4	5	6	7

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Herd Structure of Ungulates												
Total No. of Herds (Chital/ Sambar/ Barasingha/ Gaur)	All Male Herd				Female-Fawn Herd				Mixed Herd			
	Adult	Sub-Adult	Fawn	Total	Adult	Sub-Adult	Fawn	Total	Male	Female	Fawn	Total
8	9	10	11	12	13	14	15	16	17	18	19	20

Various Stages of Antler Development					Birth Frequency of Ungulates (15 days Intervals)		Stages of Gestation	
Males with Fallen Antlers	Males with Developing Antlers	Males with Branched Antlers	Males with Developed Antlers	Total	Date	Total New Borns	No. of Pregnant Female	No. of Lactating Females
21	22	23	24	25	26	27	28	29

Data/ Evidence Relating to the Tiger										
Male/ Female Pugmark (No./ Unit Distance Walked)	Urination (No./ Unit Distance Walked)	Scraping (No./ Unit Distance Walked)	Call (No./ Unit Distance Walked)	Scratches (No./ Unit Distance Walked)	Scat (No./ Unit Distance Walked)	Cattle Kill	Other Kill	Stride Measurement	Straddle Measurement	Signature Inspecting Officer
30	31	32	33	34	35	36	37	38	39	40

Besides, digital photographic albums of ground flora covering species of grasses, herbs and forbs should be updated, identified, and placed at each range headquarters to facilitate easy identification of species from the management point of view. The Park

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Management should ensure that the current herbarium at the Kanha laboratory should be periodically updated and properly identified, and meticulously maintained.

20.5 Training Needs Assessment:

As wildlife management has been recognized a distinct discipline of conservation science and is growing in importance, different levels of officers/ frontline staff vitally need to acquire adequate technical efficiency. Professionalism is of utmost importance for the staff of the Core Zone to achieve the stated objectives/ goals of management. The lack of professionalism cannot be concealed, and it ultimately becomes the root cause of the downfall of any wildlife protected area. Broadly, professionalism include, besides initial and basic training, periodic exposure to skill development opportunities, special courses in wildlife management, basic knowledge of computer and important software, and interactions with resource persons. The following training needs have been assessed for the staff of the Core Zone.

- Wildlife and forest laws.
- Management of man-animal conflict.
- Tourism management.
- Park/ nature interpretation.
- Population dynamics and wildlife estimation.
- Animal health and nutrition.
- Ecological monitoring/ field techniques.
- Basic ecology and population biology.
- Intelligence gathering.
- Management of semi-captive elephants.
- Wildlife crime investigation/ law and judicial proceedings.
- Basic wildlife forensics.
- Basic knowledge of relevant computer software.
- GIS and remote sensing techniques.
- Training of arms and ammunition.

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- At least 15 days' training exposure to the newly posted staff in the Core Zone before allowing it to join the new posting.

The above trainings/ orientation courses by resource persons should be arranged periodically by the Park Management. There are also several institutes in the country which can be contacted for short-term courses.

20.6 HRD Plan:

A Human Resources Development Plan can be explained as a framework for the expansion of human wealth or capital within an institution/ organization through the development of both the organization and the individual to achieve performance improvement. HRD is actually the integrated use of training, skill development, capacity building, organization, and career development efforts to improve individual, group and organizational effectiveness. HRD aims at developing the key competencies to enable individuals in institutions/ organizations to discharge present and future responsibilities of jobs through systematic and planned learning activities. Such plans develop human resource by attaining or upgrading the skills and attitudes of employees at all levels and maximizing the organizational effectiveness to achieve stated objectives of management and to satisfy employees' career goals and mutual relationship.

HRD experts should also be outsourced periodically to enhance employees' potential and promote high ethical standards in meeting the vision, goals and objectives of the protected area and also to foster camaraderie, commitment, pride and mutual trust.

Though the management of the Kanha ecosystem itself is a learning process for the majority of the frontline staff, the Park Management should ensure that newly inducted forest guards undergo basic forestry training conducted by the Bandhavgarh/ Amarkantak/ Jhabua/ Govindgarh Training Schools.

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Park officers should also be encouraged to undergo Diploma as well as Certificate and Capsule courses in wildlife management conducted by the Wildlife Institute of India, Dehradun.

The Park Management should also ensure that internal workshops on monitoring/ field techniques/ wildlife crime investigation and legal proceedings are also conducted periodically, by experts/ resource persons from premier institutes.

In-house workshops/ seminars and periodic discussions between officers and field staff should also be ensured so that the frontline staff of the Core Zone remains updated on new perspectives relating to wildlife management.

The Park Management should also request the senior officers of the wildlife wing of the state to create special provisions for awards/ rewards and out of turn promotions for the frontline staff of protected areas.

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CHAPTER – 21

VISION BEYOND BUFFER

The protected area is almost completely surrounded by a Buffer Zone, and the Tiger Reserve is managed under a core-buffer strategy to provide an additional impetus to wildlife conservation. The Tiger Reserve lies in the middle of an extensive forest belt stretching from the forests in and around Achanakmar Tiger Reserve (CG) in the north-east to the Pench Tiger Reserves in the south-west (Maharastra and Madhya Pradesh). This forest block includes widespread forest patches in the Bilaspur, Kawardha, Dindori, Balaghat and Seoni, districts under traditional forestry operations and different local land uses. Most of these forests are under tremendous biotic pressure and the land uses immediately adjacent to these forests in many areas are detrimental to wildlife conservation, especially tiger conservation. This extensive forested landscape is extremely vital for tiger conservation in India as it forms one of the three main tiger inhabited landscapes still in existence. The region has four Tiger Reserves and the intervening landscape varies from good to extremely fragmented, with several revenue or privately owned forest patches. These forest blocks have to be managed assiduously as they also form the habitats that support the spill-over wildlife populations, specially tigers, of the high-density areas of the Kanha and Pench Tiger Reserves.

Now to focus on the immediate environs, the eastern most boundary of the Core Zone is not surrounded by the Buffer Zone as it lies in the Chhatisgarh State. The Chhatisgarh Forest Department needs to enhance the legal status of the Chilpi forest range, increasing the possibility of good connectivity upto the Bhoramdeo Wildlife Sanctuary. The Chhatisgarh Forest Department, however, has also introduced several important conservation initiatives to strengthen the overall ground situation. These initiatives will also add to the restoration of some part of the Kanha-Achanakmar corridor. The Kanha-Achanakmar forest corridor is contiguous almost throughout. However at several places it is extremely thin and degraded, and in between there are several relatively good blocks.

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These can function as potential stepping-stones on the landscape between the Tiger Reserves.

Besides, the Park Management and the Kawardha Division (CG) can also make arrangements for joint patrolling along this border and sharing of information on wildlife crimes/ intelligence.

Currently, the Phen Wildlife Sanctuary stands more strengthened with the recent expansion of the Buffer Zone area. There is now good connectivity between the Supkhar range and the Phen Wildlife Sanctuary through the Buffer Zone. Besides, Sajalagan, the only forest village inside the Wildlife Sanctuary, shall also be relocated in the near future. Now it is logical that the Wildlife Sanctuary should also be declared a Critical Tiger Habitat to ensure a promising linkage from the Core Zone to the Phen Wildlife Sanctuary and beyond in the Chhatisgarh State. Some basic wildlife improvement practices such as developing good water bodies and grasslands in these areas shall add to the movement of animals in the region.

The Kanha-Pench corridor on the western side is probably the most promising connectivity. Though fragmented in between, this is reported to be used by tigers frequently. The strengthening of this corridor at the Kanha end has already been proposed in the Tiger Conservation Sub-Plan for the Buffer Zone. Besides, the management plan for the Kanha-Pench corridor has also been prepared by the Forest Department, and will play a very effective role in the restoration of this important ecological connectivity. The proposed corridor passes through four territorial and three MP Forest Development Corporation divisions of Mandla, Balaghat and Seoni districts. The total area of the corridor is around 3162 sq. km., with 248 villages falling within the boundary of this corridor. The corridor is very narrow in some places, and these weak links harbours 43 critical villages. The corridor needs to be strengthened for ecological sustainability, with site specific measures. Restoration works also need to be taken up based on the Disturbance Indices of the areas. Conservation of natural resources is regarded an integrated biological and social process and needs understanding target

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communities, specially their socio-economic aspirations and cultural propensities. Past experience suggests that peoples' livelihoods and their ability to be meaningfully involved in conservation planning and practice are vital to nature conservation. The restoration of this corridor may also require new approaches to dealing with the human aspect of this enterprise.

On the northern side, the Buffer Zone borders the East Mandla (T) Division, and the region has many weak links. It should be ensured that the staff is gradually oriented for the enhanced protection and monitoring of the movement of tigers. Basic habitat improvement measures such as developing water holes and grasslands for ungulates should also be taken.

The same recommendations are also made for the part of North Balaghat (T) Division bordering the southern boundary of the Buffer Zone. Harbouring many weak links in ecological passages, this area also needs basic habitat improvement inputs. More importantly, the professional skill of the staff should be developed for a high degree of protection of wildlife and its monitoring in the area.

The human-tiger interface problems should be addressed at the earliest as per Special Operating Procedures (SOP) as laid down by the NTCA. Requisite rapid response teams should also be prescribed in sensitive areas to address such situations. Forestry and other land uses in the corridor area need to be governed by the strategy as suggested for the buffer, and a detailed management strategy should be reflected in the respective working plans of forest divisions falling in the corridor, as delineated at the 'macro level' in the 2010 country level assessment. The 'Micro level' appraisal of the ecological linkages need to be done to understand the human-wildlife interface and the existing land use patterns. Special retrofitting measures are also required for intensive land uses like mining/industry etc.

Field protection and wildlife monitoring are important in the corridor linkages, and hence the tiger reserve management should become the nodal agency for mainstreaming the

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protocol in the concerned forest divisions. Besides, movement of traditional gangs/ habitual offenders involved in poaching of wild animals should also be closely monitored and there should be a regular exchange of data relating to wildlife crime between the forest / police departments of areas falling in the corridor and the tiger reserve.

The Collectors of concerned districts harbouring these corridors should also be apprised of the corridor plans to integrate livelihood investments from various developmental schemes in these areas.

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CHAPTER – 22

TIGER DYNAMICS & LANDSCAPE APPROACH TO CONSERVATION

22.1 Introduction:

Over the years, adaptive management in the Tiger Reserve has added considerably to the understanding of the intricacies of tiger conservation in the backdrop of typical problems of a rapidly advancing country like ours. The protected area has supported a viable population of tigers for the past many years. So far, no inexplicable instance of any serious downward fluctuation in tiger numbers has been recorded. The topography of Kanha, with its several vegetal cover types, has given rise to different settings and transitions, with good perennial water holes and rocky outcrops, with natural shelters and dens. All these physiographic and habitat attributes have made the Core Zone a wonderful tiger nursery. Effectively juxtaposed and interspersed, these wildlife habitats have sustained a large number of ungulates, a good prey base for tigers. Besides, stringent and pro-active protection and adaptive management practices over the years have also ensured outstanding natal areas for tigers within these habitats that have since long witnessed a huge number of tiger cubs reared to adulthood and integrated into this wildlife ecosystem.

22.2 Natal Areas of Tigers:

As already mentioned above, the Core Zone supports excellent natal areas of tigers in different vegetal cover types. These natal areas have traditionally borne witness to the safe rearing of a large number of cubs and their integration into the tiger population of the protected area. These natal areas are of immense importance for tiger conservation and needs to be protected and developed for this purpose.

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22.3 Population Dynamics:

Several important concepts have also been developed from our knowledge of the dynamics of and life events in tiger populations, which are monitored and managed in the protected area on the basis of these crucial scientific understandings. Some basic concepts derived from the above include social organization and land tenure system, home ranging and territoriality, and the source and sink population phenomenon. Now it is established knowledge that tigers need tranquility and undisturbed habitat for breeding and survival to a normal span of around 7-9 years for males and 12-14 years for females in the wild. Tigers have such a high reproductive potential that if there is sufficient prey base and the population is well-protected against the usual decimating factors, they can contribute enormously to a sinking population outside. This is the reason why the number of breeding females in a tiger population is of vital importance to wildlife managers. A viable population of tigers consists of 80-100 animals, with at least 20 breeding females in an inviolate area of around 800-1000 sq.km (Jhala et al., 2008).

The tiger is a highly mobile and long ranging animal and its survival precariously depends on genetic exchange with other tiger populations in the landscape. In places like Kanha, with a good tiger population, the inherent mechanism in social organization and tenurial complex results in several tendencies/ events within the population, such as association, dissociation, dominance, infighting and death. Consequently, some tigers have to move away to peripheral and sub-optimal habitats, even outside the protected areas. Needless to add such suitable habitats, abundant prey and cover are scarce outside the Core Zone. These tigers have to face a hostile environment of diverse land uses and poaching that ultimately lead to their extermination. In this way, the Core Zone cannot carry a tiger population beyond a certain limit, and the survival of spill-over tigers outside the Core Zone is rendered difficult by the incompatibility of land uses for tiger conservation. These incompatible land uses also include many managed forest divisions where forestry operations/ workings prevail over tiger conservation, and the degree of protection is perilously low.

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22.4 Ecological Nucleus:

Presently, the Core Zone commands an excellent ecological nucleus for the source population of tigers in this tiger eco-region or tiger landscape of around 10000 sq. km. in Central India. Kanha supports, though fragmented, natural linkages/ connectivity with several other wildlife protected areas in the region, viz. Phen WLS (MP), Bandhavgarh and Pench TRs (Madhya Pradesh), Bhoramdeo WLS and Achanakmar TR (Chattisgarh), Nagzira WLS and Pench TR (Maharastra). The connectivity between Kanha Tiger Reserve and these protected areas may be fragile, there is an ample scope for ensuring gene flow from the Kanha core conservation unit by resorting to appropriate site-specific restorative management. Thus, Kanha Tiger Reserve is considerably significant as a conservation nucleus. Besides, it affords ample scope for fostering eco-regional development to complement the conservation initiatives. Now as breeding tiger populations in the Core Zone forms the source from which tigers disperse throughout connected forests to maintain tiger occupancy of entire landscapes, protecting and managing these source populations is the crux of tiger conservation.

Tiger movements have been reported frequently outside protected areas, sometimes even in the unlikeliest areas in the landscape, such as fragmented forest patches, cultivation fields and close to habitations. However, most of these reports were not relied upon completely due to lack of concrete evidence. In the recent past, camera traps and radio telemetry have helped in the identification of some of these tigers as immigrated from/ emigrated to the Core Zone itself. The movements of radio-collared tigers well outside the protected area have also confirmed the use of existing, though fragmented, connectivity to some extents in the landscape. Of late, some excellent field studies on genetics, long dispersal distances covered by tigers and on the dynamics of their population in the Core Zone have added to our knowledge of landscape approach to the conservation of tigers in this eco-region.

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22.5 Field Studies:

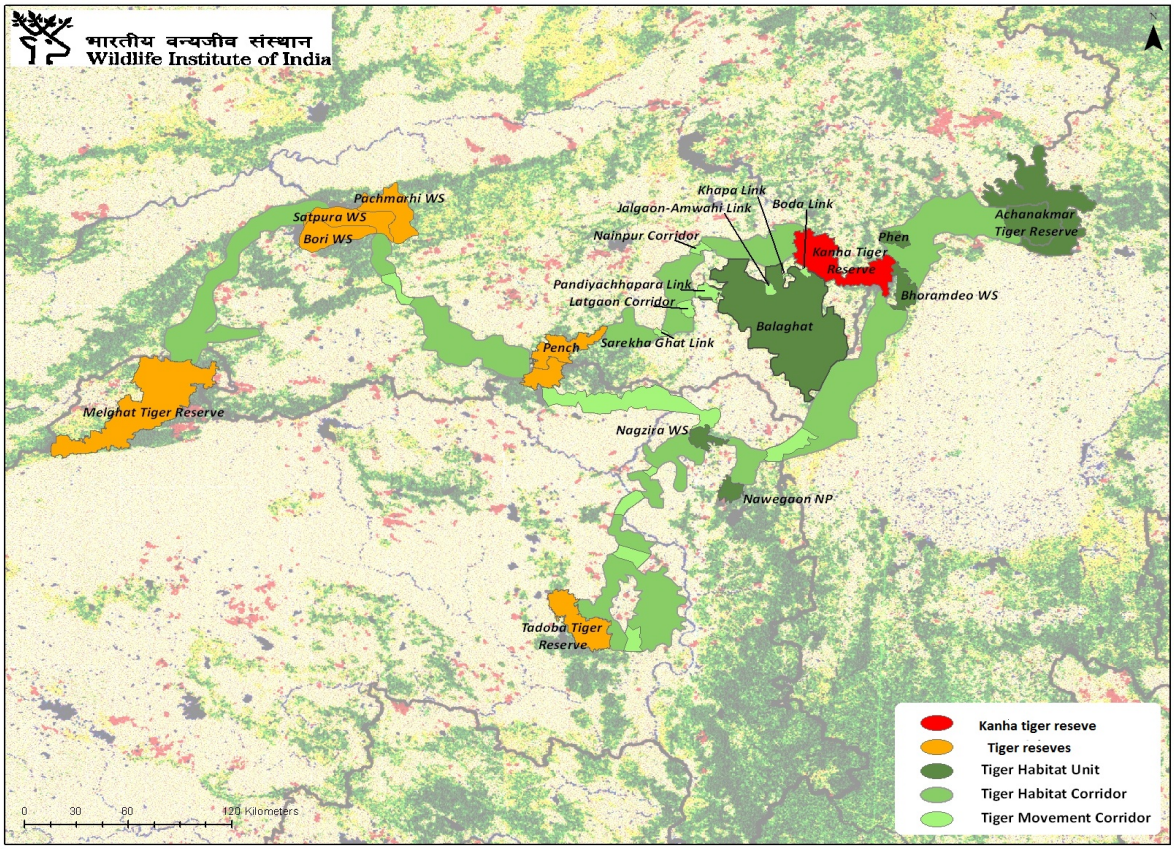
22.5.1 **Identification of Linkages:** The following potential linkages have been identified by Jhala et al. (2011a) for the dispersal of tiger from Kanha Tiger Reserve:

Kanha- Pench Corridor: This is the most important corridor for the tiger movement as the recent study by Jhala et al. (2011b) has also confirmed.

Kanha- Achankamar Corridor: This linkage ensures the eastward connectivity of the important Pench-Kanha-Achankamar landscape through the forests of Phen Wildlife Sanctuary (KTR) and the reserved forests of the Mandla & Dindori forest divisions along the border of Chhatisgarh.

Kanha-Navegaon-Nagzira: A narrow forested strip southward along the border of Chhatishgarh from the forests of Balaghat connects Kanha Tiger Reserve with tiger population of Maharashtra. This corridor passes through degraded forests and needs restoration for better viability.

Location of Kanha Tiger Reserve With Respect to other Wildlife Protected Areas



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22.5.2 **Preliminary Findings of Genetic Analysis:** This study (Jhala et al., 2011b) was conducted by the Wildlife Institute of India, Dehradun and National Tiger Conservation Authority, New Delhi. DNA was extracted from 17 blood/tissues samples of collared tigers and 552 scat samples collected from throughout the area. Microsatellite loci genotyping on the DNA extracts produced a total of useable 213 tiger genotypes. A subset of 150 individual tigers was identified from the 213 genotypes. This amount is representative of more than 50% of the total population in the sampled Tiger Reserves in the area. Calculation of genetic diversity statistics and analysis of population structuring patterns was subsequently conducted on these 150 genotyped individuals to infer preliminary generalizations about the allelic diversity, and other population genetic parameters. The diversity values across the seven loci are highly informative (6-11 alleles per locus, 63 to 80% heterozygosity) and have a combined probability of identity - siblings value of $1.8x10^{-3}$. In other words, the low overall PI score obtained here means that 1 individual in a population of 500 related sibling individuals carry the identical DNA fingerprint.

Tentative results of the STRUCTURE analysis reveal moderate to high levels of population structuring among the major sampled populations. The bar plot in Figure B of individuals assigned to the five major populations show ongoing isolation in the Bandhavgarh and Satpura populations, genetic exchange between Pench and Kanha at modest levels with both populations having some cross-assigned individuals, and reduced gene flow between Pench–Melghat and Kanha-Melghat. The genetic assignments of individuals from Achanakmar, Bhoramdeo, Indravati and including two from Bandhavgarh are cross-assigned to the Kanha population. Population-wise genetic diversity estimates are high, heterozygozity values being highest in Pench (73%) and lowest in Bandhavgarh (57%), while the *Fst* estimates of genetic isolation was highest in Bandhavgarh (0.3361) and lowest in Pench (0.1272) reflecting the degree of isolation and connectivity of these two respective populations. On the other hand, despite the low *Fst* estimate, the

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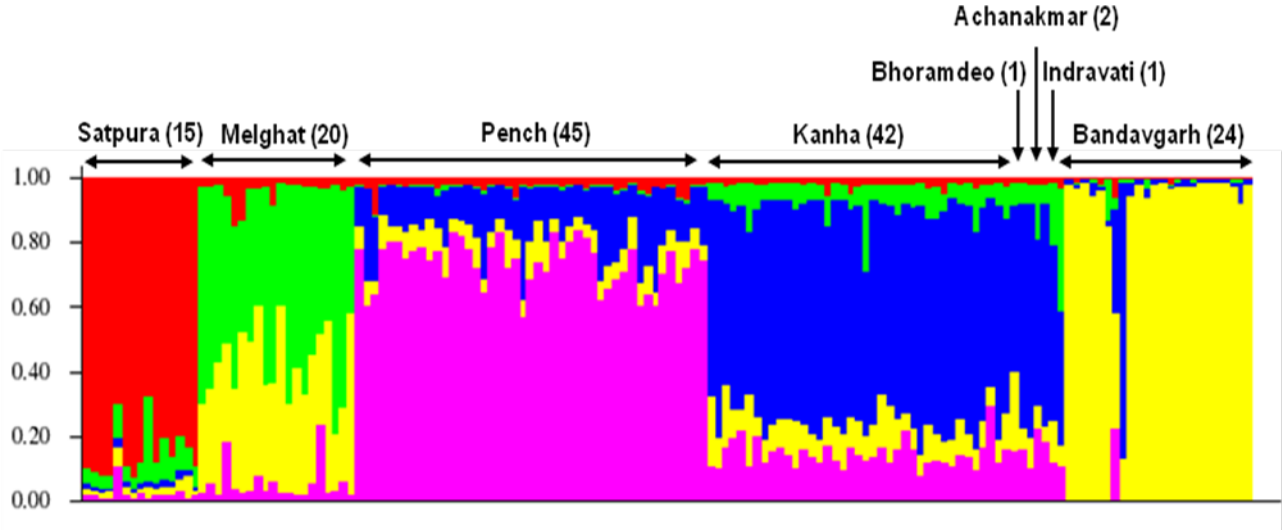
Satpura population distinctly showed structuring. The degree of admixture (α local) was highest in Kanha and Pench, while very low to moderate levels were observed in the other populations. Allele frequency divergence among populations shared similar values between most populations, and overall was not very conclusive. Though tentative, these results based on both the classical *Fst* values and the newer model based individual clustering methods provide definitive evidence of fragmentation induced population genetic structuring among all five sampled source populations. The population in Kanha is as a major source for dispersing tigers in the landscape and the barplot summarizes the importance of this finding. All tigers from Bhoramdeo and Achanakmar were assigned to the Kanha population. Some individuals from Pench, Bandhavgarh and Indravati were also assigned to Kanha, and a major proportion of the Melghat population shares genes with Kanha.

Figure B: Summary plot of estimates for population-wise assignment of individuals obtained from STRUCTURE analysis. Y-axis depicts the membership coefficients (Q values) for each individual to assigned populations. Distinct structuring between all five sampled populations.



22.5.3 **Tiger Connectivity in Central India:** This study was conducted by Messrs Aditya Joshi, SrinivasVaidyanathan, Samrat Mondol, Advait Edgaonkar and Ms. Uma Ramakrishnan of the National Centre for Biological Studies, TIFR, Bangalore. The highlights of this study include that dispersal is an ecological parameter with evolutionary consequences. Absence of dispersal results in

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isolated populations and loss of genetic variation. This is particularly true for species with small individual populations that are patchily distribution, such as large carnivores. For tigers the largest of the wildcats, their body size suggests long dispersal distances.

However empirical studies do not support long dispersal distances. Is this because tiger populations are far apart with intervening landscape, or because most populations are too small to participate in dispersal and gene flow?

The study investigated tiger population connectivity using genetic methods. It focused on one of the three largest tiger landscapes in India, which includes six reserves (Kanha, Pench Maharashtra, Tadoba, Melghat, Nagarjunasagar Srisailam and Nagzira; between 150 and 3500 sq. km.) with varying tiger density (1.5 to 8.7 individuals /100 sq. km.), and separation (~91 to 631 km. apart). Genetic assignment (14 loci) based on 55 individuals (12-30% of each population) suggests that tigers are moving over 600 km.

The study suggests that six of the seven potential dispersers are either going into or coming out of Kanha. These data also suggest that Kanha is a dynamic player in this landscape in terms of dispersal. Particular "movements" include between Kanha and Nagarjunasagar. Assignments tests were confirmed with alternate methods. While assignments are not confirmatory of movement, they have been used extensively to investigate genetic connectivity.

Genetic connectivity was also investigated using population differentiation (F_{st}) and recent migration rates (last two generations). Further analyses at the regional level (park and 10 km radius) reveals that emigration (rates of movement out of the park) positively correlates with tiger density. Being a high-density park, Kanha has the highest emigration rate in this landscape. The study, however, did not include Bandhavgarh and Pench, Madhya Pradesh in these analyses, but studies are ongoing in these protected areas.

The study also assessed (using mantel tests) correlations between resistance to movement (due to varying landscape features) and genetic emigration rate. Just outside the park (10 km. radius), tree cover, urban settlements and tiger habitat also affect emigration. Given the buffer surrounding Kanha, the analyses suggest that from a regional perspective (density and edge) Kanha is an important source for tigers in this landscape.

At larger spatial scales, landscape analyses reveal that genetic differentiation (F_{st}) is not a function of geographic distance. However, urban settlements have a negative effect on connectivity. Emigration rates over the last two generations strongly correlate with parameters that quantify footprint of human settlements.

22.5.4 **Tiger & Other Carnivores in the Kanha-Pench Corridor:** WWF-India has also undertaken a study on the presence of tiger and other carnivore species in the Kanha-Pench corridor (Jena, J, J Borah, C Dave & J Vattakaven (2012). The study was part of the All India Tiger Monitoring Exercise and was conducted in collaboration with National Tiger Conservation Authority, Wildlife Institute of India and Forest Department of Madhya Pradesh. The gist of the study is as under:

22.5.4.1 **Tiger Presence and Occupancy:** The intensive study that lasted forty five days revealed that of the over 2200 sq. km. of potential tiger habitat available in the Kanha-Pench Corridor (KPC), tigers occupy 84%, or an area of 1848 sq. km. (SE = 332.64 sq km) (Fig-1).

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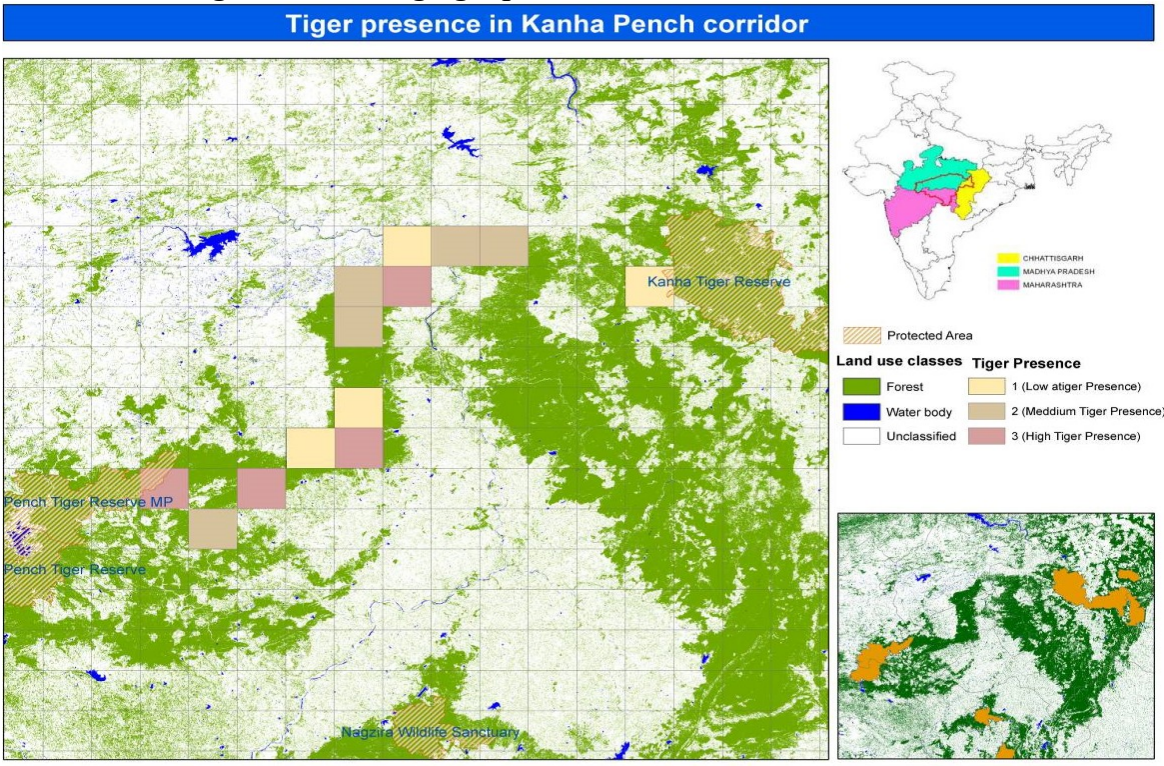
Figure.1. Showing tiger presence in Kanha-Pench Corridor



Tiger presence was high in the South Seoni division, as the majority of the KPC falls in this division. But among all the ranges sampled in this division, Rukhad, Kurai, Keolari, Barghat and Ugli range hold good tiger presence. It's worth mentioning that since Rukhad and Kurai are adjacent to the Pench Tiger Reserve and the prey density in these areas is good, the area support some tigers, which venture out of the Tiger Reserve. Besides this study, there have been several tiger sightings in the Kopijhola beat of Barghat range, Rukhad and Kurai range.

The camera trapping of cattle kills revealed some more interesting facts on large carnivores of KPC. Information on cattle kills along the corridor gathered by WWF-India field staff from the Forest Department and local people from July 2010 till date. The payment of interim relief along with setting up of camera traps at livestock kill-sites was started from January 2011, after getting formal

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permission from the Forest Department. The cases recorded up to May 2012 were used for the analysis.

A total of 181 cases of cattle kills have been reported from January 2011 to May 2011. The actual number of cases would be higher than this figure as information from the entire corridor wasn't available. Out of 181 cases, on 130 (72%) occasions cattle owners were provided interim relief by WWF-India. For rest of the 51 (28%) cases, interim relief couldn't be paid either due to delay in getting permission from forest department in initial stage or due to a delay in reporting the case. A total sum of Rs. 1,25,000.00 was paid to cattle owners as interim relief for cattle depredation.

Carnivore identified on cattle kills in Kanha-Pench corridor

Tigers	**11 individuals**
Leopards	**7 individuals**
Hyena	**4 individuals**
Jackals	**10 occasions**
Wild dogs	**3 occasions**

It was found that out of 181 cases reported, 93 (51.4%) kills were made by tigers, 69 (38.1%) by leopards, and in 16 (8.8%) cases, it was difficult to identify the carnivore involved. Wild dogs rarely predated on cattle (only 3 incidents) and mostly killed goats and cattle calves. Though other carnivores like hyenas and jackals are common in this corridor and on many occasions have been photographed on kills by camera traps, they remain confined to scavenging the carcass.

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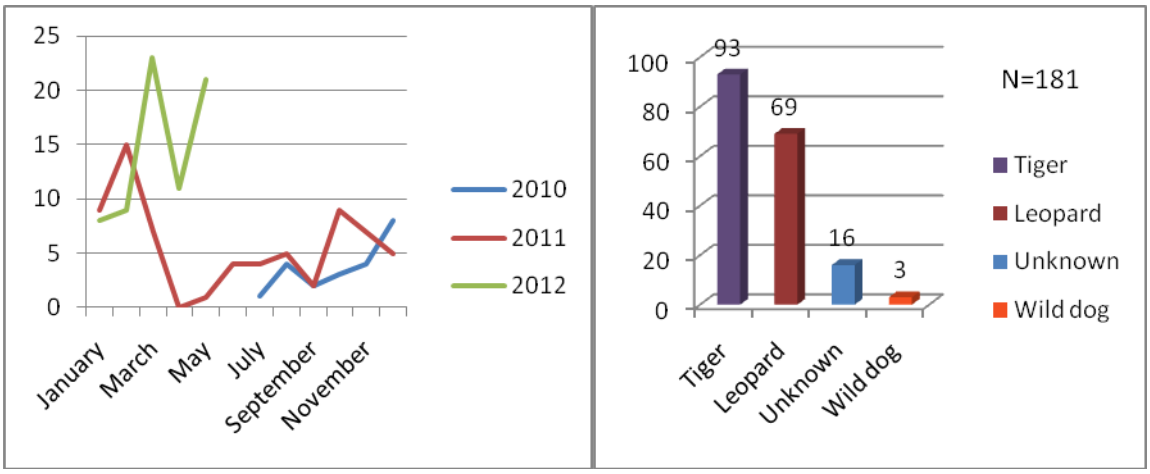
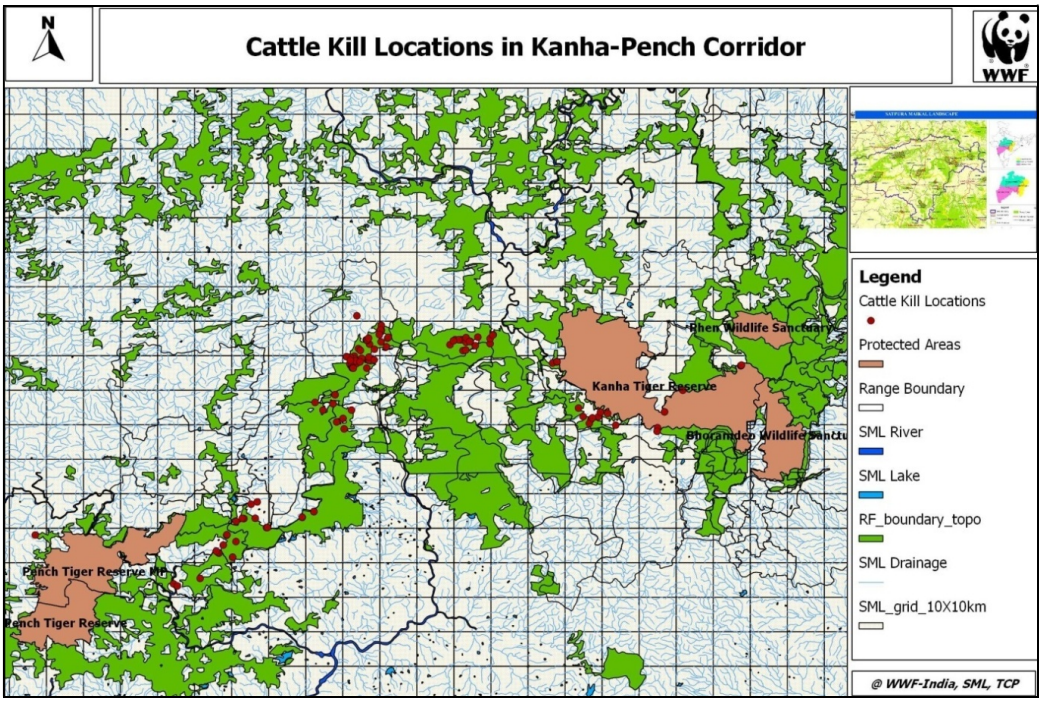
Graph.1. Monthly variation of cattle depredation cases
Graph.2. Showing carnivores involved in cattle depredation cases



The study not only recorded 11 different tigers using this corridor but also recorded 7 individual leopards and other carnivores. Overall, the compensation scheme covered 37 villages and 12 ranges in the corridor. The primary objective of reducing the retaliatory killing of tigers to zero has been achieved by providing immediate interim relief to cattle owners.

Figure.2. Showing Cattle kill locations in Kanha-Pench Corridor



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In addition, the operational area of two individual tigers was mapped through camera trap capture locations to know their habitat use in the KP corridor, which is as follows:

Figure.3. Showing tigress (KF1) trapped locations

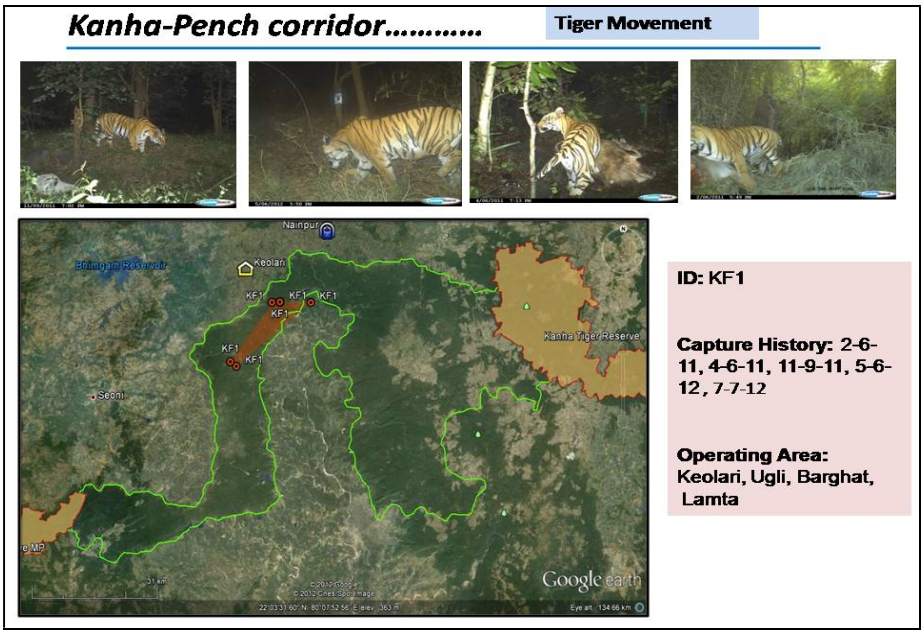
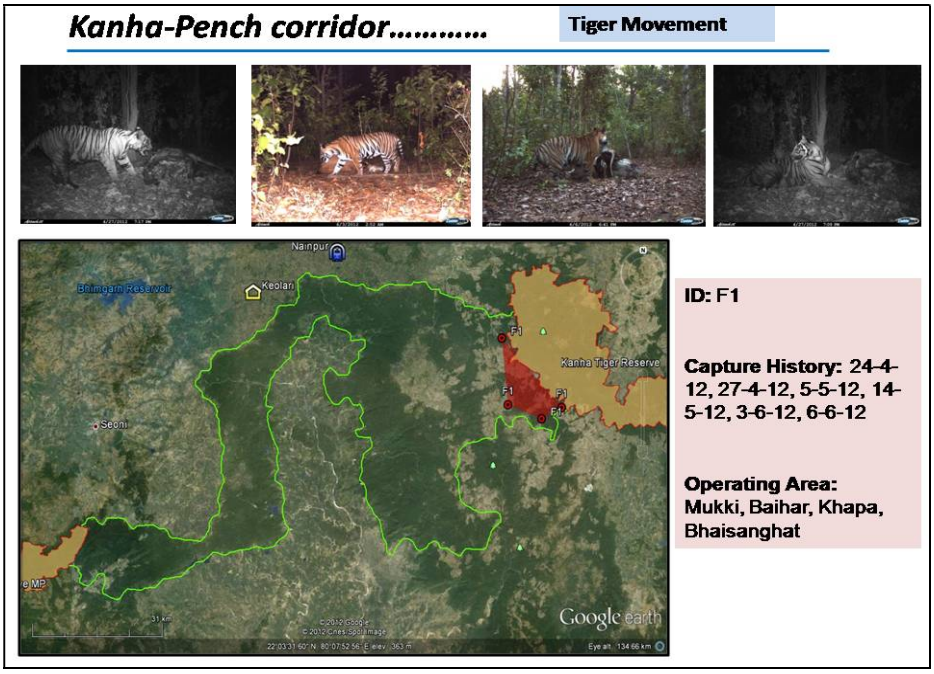


Figure.4. Showing tigress (F1) trapped locations



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22.5.5 **Intensive Population Monitoring & Study of Tiger Dispersal in Kanha Tiger Reserve:** Under a joint initiative of the Wildlife Institute of India, Dehradun, National Tiger Conservation Authority, New Delhi and MP Forest Department, Bhopal, this initiative was taken up. The report of Jhala et al. (2010) summarizes these findings as under:

Ten tigers were radio-collared for the study. These included 3 adult females, 1 sub-adult female, 2 Adult males, and 4 sub-adult males. The radio-collared tigers were radio-tracked and monitored from elephant back during the study period.

22.5.5.1 **Movement Patterns:** A total of 4877 independent locations were obtained by tracking these tigers. The tigers radio-collared included sub adult females, sub adult males, adult females and adult males. Their weights ranged from 84 kg (sub adult female) to over 200 (adult male) and lengths from 2.51 m to A total of 4877 independent locations were obtained by tracking these tigers. The tigers radio-collared included sub adult females, sub adult males, adult females and adult males. Their weights ranged from 84 kg (sub adult female) to over 200 (adult male) and lengths from 2.51 m to 2.97 m. The average Daily Distances Moved (DMD) in 24 hours by adult male tigers was 8.85 km and that by adult female tigers was 6.87 km. Within adult females, those with small cubs (<3 months) moved the shortest distances (avg. 4.50) and a female with large cubs (6 months and above) moved the largest distance (avg. 8.10). Subadult males in their dispersal phase moved a mean distance of 5 km. whereas sub adults partially dependent on their mothers and associated with their natal areas moved less than half of this and had the shortest daily distances (avg. 2.39). The maximum distance moved in a day was 24.4 km for an adult female without cubs followed by 21.1 km for a sub adult male in dispersal phase and 18.9 km for an adult male. The distance moved by males would be expected to increase if sampled at similar interval to the adult females.

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The average Straight Line Distances (SLD) between consecutive days were much less for all tigers with adult males having the largest distances followed by sub-adult males. Adult females with cubs less than 3 months had the shortest SLD of 0.58 km.

The ratio of SLD/DMD was highest in males (adults and sub adults in dispersal) and lowest in adult females with small cubs, indicating that males moved in a different manner than females. The average intra specific distance between adult females located on the same day was 2.63 (SE=0.14; Range 0 to 5.75). Average rate of travel for all tigers as estimated from the 24 hr continuous sessions (413) was 0.25 km./hr. (SE=0.08; range: 0.02 to 1.01).

22.5.5.2 **Ranging Patterns:** Male ranges were found to be more than 10 times larger than female ranges. The estimated average 95% kernel home range, of adult female tigers in the intensive study area was 10.37 sq km (SE=0.65; n=4) and that of the adult male tigers was 110.34 sq km.(SE=11.73, n=2). Independent sub-adult males had an average range of 39.79 sq km (SE=2.63; n=2).

22.5.5.3 **Population Estimation in the Kanha Tiger Reserve:** It was done by selecting two sample sites, namely Kanha-Kisli-Mukki and Supkhar. The results are summarized as under:

Year	Landscape	Effort (Trap nights)	Population Estimate N±SE	Capture probability *p*	Density ±SE / 100Km^2 (MMDM/2)	Best fit Model	Density ±SE / 100Km^2 MLSECR*	No. of unique individual captured M_{t+1}
2006	Kanha	**2860**	**45 ±4.5**	P= 0.0558	**07.39±0.64**	M_h	**6.3 ± 1.0**	39
2006	Supkhar	**2016**	**05 ±0.39**	P= 0.5200	**2.4**±0.28	M_o	**2.07±1.01**	05
2010	Kanha	**1736**	**28 ±0.86**	P=0.4032	**6.9 ±0.66**	M_h	**5.61±1.1**	27
2010	Supkhar	**1368**	**10 ±1.5**	P=0.2333	**2.75±0.76**	M_h	**2.08 ±0.68**	10
2011	Kanha	**2900**	**38 ±4.67**	P=0.3142	**8.70 ±1.10**	M_h	**5.9±1.04**	34
2011	Supkhar	**1900**	**13±0.7**	P=0.1900	**3.5±0.46**	M_{th}	2.50 ±0.7	13
2006	Kanha	**2860**	**45 ±4.5**	P= 0.0558	**07.39±0.64**	M_h	**6.3 ± 1.0**	39
2006	Supkhar	**2016**	**05 ±0.39**	P= 0.5200	**2.4**±0.28	M_o	**2.07±1.01**	05
2010	Kanha	**1736**	**28 ±0.86**	P=0.4032	**6.9 ±0.66**	M_h	**5.61±1.1**	27
2010	Supkhar	**1368**	**10 ±1.5**	P=0.2333	**2.75±0.76**	M_h	**2.08 ±0.68**	10

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22.6 Conclusion:

This study concludes that due to the high prey density in most parts of the reserve breeding tigresses require small territories 10.37 (SE= 0.65) km. , while breeding male territories were 10 times larger 110.34 (SE=11.73) km and covered territories of 2-4 breeding tigresses. Sub-adult males stayed within and around their natal areas till over 3 years old after which they explored very large areas. It was this age group that dispersed to maintain demographic and genetic contiguity across the landscape with other source populations (in this case, with Pench and Achanakmar Tiger Reserves). Of the six sub-adult males that were intensively monitored only one was successful in establishing a breeding territory in Kanha, two of these tigers were killed in territorial disputes between the age of 4-5 years and three were believed to have dispersed long distance between the age of 3-5 years as their radio contact was lost and they were not observed again in the reserve. One of these dispersing sub-adult males (3.5 yr.) is believed to have reached Pench Tiger Reserve as it was sighted on two occasions in the periphery of this Tiger Reserve.

Intensive cameras trapping in Kanha & Pench have also confirmed that the Kanha-Pench corridor is a route of dispersal. One sub-adult male that was captured in 2006 in the Karmajhiri area of the Pench tiger reserve entered Kanha in Feb. 2010 and finally established his territory in the Mukki range after killing the resident male of Mukki in September 2010.

Camera traps placed in the Kawardha Forest Division, Chhatishgarh, for confirming cattle kill by tigers have also proved that two sub adult tigers have moved from Kanha into the Kawardha division.

The above field studies have confirmed our empirical knowledge, acquired through years of conserving tigers that the Tiger Reserve Management should strengthen tiger conservation from the standpoint of landscape level. Besides the proposed management

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practices given in the preceding chapters, wildlife mainstreaming in the buffer zone, effective corridor planning involving contiguous territorial divisions, effective monitoring of tigers, and the sharing of relevant information with neighboring divisions and protected areas are very essential for tiger conservation in the Kanha landscape.

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CHAPTER – 23

MISCELLANEOUS ISSUES

23.1 Active Wildlife Management:

The Kanha Core Zone is one of the best wildlife protected areas of the country, and has witnessed a host of wildlife conservation practices, including the conservation of some endangered species. In this way, the Core Zone has gained much experience and managerial expertise over the years. With sizeable populations of different wildlife species to share with some other protected areas, and its own need to reintroduce some species into the Core Zone, Kanha is also expected to play an important role in active wildlife management. As described in an earlier chapter of the part-I, the Park Management has successfully translocated a few gaur, a tiger and two tigresses to some other protected areas. The following projects are proposed under active wildlife management:

23.1.1 **Translocation of Gaur:** The Core Zone has a good population of the gaur, around 1600, and the Park Management can spare another 100 animals for translocation to other protected areas.

23.1.2 **Translocation of Barasingha:** This has already been discussed elaborately in the chapter of Barasingha Conservation in part-II. Around 50 animals can be translocated to the Satpura Tiger Reserve, Phen Wildlife Sanctuary and the Van Vihar National Park to ensure alternative habitats for this endangered cervid.

23.1.3 **Translocation of Chital:** The Core Zone supports a large number of chital, and around 1000 chital can be spared for translocation to wherever they are required.

23.1.4 **Reintroduction of the Wild Buffalo:** Wild buffaloes (Bubalus bubalis) are also proposed for reintroduction into the Supkhar range. As per Forsyth (1889) and

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Brander (1923) the Mandla district and the east and north-east of Balaghat district supported these animals in fair numbers. The animals were also reported to occur in the Banjar valley areas. Besides, some years back, a team constituted by the Wildlife Institute of India, Dehradun to conduct a field survey for the assessment of the status of the wild buffalo in undivided Madhya Pradesh, also recommended the reintroduction of a small breeding group into the Kanha Tiger Reserve.

The Supkhar range of Core Zone harbours, to a large extent, an ideal habitat for the wild buffalo. Besides moist and grassy glades, there are also several swampy/ marshy water bodies facilitating, at present, the habitat requirements of the guar. The wild buffalo is primarily a grazer and water loving animal, and likes wallowing. The Park Management feels that the introduction of around 30 wild buffalo in the Supkhar range would not pose any problem in the initial stages, and may, in future, build a good population.

As the wild buffalo and the guar are sympatric competitors and share the overlapping niches, the introduction of more calves may lead to the degradation of habitats in the coming years. Besides, the contamination and overuse of swampy water bodies in the Supkhar range may also threaten the small population of barasingha. Therefore, the wild buffalo should be maintained initially only in an *in-situ* enclosure and be periodically released into the wild.

23.1.5 **Reintroduction of the Blackbuck:** The blackbuck (*Antelope cervicapra*) is one of the common antelopes in India. In the Kanha landscape, small herds of blackbucks were reported on plateaus to the east of the Banjar river passing through the Baihar tehsil, and in several valley villages. The Core Zone also supported, till a few years back, a small population of the antelope. The population, however, declined steadily since 1975, and there was only one animal in 2004. The small population occupied only the contiguous and large meadows near the erstwhile Kanha forest village. The Kanha Management also kept some founders in an enclosure for safe multiplication in the Kanha Range. Most

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animals, however, fell prey to pythons. The populations of blackbuck in the past years are as under:

Year	Population	Year	Population
1974	93	1990	Figures not available
1975	79	1991	Figures not available
1976	76	1992	21
1977	67	1993	15
1978	66	1994	13
1979	69	1995	9
1980	33	1996	3
1981	30	1997	2
1982	28	1998	2
1983	27	1999	2
1984	33	2000	2
1985	32	2001	2
1986	32	2002	1
1987	32	2003	1
1988	32	2004	1
1989	Figures not available	2005	0

The blackbuck prefers short grass areas and agricultural crops, and these habitat requirements are difficult to meet with in the Core Zone. As the area has been well protected against cattle grazing for a long time, the ground vegetation, including grasses, remains dense and tall most of the year. Such dense vegetation along with the proximity to shrubs and bushes weaken the anti-predator strategy of the blackbuck, rendering it vulnerable to predation.

However, there are some extensive areas of short grass with low density of shrub and woody species in the Core Zone and they may serve as good rehabilitation sites for the blackbuck. These sites are Matigahan, Yusufdadar, Silpura, Mundidadar, Deoridadar, Adwardadar and Dulhadadar. It is proposed that at least 100 blackbucks should be systematically translocated from the Bandol and the Chhapara ranges of the North Seoni Division and Narsinghpur and release them straight into the wild. The reintroduction of blackbuck will add to the biodiversity of the protected area.

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23.2 Monitoring of Tiger Conservation Plan:

Monitoring of the efficacy and efficiency of policy statements and plans is very important in wildlife resource management planning. The monitoring of the Tiger Conservation Plan should start as early as possible to avoid loss of valuable information. Regular monitoring is very critical for determining whether the TCP is meeting its stated goals and objectives vis-à-vis subsequent instructions. The Reserve Management may also outsource this task to some reputed institutes/organisation that can design an effective and systematic programme for this purpose. Some important indications for the monitoring of the TCP are as under:

- Phase-IV,
- M-STrIPES
- Quality of grasslands and usage
- Administrative – MEE
- Supervisory
- Advisory

23.3 Erection of Chain-Link Fencing:

The Park Management can reduce biotic pressure in sensitive areas of the Core by erecting chain-link fences. The erection of these chain-link fences in select areas will prevent intrusion of villagers and their cattle into the Core Zone, this will minimize disease transmission and man-animal conflicts in the Core and its immediate surrounds.

23.4 No Felling/ Removal of Trees:

As already prescribed in Chapter-12 of Habitat Management, no forest crops should be felled/ removed in this operation. If under exceptional circumstances such fellings/

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removals are inevitable in the Core area, proper permission should be obtained from the National Tiger Conservation Authority.

23.5 Payment of Crop Compensation:

Currently, compensations for crop raiding by wild animals in the forest and revenue villages of the Tiger Reserve are paid by the revenue department under the Madhya Pradesh Public Service Guarantee Act, 2010. The Act has been notified and provides for time limits, responsible officers and appellate officers for these payments. The Park Management has to coordinate with the revenue department in the registration of and expeditious payments in such cases.

23.6 Wildlife Week Celebration:

The students of the various schools in the Core Zone shall be the target group of wildlife week celebrations every year. The Park Management shall take up the following activities during the wildlife week.

- Essay, drawing, quiz competitions.
- Holding of exhibitions at range headquarters.
- Wildlife film shows at villages.
- Distribution of stickers/ posters/ brochures to schools.
- Rewards to the winners of the above competitions.
- Park excursions for the winners.

23.7 Staff Health Management:

Needless to add, the credit of the renown and fame of the protected area go to the hard working and sincere frontline staff of the Kanha Core Zone. Service conditions in the Core Zone are comparatively very difficult owing to the sheer responsibility of protecting forest and wildlife in the protected area. Local officers and frontline staff always have to

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stay inside the Core Zone. There is also a good network of patrolling camps and most are remotely seated and also pose typical problems. Most are non-family postings in the Core Zone, and living continuously in frightening isolation and away from families do take tall on the mental health of the frontline staff. The Park Management has to face many such cases of medical emergencies in the Core Zone.

There is also a medical dispensary at Mukki. Till around 15 years back, a physician used to be posted to this health clinic and was responsible for the treatment of the staff of the Core Zone and the people of closely situated villages. After the retirement of this physician, the post fell vacant and despite much effort by the Park Management no regular physician could be posted. In the meanwhile, the frontline staff also had to suffer a lot for want of routine treatment and timely medical interventions. Ultimately, after such a long time and so much effort, the Park Management was able to procure fulltime services of a retired physician on contractual basis in 2007-08. Presently, the physician is in-charge of the Mukki Forest Dispensary, which is modestly equipped with necessary medical instruments and medicines. There are also two ambulances in the Core Zone for taking the physician to far-off places within the Tiger Reserve, and also transporting patients to the Mukki dispensary for treatment.

Generally, the staff suffers from the following diseases/ ailments:

Gastroenteritis	Infective hepatitis	Malaria	Typhoid	Pneumonia	Gastritis
Tuberculosis	Hypertension	Allergies	Insect bites	Skin infection	Cold & cough

The Park Management should ensure to take care of general health of the staff of the protected area. The following broad guidelines are proposed:

- The Mukki dispensary should always be well-maintained with all necessary equipment and medicines. The physician should be periodically consulted for his professional advice and requirements.

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- Both the ambulances should always be well-maintained and in readiness for any medical emergency.
- The practice of supplying the frontline staff with annual first-aid kits should continue. The medicines for this first-aid kit and their doses should be prescribed by the CMHO/ a senior physician of the district hospital of Mandla. The medicines of first-aid kits are appended **(Appendix-62)**.
- The Park Management should also make effort to arrange special medical camps for the check-up and treatment of frontline staff through the help of such NGOs/ doctors as are interested in the welfare and wellbeing of the protectors of wildlife.
- The health of the villagers of forest villages is also the responsibility of the Park Management. The outbreak of any epidemic should be immediately reported to the CMHO of concerned district and district Collector.

23.8 Disposal of Stocked Fallen Antlers:

The male animals of cervidae (deer) in the Core Zone drop their antlers annually and re-grow them. The antler growth coincides with the overall growth period of the habitat in the monsoon. Antler is a simple extension of bone and it is reported to have a calcium-phosphate matrix of hydroxyapatite integrated with calcium carbonate, and its composition is similar to that of human bones. Besides, it also contains related mineral compounds and organic material derived from the habitat through food. Thus, this phenomenon may also cause calcium depletion in the habitat to some extent, and the natural cycle ensures recycling of the same through the fallen antlers. Besides, deer also sometimes takes bites at fallen antlers to benefit from the mineral salts contained in them. Rodents also nibble away the fallen antlers. However, based on past experience, fallen antlers are collected by the Park Management to avoid pilferage, and later illegal sale, and used to be disposed off by incineration as per instructions. Besides, apart from the risk of pilferage, fallen antlers also lure miscreants to sneak into the protected area, who set fire to the grasslands to collect the same in dry summer moths.

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Deer antler is a common constituent in the Chinese pharmacology. China is also a major producer and consumer of deer antler products and has probably the longest history of medicinal use of deer antler as well as production through deer farming. It is, however, surprising, that New Zealand is probably the largest producer of deer antler in the world, followed closely by Australia and Canada. Besides, Korea is also reported as the world's largest user of antlers of almost all species.

Presently, there are huge stocks of these antlers dumped in various buildings in the Core Zone. Needless to add, this stock should be disposed off at the earliest so that the buildings may be used for more important purposes. The Park Management wrote to the Principal Chief Conservator of Forests (Wildlife), Madhya Pradesh, requesting its disposal by having it grinded/ crushed and spread all over the grasslands for natural recycling, and the permission has been accorded to go ahead as proposed. Now the Park Management should see to it that the huge stock of antlers is disposed off properly.

23.9 Mortality Survey:

This should be continued as before every six months. The camp staff should be suitably instructed to collect all mandibles/ skulls from the habitat for an assessment of species specific/ age-specific mortality.

23.10*Kanha Workers Sahkari Sakh evam Kamgar Samiti Maryadit*:

One of its own kind, the Kanha Workers *Sahkari Sakh evam Kamgar Samiti Maryadit*, Kisli was formed under the Society Act, 1960 for the welfare of the Kanha staff. Every serving individual of the Tiger Reserve, including daily wagers, are the members of this Society. The members have to pay annual membership fees of the Society. As service conditions, specially in the Core Zone, are very difficult, and most are non-family postings to remotely located patrolling camps, the staff sometimes has to go 8–10 km. for weekly market to buy household goods. In this way, the Society provides the remotely placed wildlife personnel with the essentials of the household at concessional prices. The

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Society also gives almost interest free soft-loans to the frontline staff and daily wagers on easy installments. Moreover, the Society also caters to the needs of tourists at Khatia and Mukki entry points of the Core Zone. It makes arrangements for breakfast, meals and basic daily needs on payment basis at both the entry points. Through its sale counters, the Society also deals in mementos and other reminiscences of the Tiger Reserve, which include: T-shirts, caps, key rings, badges, stickers, cards, posters, the Kanha literature etc.

The continuance of this Society is of vital importance for the staff of the Kanha Tiger Reserve, and the Park Management should ensure its proper functioning and intended benefits to the field staff. The Deputy Director, Core is presently the president of the Society, and he is assisted by a few officers and field staff as directors. There is already a code of bylaws to ensure the timely elections of office bearers, holding of meetings, auditing of the Society's account, membership fees and other related issues.

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CHAPTER – 24

ORGANIZATION, ADMINISTRATION & BUDGET

24.1 Tiger Steering Committee:

As per provision under Section 38U of the Wildlife (Protection) Act, 1972 (as amended upto 2006) the Govt. of Madhya Pradesh has constituted a state level steering committee for three years for ensuring coordination, monitoring, protection and conservation of tigers, co-predators and wild animals in the state. The constitution of the steering committee has been notified vide No. F-15-2-2009-X-2, Bhopal dated 20-03-2009. The structure of this steering committee is as under:

(A) Chief Minister, Govt. of MP - Chairman

(B) Forest Minister, Govt. of MP - Vice-Chairman

(C) Govt. Officers (Five):

(I) National Park/ Tiger Reserve, Directors (Two)

(i) Field Director, Kanha - Member

(ii) Field Director, Bandhavgarh - Member

(II) Officer from Tribal Welfare Deptt. (One) - Member

(III) Other Govt. Members (Two):

(i) Addl. Chief Secretary/ Chief Secretary (Forests) - Member

(ii) PCCF, Madhya Pradesh - Member

(D) Wildlife Experts (Three):

(i) Mr. AP Dwivedi - Member

(ii) Mr. Lokendra Singh - Member

(iii) Mr. Eric De Kunha - Member

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(E)	Members of the Tribal Advisory Board (Two)	-	Member
(F)	(i) Representative from the Department of Panchayat (One)	-	Member
	(ii) Member from the Department of Social Justice & Empowerment (One)	-	Member
(G)	Chief Wildlife Warden	-	Member Secretary

24.2 Tiger Conservation Foundation:

Under section-38X of the Wildlife (Protection) Act, 1972 (as amended upto 2006), the State Govt. has to establish Tiger Conservation Foundations in Tiger Reserves in order to facilitate and support their management for conservation of tiger and biodiversity, and to take initiatives in ecodevelopment by involvement of people in such development process. Section-38X (2) of the above Act states several objectives of the establishment of Tiger Conservation Foundation.

The MP State Govt. already has an almost similar body constituted at the state-level. The Madhya Pradesh Tiger Foundation Society was registered on 15-01-1997 under the Madhya Pradesh Society Registration Act, 1973 (No. 44 of 1973). The Society is chaired by the Forest Minister of Madhya Pradesh, with the Chief Wildlife Warden of the State as Secretary of the Society. The other members of the Society include Principal Secretary/ Secretary (Forest), Secretary (Finance), Principal Secretary/ Secretary (Public Relations), Principal Secretary/ Secretary (Tourism), Principal Chief Conservator of Forests (MP), Addl. Principal Chief Conservator of Forests (Development), Addl. Principal Chief Conservator of Forests (Protection), Chairman, Tiger Cell (Addl. Director General of Police/ Inspector General of Police), and four prominent individuals working for wildlife conservation and nominated by the State Govt. Besides, the Field Director/ Director of each Tiger Reserve/ National Park has been made an Executive Director. These Executive Directors have been assigned responsibilities and empowered accordingly.

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The sole objective of the MP Tiger Foundation Society is to conserve tigers and protect wildlife and biodiversity in the state. As the Society strives to achieve almost the same goals/ objectives as are set for the Tiger Conservation Foundation, it is felt that there is currently no need to establish such Foundations as envisaged in the Wildlife (Protection) Act, 1972 (as amended upto 2006).

The rules of Madhya Pradesh Tiger Foundation Society are appended **(Appendix-63)**.

24.3 Coordination with Line Agencies/ Departments:

The Park Management understands perfectly well that the contribution of the district administration of Mandla and Balaghat districts is of utmost importance for the successful management of the Core Zone. The Park Management ensures to hold periodic formal and informal meetings with the officers of district administration and other government departments and discuss various issues of the protected area. The major inputs generally received from the departments of these two districts are as under:

24.3.1 **District Administration:** Generally, the district administration plays a coordinating role between the Core Zone and various other departments to expedite and meet deadlines of important processes/ undertakings in the interest of the Core Zone. Besides, the district administration and the Park Management also work in close cooperation during the visits of State Guests and VIPs.

24.3.2 **Police Department:** The police also lend full support at the request of the Park Management in various eventualities. If required, they help park officers raid places and seize wildlife products, and also assist in the capture of absconded offenders. The role of police also becomes very important at the time of protests/ sit-ins staged by crowds against the Core Zone and government policies. At the district level, important intelligence relating to wildlife offences and offenders is also shared between the Park Management and police department.

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24.3.3 **District Rural Development Agency (DRDA):** Sometimes the Park Management also requests the DRDA to allocate funds for some important field works in the Core Zone to supplement budgets received from the NTCA, New Delhi and State Govt. The National Park has received funds from DRDA, Mandla for wildlife and fire protection in the current financial year under the Mahatma Gandhi National Rural Employment Guarantee Act.

24.3.4 **Health Department:** The Core Zone has remotely located patrolling camps with staff and 17 forest villages with a population of around 7000 people. The Park Management also regards itself responsible for dealing with health related issues of its staff and villagers. At the request of the Park Management, the Mandla and Balaghat health departments have to play an important role to organize health camps in various places to treat staff and villagers. Besides, they also take swift medical action at the time of the outbreak of any epidemic etc. The department also advises medicines for the first-aid boxes for the staff.

24.3.5 **Veterinary Department:** The Mandla and Balaghat veterinary departments play an important role in the vaccination/ immunization of the cattle of the forest villages located inside and those outside close to the periphery of the protected area. Besides, in emergencies, the veterinarians also conduct postmortems on wild animals. District veterinarians also support the Park Management at the time of the outbreak of any infectious disease in the livestock of any forest village.

24.4 Staff Development:

Our governments have been in the forefront of nature/ wildlife conservation for many years, and have also drawn considerable accolades from international community from time to time. There is hardly any need to emphasize the significance of wildlife protected areas in the country. The importance of the protected area network of our country has also ensured a permanent focus of national and international communities/ watchdogs on

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the performance of, and even day-to-day activities, in these protected areas, specially those harbouring rare and endangered floral and faunal attributes and threatened ecosystems. Our commitments to transparency and media activism have also added to our responsibility of managing the protected areas for the posterity.

Achieving the conservation objectives/ goals of a world class protected area like the Core Zone and its consistently successful management requires a clear and futuristic policy of staff development. It is a foregone conclusion that service conditions in the Core Zone are comparatively very difficult owing to the sheer responsibility of protecting forest and wildlife in the protected area. The local officers and frontline staff always have to stay inside the Core Zone. There is a good network of patrolling camps and most are remotely seated and also pose typical problems of living in isolation. Most are non-family postings in the Core Zone, and living continuously in frightening isolation and away from families and physical exertion of daily patrols do take tall on the mental health of the frontline staff.

Needless to add, the efficiency of the field and office staff is reflected in the way in which the whole protected area is managed. The top management has to build-up a disciplined, efficient and well motivated staff for the protected area. The following points are proposed to form guidelines for staff development in the Core Zone:

24.4.1 **Filling-up of Vacancies:** The current position of staff in the Core Zone is appended (**Appendix-21**). Several posts of the field as well as office have fallen vacant and need to be filled up at the earliest. It has to be accepted that the vacant posts of frontline staff in the Core Zone affect overall protection very adversely. Besides, the number of several posts has also to be increased in the light of new initiatives in tourism management, park interpretation etc. Similarly, the growing demand/ pressure of prompt communication and expeditious exchange of information with the higher offices of state and central governments, and routine work at the Mandla head office also underscore the vital need of the filling up of ministerial vacancies. The management should also refer to the previous

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correspondence with the Principal Chief Conservator of Forests (Wildlife), Madhya Pradesh and the Chief Conservator of Forests, Jabalpur Circle and pursue the matter at higher levels.

24.4.2 **Staff Training:** There is no need to emphasize the importance of forestry and wildlife training at all levels of field personnel in a protected area of the renown of the Kanha Core Zone. The Park Management should also ensure, as far as possible, that several untrained forest guards should be sent to training schools every year for one-year training. Similarly, foresters and deputy rangers should also be sent for refresher training. Efforts should also be made to have wildlife trained officers posted to the protected area for better coordination in management. As there is now no special wildlife training for forest guards and foresters, special in-house classes/ sessions should be organized by the Park Management to impart them the basics and day-to-day field exercises of wildlife management. Resource persons should also be invited from premier institutes to help officers build and develop capacity in wildlife management, and make them aware of the latest concepts. Study tours of frontline staff and officers should also be ensured by the Park Management. The office staff should be trained in basic computer operation and also in relevant official software of their branches for speed and efficiency.

24.4.3 **Posting of Young Staff:** It is very difficult for elderly field staff to do justice to their conservation duties in the Core Zone. Besides involving a lot of leg work in daily patrols, duties also include night patrolling, intelligence gathering, and apprehending offenders etc. These protection activities take a considerable toll on the physical and mental health of the staff. In view of this, the Park Management should develop a mechanism wherein older staff is gradually replaced with younger once.

24.4.4 **Staff Welfare:** The Park Management should also ensure the welfare of the frontline staff of the protected area. Besides medical facilities throughout the

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year, residential facilities for their families and education of children should also be provided. Annual/ biennial provision of a good support package of their daily needs, including cycle, uniforms, field equipment, water filter, solar light, torch with batteries, jungle boots, rain-proof and warm clothing etc., should also be a good idea.

24.4.5 **Rewards & Incentives:** The Park Management should also develop a fair system of rewards and incentives to encourage good performance of the frontline staff. Such rewards and incentives may include commendation, speedy promotion, opportunities for special trainings, and cash remuneration etc. Money from the Kanha Vikas Nidhi can be utilized for this purpose every year.

24.5 Funding & Schedule of Operations:

The Kanha Core Zone is one of the first nine National Parks where the scheme of Project Tiger was launched by the Govt. of India on 01-03-1974. The scheme was started as Central Sector Scheme and later came to be known as Centrally Sponsored Scheme. On the recommendations of the Tiger Task Force constituted by the Prime Minister in 2005, Project Tiger was also upgraded as a statutory body under the ministry of Environment and Forests, Govt. of India, and renamed as National Tiger Conservation Authority.

The Kanha Tiger Reserve receives funds from the Govt. of India through the National Tiger Conservation Authority, New Delhi under the Plan budget viz. Non-Recurring (100%) and Recurring (50%), on the basis of the Annual Plan of Operations (APO) submitted through the Principal Chief Conservator of Forests (Wildlife), Madhya Pradesh and the State Government. The State Govt. releases the same under the Tribal Sub Plan. The APO has to be submitted in a prescribed format every year in the month March-April.

For the recurring items of expenditure the matching grant is borne by the State Government. In addition, 100% grant is also provided by the Centre for Ecodevelopment

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and village relocation. The details of budgetary allocations and expenditure incurred under the State and Central sector from 2001-2002 to 2010-11 in the Kanha National Park, including Phen Wildlife Sanctuary, are as under:

Details of Budget Allocations from Project Tiger (Govt. of India)

(Rs. in Lakhs)

Year	Allotment		Total	Expenditure		Total
	Recurring	Non-Recurring		Recurring	Non-Recurring	
1991-92	54.600	34.691	**89.291**	55.642	25.095	**80.737**
1992-93	52.310	44.200	**96.510**	67.481	40.352	**107.833**
1993-94	77.100	27.340	**104.440**	76.968	25.403	**102.371**
1994-95	80.550	27.120	**107.670**	78.647	26.373	**105.020**
1995-96	92.450	32.350	**124.800**	89.657	27.944	**117.601**
1996-97	91.500	35.250	**126.750**	89.241	23.467	**112.708**
1997-98	114.100	36.000	**150.100**	107.004	28.259	**135.263**
1998-99	105.600	38.000	**143.600**	104.398	35.572	**139.970**
1999-00	167.650	84.100	**251.750**	159.078	68.891	**227.969**
2000-01	159.00	113.95	**272.95**	157.08	64.57	**221.65**
2001-02	191.45	59.30	**250.75**	183.17	55.00	**238.17**
2002-03	121.50	81.85	**203.35**	116.80	48.00	**164.85**
2003-04	107.10	84.49	**191.59**	107.61	70.00	**177.61**
2004-05	162.85	46.60	**209.45**	153.41	42.84	**196.25**
2005-06	174.50	59.85	**234.35**	171.20	57.30	**228.50**
2006-07	151.50	49.00	**200.50**	146.42	46.38	**192.80**
2007-08	156.53	79.96	**236.49**	156.16	76.17	**232.33**
2008-09	264.58	1479.39	**1743.97**	1743.97	1470.08	**1730.665**
2009-10	247.69	263.15	**510.84**	209.05	112.60	**321.65**

As per the Project Tiger guidelines (GOI), Kanha Tiger Reserve is constituted on a Core –Buffer strategy. Both the units have a separate complement of field staff and Deputy Directors, who are also Drawing & Disbursing Officers (DDO) for their respective conservation units. Though, the Phen Wildlife Sanctuary has a status of its own, it is administratively treated as a part of the core unit, and all the three units (Core, Buffer and

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Phen Wildlife Sanctuary) are under the administrative control of the Tiger Reserve Management. The allocations under Project Tiger are utilized in all these units. Since Sectoral Integration is the underlying principle in the Buffer Zone Management, allocations from various sectors complement the Project Tiger funding, which should be continued.

Details of Budget Allocations from Project Tiger (Govt. of India)
(Ecodevelopment)

(Rs. in Lakhs)

Year	Allotment	Expenditure
1992-93	14.000	13.350
1993-94	1.185	-
1994-95	11.110	11.000
1995-96	5.695	1.671
1996-97	-	-
1997-98	6.35	6.23
1998-99	5.50	4.70
1999-00	7.20	7.20
2000-01	18.75	8.67
2001-02	25.95	24.90
2002-03	19.18	17.98
2003-04	21.75	20.29
2004-05	16.19	16.12
2005-06	38.19	37.40
2006-07	25.84	25.84
2007-08	14.83	14.82
2008-09	-	-
2009-10	-	-

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Details of Budget Allocations from State Govt.
Non-Plan (Core)
(Rs. in Lakhs)

Year	Allotment	Expenditure
1991-92	109.330	106.99
1992-93	108.050	108.450
1993-94	137.040	143.390
1994-95	136.610	145.840
1995-96	176.300	156.660
1996-97	221.80	199.79
1997-98	232.90	190.93
1998-99	181.67	197.68
1999-00	108.08	218.75
2000-01	214.65	213.61
2001-02	188.51	215.99
2002-03	312.86	265.83
2003-04	343.10	325.67
2004-05	268.89	266.13
2005-06	333.75	307.46
2006-07	342.87	342.47
2007-08	430.72	416.80
2008-09	501.47	487.62
2009-10	556.84	624.01

Budget from the 11th Finance Commission (Core)

(Rs. in Lakhs)

Year of Allotment	Allotment	Expenditure
2002-03	140.00	109.07
2003-04	210.00	123.21
2004-05	-	69.76
2005-06	-	6.77
2006-07	-	3.57
2007-08	-	18.23
2008-09	-	14.82
2009-10	-	0.50
Total:	**350.00**	**345.93**

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Budget from the 12th Finance Commission (Core)

(Rs. in Lakhs)

Year of Allotment	Allotment	Expenditure
2005-06	27.80	25.21
2006-07	25.00	25.00
2007-08	31.25	19.58
2008-09	49.25	50.00
2009-10	85.00	85.00
Total:	**218.30**	**204.79**

41-2406 Tribal Sub-Plan (Special Central Assistance)
3874 Development of Forest Villages

(Rs. in Lakhs)

Year	Allotment	Expenditure
2000-01	3.600	0.310
2001-02	-	-
2002-03	-	-
2003-04	-	-
2004-05	-	-
2005-06	-	-
2006-07	-	-
2007-08	-	-
2008-09	-	-
2009-10	-	-

Budget Allocations from Forest Development Authority (National Park)

(Rs. in Lakhs)

Year	Allotment	Expenditure
2000-01	-	-
2001-02	-	-
2002-03	-	-

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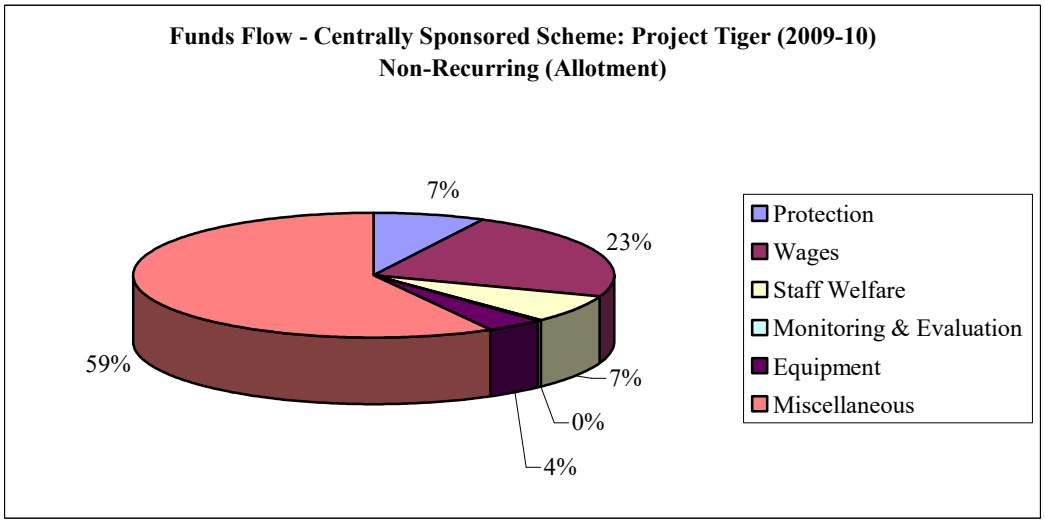
2003-04	-	-
2004-05	-	-
2005-06	-	-
2006-07	-	-
2007-08	189.35	149.59
2008-09	88.45	67.37
2009-10	-	-

Budget Allocations Under the
Mahatma Gandhi National Rural Employment Guarantee Act (National Park)

(Rs. in Lakhs)

Year	Allotment	Expenditure
2000-01	-	-
2001-02	-	-
2002-03	-	-
2003-04	-	-
2004-05	-	-
2005-06	-	-
2006-07	15.62	-
2007-08	24.18	23.96
2008-09	-	-
2009-10	14.84	-

The typical patterns of expenditure is depicted below:



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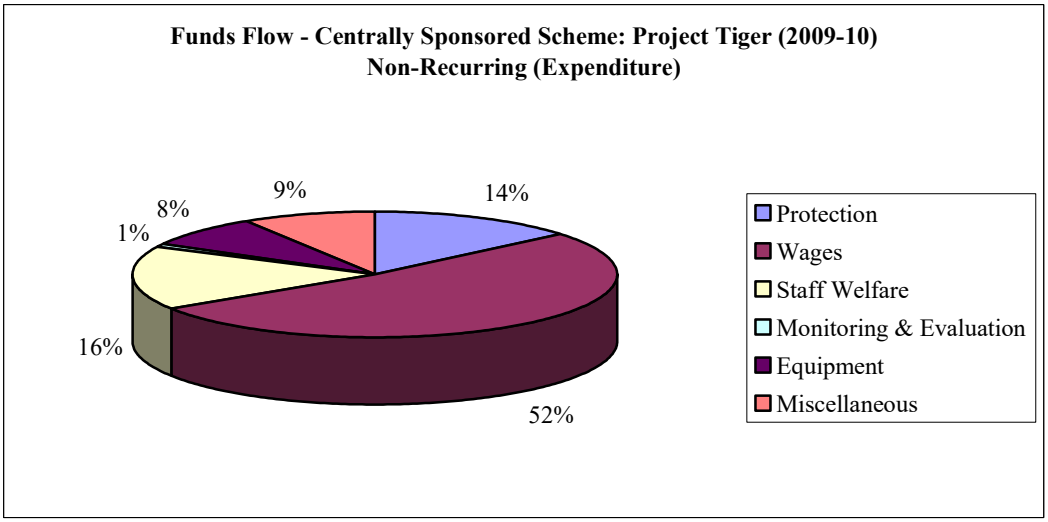

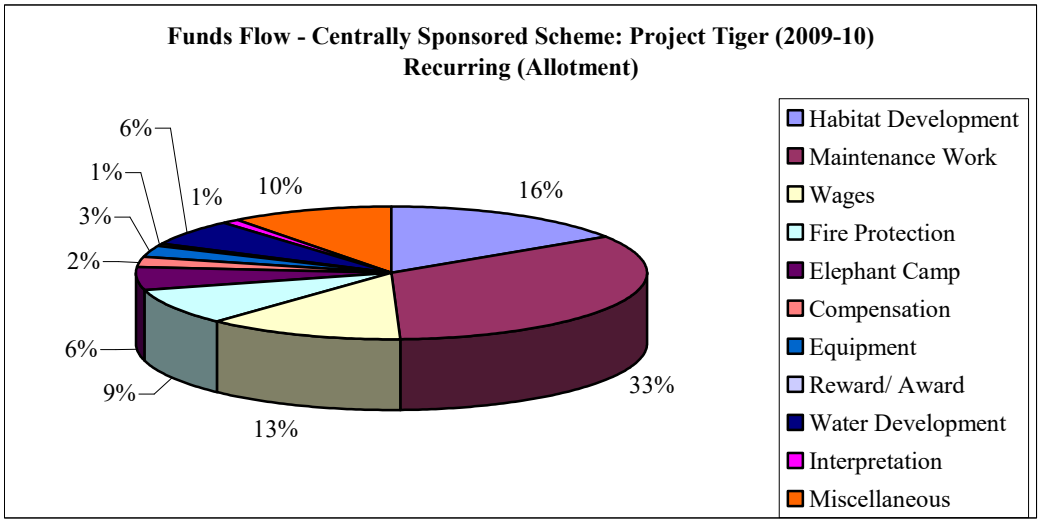

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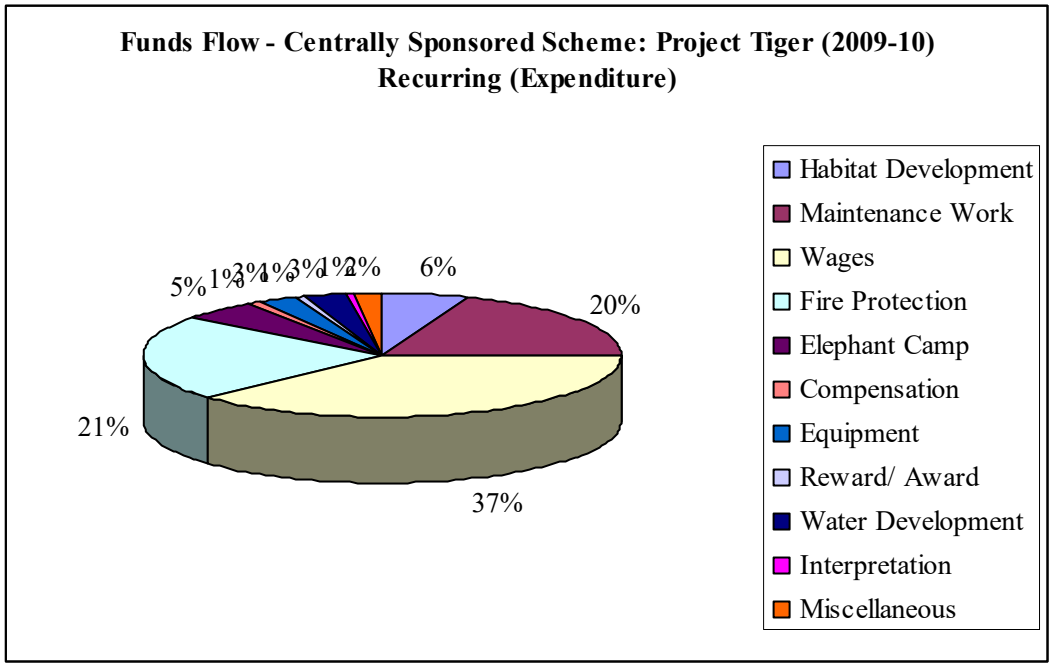

The trend in funding under Project Tiger/ NTCA since inception is shown below:

Fund Position Since Inception (Project Tiger)
(National Park & Phen WLS)

(Rs. in Lakhs)

Year	Allotment	Expenditure
1972-73	-	-
1973-74	0.20	-
1974-75	4.00	3.51
1975-76	8.30	8.49
1976-77	13.53	11.49
1977-78	11.00	10.49
1978-79	16.00	14.15
1979-80	15.00	15.50
1980-81	14.00	15.66
1981-82	16.00	16.28
1982-83	17.00	15.07
1983-84	30.00	30.17
1984-85	30.00	25.98
1985-86	25.00	18.39
1986-87	25.00	24.99

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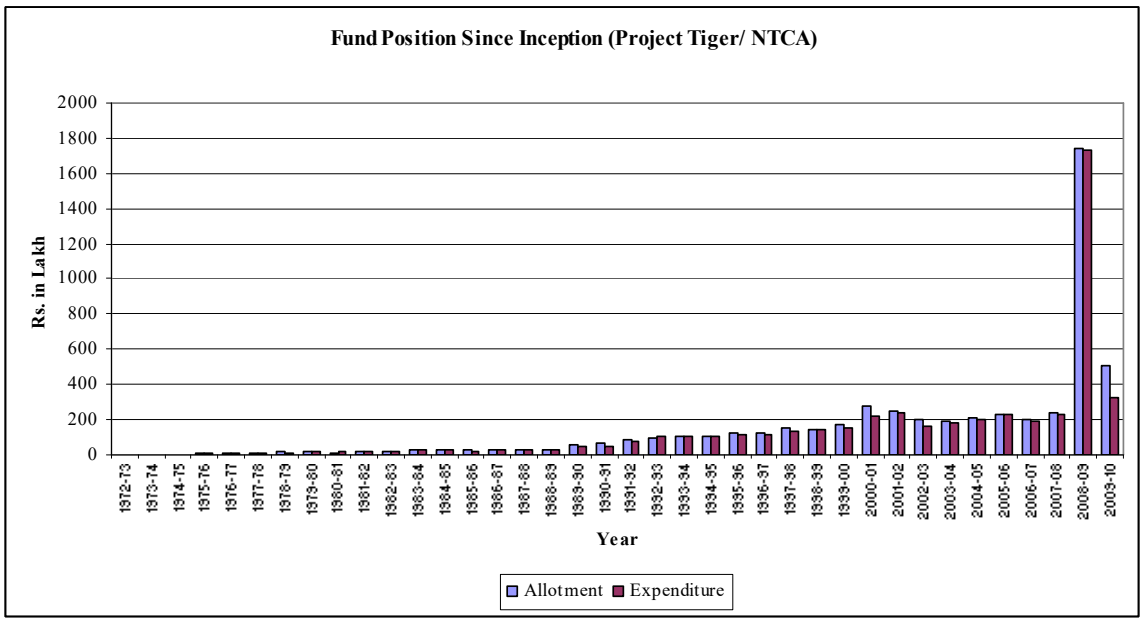
1987-88	33.00	30.46
1988-89	24.00	28.97
1989-90	57.38	45.20
1990-91	64.81	45.62
1991-92	89.29	80.74
1992-93	96.51	107.83
1993-94	104.44	102.37
1994-95	107.67	105.02
1995-96	124.80	117.60
1996-97	126.75	112.70
1997-98	150.10	135.26
1998-99	143.60	139.97
1999-00	167.925	148.925
2000-01	272.95	221.65
2001-02	250.75	238.17
2002-03	203.35	164.85
2003-04	191.59	177.61
2004-05	209.45	196.25
2005-06	234.35	228.50
2006-07	200.50	192.80
2007-08	236.49	232.33
2008-09	1743.97	1730.665
2009-10	510.84	321.65



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The concept of the Kanha Vikas Nidhi has already been described in an earlier chapter. Part of the Vikas Nidhi is used every year for the development of tourism infrastructure, development of relocated forest villages and existing forest villages, and as support funds to various ecodevelopment committees of the Tiger Reserve. Besides, money from the Kanha Vikas Nidhi is also utilized in anticipation of regular allocations made by the Govt. of India, and the same is returned after allocations are received. The year-wise expenditure from the Vikas Nidhi is as under:

Tourism Year (16 Oct to 30 June)	Revenue from Vikas Nidhi (In Rs.)	Allotment (In Rs.)	Expenditure (In Rs.)			
			Tourism Infrastructure	Development Work	Support Funds to EDCs	Total
1995-96	836138	-	-	-	-	-
1996-97	1750035	-	-	-	-	-
1997-98	2086275	1246395	585005	-	-	585005
1998-99	1874494	884234	884161	-	-	884161
1999-00	4229597	5634852	2515534	1584874	-	4100408
2000-01	4585652	4391119	1986005	1031432	200000	3217437
2001-02	4483013	4642000	1069492	572508	3000000	4642000
2002-03	4394181	7080000	3183903	2820258	500000	6504161
2003-04	5866977	4779000	1314148	2038908	1220000	4573056
2004-05	13044322	3295000	512156	1254000	995000	2761156
2005-06	15964837	10515800	4893011	3655531	1665000	10213542
2006-07	23986592	27379686	12318789	12859159	1665000	26842948
2007-08	29165749	19481392	4560191	12740094	2080000	19380285
2008-09	29359134	26100985	9325373	11586847	4300000	25212220
2009-10	30505860	38819431	5739978	17019130	4335000	27094108
Total:	**172132856**	**154249894**	**48887746**	**67162741**	**19960000**	**136010487**

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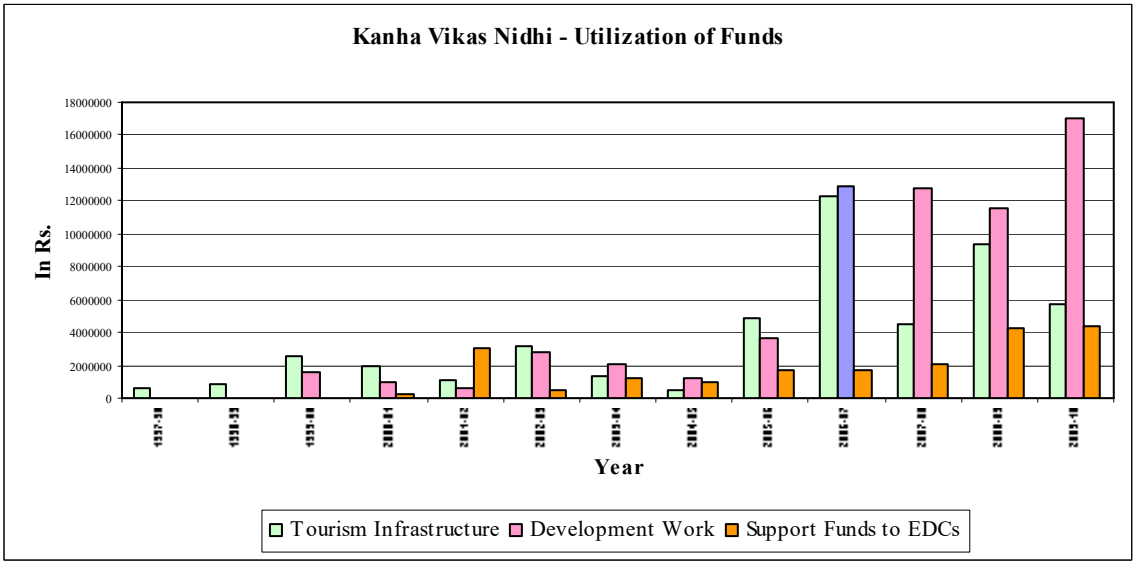

24.6 Fund Raising Strategies:

Needless to add, well-maintained and well-regulated wildlife protected areas such as the Kanha Core Zone need adequate funds on a regular basis. While there are assured regular financial allocations from the State and Central governments, the Park Management does require additional allocations in several inadequately funded budgetary heads. The development of the frontline staff of the Core Zone is one such head that requires more financial support. Naturally, under these circumstances, the Park Management should welcome funds received from non-governmental individuals/ non-governmental organizations.

The Park Management should appraise such agencies/ organizations on the conservation efforts in the protected area over all these years and the problems of frontline staff, it should also be made clear to them that donations/ support will in no way be allowed to dictate/ change the existing conservation policies of the government. The Park Management should also ensure that these donations/ support are not received directly

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and should come through the MP Tiger Foundation Society, Bhopal. The information on funds/ support received from various agencies in the last several years is as under:

Year	Name of Agency	Amount Received (In Rs.)	Utilization
2002-03	31 individuals	18500.00	Amount sent to the MP Tiger Foundation Society, Bhopal
2003-04	8 individuals	8000.00	Amount sent to the MP Tiger Foundation Society, Bhopal
2004-05	-	-	-
2005-06	-	-	-
2006-07	-	-	-
2007-08	-	-	-
2008-09	Wildlife Conservation Trust, Mumbai	250000.00	Green Lights -355 Nos.
2008-09	Dr. Parikh, Mumbai	50000.00	Medicines for Mukki dispensary
2008-09	Mr. Nikhil Nagle, Hong Kong	769000.00	Ambulance-1 No.
2008-09	Mr. Nikhil Nagle, Hong Kong	1903820.00	Solar Lantern-180 Nos. & Home Light System-40 Nos.
2008-09	Mr. Nikhil Nagle, Hong Kong	203970.00	Home Light System-30 Nos.
2008-09	Wildlife Conservation Trust, Mumbai	2812332.00	Bolero Camper-6 Nos.
2008-09	Wildlife Conservation Trust, Mumbai	364000.00	Water Filter (Pure_it)-200 Nos.
2008-09	Wildlife Conservation Trust, Mumbai	600000.00	Trunk with Stand-200 Nos.
2008-09	Wildlife Conservation Trust, Mumbai	150000.00	Mosquito Net-1150 Nos.
2008-09	Wildlife Conservation Trust, Mumbai	118000.00	Gas-Chullahs with Cylinders-75 Nos.
2008-09	State Bank of India, Mandla	579527.00	Ambulance-1 No.
2008-09	Wildlife Conservation Trust, Mumbai	100000.00	Seed of Conservation Programme for forest villages
2009-10	Donation Box at Kanha Museum	14891.00 17 Dollar 5 Euro	Amount sent to the MP Tiger Foundation Society, Bhopal
2009-10	Mr. Nikhil Nagle, Hong Kong	24900.00	Green Light for patrolling camps
2009-10	World Wide Fund for Nature-India	-	Tractor with Tanker-1 No.
2009-10	World Wide Fund for Nature-India	-	Gypsy-1 No.
2009-10	Wildlife Conservation Trust, Mumbai	469268	Bolero Camper-1 No.
2010-11	Mr. Hector D'Souza, Mumbai	-	Solar Lamps-4 Nos.
2009-10	Celebration Van Vilas, Mocha	-	Ration for patrolling camp staff
2009-10	Wildlife Conservation Trust, Mumbai	-	Motorcycles-15 Nos.

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24.7 Proposed Plan Works:

No budgetary projections have been made in the plan, instead year-wise recurring works under theme plans, which are imperative annually, have been proposed for the improvement/development of grassland/ barasingha habitats within the Core Zone. The details of proposed works are as under:

Grassland Management

Proposed Work	Financial Year									
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
	Area (ha)									
Kanha Range										
Lantana Eradication	10	20	30	30	30	30	30	30	30	30
Brushwood Eradication	20	40	60	60	60	60	60	60	60	60
Amelioration of Meadows (grass enclosure & harrowing)	30	30	30	30	30	30	30	30	30	30
Sarhi Range										
Lantana Eradication	25	50	75	75	75	75	75	75	75	75
Brushwood Eradication	-	-	-	-	-	-	-	-	-	-
Amelioration of Meadows (grass enclosure & harrowing)	25	25	25	25	25	25	25	25	25	25
Kisli Range										
Lantana Eradication	-	-	-	-	-	-	-	-	-	-
Brushwood Eradication	-	-	-	-	-	-	-	-	-	-
Amelioration of Meadows (grass enclosure & harrowing)	-	-	-	-	-	-	-	-	-	-
Mukki Range										
Lantana Eradication	10	20	30	30	30	30	30	30	30	30
Brushwood Eradication	-	-	-	-	-	-	-	-	-	-
Amelioration of Meadows (grass enclosure & harrowing)	15	15	15	15	15	15	15	15	15	15
Bhaisanghat Range										
Lantana Eradication	30	35	35	35	35	35	35	35	35	35
Brushwood Eradication	25	50	50	50	50	50	50	50	50	50
Amelioration of Meadows (grass enclosure & harrowing)	15	15	15	15	15	15	15	15	15	15
Supkhar Range										
Lantana Eradication	15	30	45	45	45	45	45	45	45	45

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Brushwood Eradication	30	60	60	60	60	60	60	60	60	60
Amelioration of Meadows (grass enclosure & harrowing)	20	20	20	20	20	20	20	20	20	20

Barasingha Habitat Management

Proposed Work	Financial Year									
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
	Area (ha.)									
Kanha Range										
Lantana Eradication	10	20	30	30	30	30	30	30	30	30
Brushwood Eradication	20	40	60	60	60	60	60	60	60	60
Amelioration of Meadows (grass enclosure & harrowing)	30	30	30	30	30	30	30	30	30	30
Sarhi Range										
Lantana Eradication	35	70	80	80	80	80	80	80	80	80
Brushwood Eradication	20	40	60	60	60	60	60	60	60	60
Amelioration of Meadows (grass enclosure & harrowing)	20	20	20	20	20	20	20	20	20	20
Kisli Range										
Lantana Eradication	20	40	60	60	60	60	60	60	60	60
Brushwood Eradication	10	20	30	30	30	30	30	30	30	30
Amelioration of Meadows (grass enclosure & harrowing)	20	20	20	20	20	20	20	20	20	20
Mukki Range										
Lantana Eradication	15	30	45	45	45	45	45	45	45	45
Brushwood Eradication	20	40	60	60	60	60	60	60	60	60
Amelioration of Meadows (grass enclosure & harrowing)	20	20	20	20	20	20	20	20	20	20
Bhaisanghat Range										
Lantana Eradication	20	40	60	60	60	60	60	60	60	60
Brushwood Eradication	20	40	60	60	60	60	60	60	60	60
Amelioration of Meadows (grass enclosure & harrowing)	10	10	10	10	10	10	10	10	10	10
Supkhar Range										
Lantana Eradication	15	30	45	45	45	45	45	45	45	45
Brushwood Eradication	20	40	60	60	60	60	60	60	60	60
Amelioration of Meadows (grass enclosure & harrowing)	15	15	15	15	15	15	15	15	15	15

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The financial year-wise required funds for ecodevelopment interventions in the forest villages of the Core Zone for the plan period are as under:

Range	No. of EDCs	Plan Duration	Proposed Development Work Each Year	Financial Year	Average Required Amount (Rs.)
Sarhi	10	2011-12 to 2020-21	Drinking water facilities, irrigation facilities, nistari tank, approach road, gobar-gas plant, distribution of LPG gas connection, solar light system, distribution of pressure cooker, distribution of improved cattle, self-employment, bio-agriculture, wormiculture	2011-12	4000000
				2012-13	4400000
				2013-14	4840000
				2014-15	5324000
				2015-16	5856400
				2016-17	6442040
				2017-18	7086244
				2018-19	7794868
				2019-20	8574355
				2020-21	9431791
Mukki	1	2011-12 to 2020-21	Drinking water facilities, irrigation facilities, nistari tank, approach road, gobar-gas plant, distribution of LPG gas connection, solar light system, distribution of pressure cooker, distribution of improved cattle, self-employment, bio-agriculture, wormiculture	2011-12	450000
				2012-13	495000
				2013-14	544500
				2014-15	598950
				2015-16	658845
				2016-17	724730
				2017-18	797202
				2018-19	876923
				2019-20	964615
				2020-21	1061076
Bhaisanghat	4	2011-12 to 2020-21	Drinking water facilities, irrigation facilities, nistari tank, approach road, gobar-gas plant, distribution of LPG gas connection, solar light system, distribution of pressure cooker, distribution of improved cattle, self-employment, bio-agriculture, wormiculture	2011-12	2610000
				2012-13	2871000
				2013-14	3158100
				2014-15	3473910
				2015-16	3821301
				2016-17	4203431
				2017-18	4623774
				2018-19	5086152
				2019-20	5594767
				2020-21	6154243
Supkhar	10	2011-12 to 2020-21	Drinking water facilities, irrigation facilities, nistari	2011-12	4000000
				2012-13	4400000

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			tank, approach road, gobar-gas plant, distribution of LPG gas connection, solar light system, distribution of pressure cooker, distribution of improved cattle, self-employment, bio-agriculture, wormiculture	2013-14	4840000
				2014-15	5324000
				2015-16	5856400
				2016-17	6442040
				2017-18	7086244
				2018-19	7794868
				2019-20	8574355
				2020-21	9431791

24.8 Activity Budget:

The Park Management has to undertake a wide range of conservation practices/ activities in the protected area throughout the year. Needless to add, these activities/ interventions have to be got approved on the basis of the APO submitted to the State Govt. and the National Tiger Conservation Authority, New Delhi. Each conservation practice/ intervention has to be taken up in a certain month (s) of the financial year. An indicative time plan of all major activities/ interventions in the Core Zone under non-recurring (all new interventions) and recurring (pay & allowances, maintenance/ repair etc.) budget heads is as under:

Particulars	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
NON-RECURRING												
Water Resource Development:												
Construction of Tanks								◙	◙	◙	◙	
Construction of Saucer											◙	◙
Deepening of Tank/ Well/ Jhiria/Anicut											◙	◙
Construction of Stop Dams								◙	◙	◙	◙	
Construction of Anicut-cum-Bridge											◙	◙
Spl. Repair of Anicuts											◙	◙
Construction of Stop Dam-cum-Bridge								◙	◙	◙	◙	
Protection Infrastructure:												
Construction of Patrolling Camps/ FG Naka								◙	◙	◙	◙	
Construction of Residential Qtrs.								◙	◙	◙	◙	
Paint & Mosquito wire-mesh for Doors, Windows, Ventilators & Grill of FG Nakas/ RA Qtrs./ RO Qtrs./ ACF Qtrs./Tiger Cell Buildings							◙	◙				
Other Construction Works								◙	◙	◙	◙	
Special Repair Work of Old Buildings								◙	◙	◙	◙	
Construction of Checking Barriers-cum-Labour Hut								◙	◙	◙	◙	
Upgradation/ Repair of Roads							◙	◙	◙			

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Construction of Culverts							◙	◙	◙			
Construction of Rapta							◙	◙	◙			
Purchase/ Maintenance/Creation of Pump House								◙	◙			
Purchase of Scorpio								◙	◙	◙		
Procurement of Digital Cameras								◙	◙	◙		
Procurement of Personal Digital Assistant (PDA) Device with Accessories								◙	◙	◙		
Procurement of Binoculars					◙	◙						
Procurement of Night Vision Device					◙	◙						
Data logger					◙	◙						
Electric charge sticks					◙	◙						
Speed guns					◙	◙						
Purchase of Wireless handsets					◙	◙						
Protection Wages:												
Ex-servicemen Engaged for Patrolling	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Tiger Protection Force	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Rewards & Awards:												
Reward to Informers	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Reward to Staff & Employees	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Legal Support for Defending Court Cases	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Field Gear for Patrolling Staff				◙	◙	◙	◙	◙	◙			
Rehabilitation of Traditional Hunting Tribes:					◙	◙	◙	◙	◙	◙	◙	◙
Research Activities:								◙	◙	◙	◙	
Construction of School Buildings & Hostels												
Soft-loans for Alternative Livelihoods	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Staff Welfare:												
Construction of Wells											◙	◙
Spl. Repair of Wells											◙	◙
Installation of Hand Pump											◙	◙
Project Allowance											◙	◙
Cattle/ Wildlife Proof Structures:												
Chain-link Fence							◙	◙	◙	◙	◙	◙
Human Resource Development:												
Training		◙	◙	◙				◙	◙	◙	◙	
Study Tours		◙	◙	◙				◙	◙	◙	◙	
Workshops		◙	◙	◙				◙	◙	◙	◙	
Training Equipment		◙	◙	◙				◙	◙	◙	◙	
Relocation & Compensation:												
Rehabilitation Package						◙	◙	◙	◙	◙	◙	
Modernization of information Technology:	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Ecodevelopment:												
Land Levelling									◙	◙	◙	◙
Construction of Wells											◙	◙
Provision of LPG Gas Connection											◙	◙
Conservation Education & Awareness, Ecotourism Facilities:												
Wildlife Week Celebrations							◙	◙				
Workshops & Seminars							◙	◙				
Purchase of Documentary Films					◙	◙	◙	◙				
Purchase of Film CDs/DVDs					◙	◙	◙	◙				

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Nature Conservation Awareness					◙	◙	◙	◙				
Library Books	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Management Planning:												
Purchase of Sattelite Imageries					◙	◙						
Digitization of Maps					◙	◙						
Wages for Field Work & Datagathering				◙	◙	◙	◙	◙	◙	◙	◙	◙
Pay & Allowances of Officers/ Employees	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Stationery, Form Printing, Software, Toner, Maintenance, etc.	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Printing of Tiger Conservation Plan for Core & Buffer	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Office Expense (Telephone, Furniture, Equipment, Books, Electric, etc.)	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Impact Assessment, Study of Grasslands, Flora, Fauna, Soil Survey, Hydrology etc.	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Procurement of GPS, Range Finder, Mobile Mapper etc.				◙	◙	◙	◙	◙	◙	◙	◙	◙
Monitoring & Evaluation:	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
RECURRING:												
Habitat Development:												
Eradication of Lantana					◙	◙						
Eradication of Weed					◙	◙						
Eradication of Brushwood from Meadows					◙	◙						
Control of Meadows Burning	◙	◙	◙								◙	◙
Reclamation of Meadows (Creation of Grass Exclosure, Corridors etc.)					◙	◙						
Eradication of Kush Grass & Plantation of Palatable Grass				◙	◙							
Water Resource Maintenance:												
Soil Moisture Conservation				◙	◙				◙	◙	◙	
Maintenance of Waterholes							◙	◙	◙	◙	◙	◙
Protection Wages:												
Patrolling Camp Watchers General Patrolling	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Monsoon Patrolling				◙	◙	◙	◙					
Wages of Wireless Attendants	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Maintenance of Protection Infrastructure:												
Special Repair Work of FG Nakas/ Wireless Stations.									◙	◙	◙	◙
Maintenance of Wireless Sets	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
POL for Vehicles	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Maintenance of Vehicles	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Maintenance of Roads:												
a. Core Zone						◙	◙	◙				
b. Staff Colony						◙	◙	◙				
Fire Protection:												
Fireline Cleaning & Burning									◙	◙		
Fire Watchers Engaged	◙	◙									◙	◙
Fire Watchers Camps	◙	◙									◙	◙
Fire Fighting Equipment (Water bottle, gamcha etc.)	◙	◙									◙	◙

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Rescue Squad Equipment:						◙	◙	◙				
Population Estimation & Monitoring:				◙	◙				◙	◙		
Office Expenses:	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Maintenance of Management Infrastructure:	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Maintenance of Elephant Camps:	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Cattle Immunization:												
Purchase of Vaccines			◙	◙						◙	◙	
Compensation for Damage to Human Life & Cattle Kills:	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙	◙
Maintenance of Conservation Education & Awareness & Interpretation, Ecotourism Facilities:												
Maintenance of Interpretation Centres						◙	◙					
Maintenance of Wayside Exhibits & Display Boards						◙	◙					

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CHAPTER – 25

MONITORING & EVALUATION

25.1 Introduction:

Monitoring and evaluation is now recognized as a very essential component of wildlife conservation practices. It is a very important tool for managing conservation programmes, and the Park Management should undertake it for decision making and accountability to measure and assess appropriateness, effectiveness and efficiency of conservation initiatives/ actions. Monitoring and evaluation can identify the exact direction of a management initiative, the course it takes to reach there and the appropriateness of this direction using resources in the most cost effective manner. In short, effective monitoring and evaluation ensures that these initiatives are delivering the desired outcomes and the Park Management is achieving the intended results.

Systematic monitoring and evaluation of important conservation practices constitutes an early warning system, enabling the Park Management to undertake preventative or remedial action. This is actually an in-depth assessment of programme performance. Monitoring and evaluation should not be regarded a theoretical concept or a dispensable luxury, but an operational reality and essential tool for adaptively managing conservation actions as conditions change and the Park Management learn from its efforts.

The Park Management should plan monitoring and evaluation programme with potential responses in mind if the monitoring detects levels of acceptable/ unacceptable change in the conditions of the natural resource base. It must focus on assessing the outcome of management initiatives specifically designed to resolve some threat to conservation issues. It should also lead to a response when expected results are not achieved and changes in management actions are required.

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25.2 Monitoring & Evaluation Committee:

The National Tiger Conservation Authority, New Delhi provides allocation (100%) for monitoring and evaluation activities and the Park Management should undertake it in right earnest. The Park Management should take necessary steps to constitute a Monitoring and Evaluation Committee, comprising officers from the office of the Principle Chief Conservator of Forests (Wildlife), Bhopal and representatives from premier institutes such as the Wildlife Institute of India, Dehradun, State Forest Research Institute, Jabalpur, Tropical Forest Research Institute, Jabalpur, and Indian Institute of Forest Management, Bhopal.

As there is a vast range of methodologies/ designs for monitoring and evaluating wildlife protected areas at various scales and recommended time intervals, it is proposed that the Committee should develop its own framework in the context of the Core Zone to avoid any possible bias.

25.3 Broad Framework & Indications:

A theoretical framework and some broad indications for the monitoring and evaluation of the Core Zone are proposed for the consideration of the above Committee. The theoretical framework should also incorporate the following points:

- Health of wildlife ecosystem/ habitats.
- Population trends of endangered species of animals and plants.
- Management interventions vis-à-vis their intended affect on wildlife ecosystem.
- Tourism activities and conservation practices.
- Park-people interface.
- Staffing.

Monitoring and evaluation and consequently management effectiveness of any protected is generally determined by the assessment of a range of criteria. These criteria are

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adequately represented by select indicators against stated objectives/ goals of management. In this way, effectiveness evaluation is defined as the assessment of how well the protected area is being managed-primarily the extent to which management is protecting values and achieving goals and objectives.

IUCN-WCPA has developed (Hockings et al., 2000) a management effectiveness evaluation framework which provides a consistent basis for designing evaluation systems for protected areas. On the basis of this evaluation framework, modified criteria and indications with special reference to the Core Zone are proposed as under:

<table>
<tr><td>Theme</td><td colspan="2">Design</td><td colspan="2">Appropriateness/ Adequacy</td><td colspan="2">Delivery</td></tr>
<tr><td>Element</td><td>Context</td><td>Planning</td><td>Inputs</td><td>Process</td><td>Outputs</td><td>Outcomes</td></tr>
<tr><td>Evaluation focus</td><td>Importance, threats and policy/ cultural environments</td><td>Design and planning</td><td>Adequacy of resources needed to manage</td><td>How management is conducted</td><td>Implementation of management initiatives/ actions</td><td>Extent of objectives achieved</td></tr>
<tr><td rowspan="2">Criteria assessed</td><td>Values</td><td>Protected area legislation and policy</td><td rowspan="2">Resources available for management</td><td rowspan="2">Suitability of management processes</td><td rowspan="2">Results of management initiatives/ actions</td><td rowspan="2">Effects of management in relation to objectives</td></tr>
<tr><td>Threats</td><td>Protected area or wildlife ecosystem</td></tr>
</table>

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Indicators	Biological importance, socio-economic importance, vulnerability	Goals/ objective legal security, site design and planning	Staffing infrastructure finance (Central & State)	Management planning, management decision making, research communication & coordination, monitoring & evaluation	Management plans, rules/ regulations, guidelines	IUCN category II Buffer Zone declaration
Level of evaluation	Status & threats	Appropriateness	Natural resources	Efficiency & appropriateness	Efficiency	Effectiveness & appropriateness

The indicators proposed for monitoring and evaluation are based on MacKinnon et. al., 1990 and Cifuentes AM et.al., 2000, and modified in the context of the Core Zone. Several broad fields selected are further divided into relevant variables. Here, a field represents a large group of variables. Each variable represent major indicators. The variables are further divided into sub-variables and parameters as under:

Field	**Variable**	**Sub-Variable**	**Parameter**	**Relation with IUCN-WCPA Framework**
Biological attributes	Connectivity			
	Status of endangered species	Tiger, hard ground barasingha		Context
Threat	Peripheral biotic pressure			Context
	Animosity towards the park			
	Fire hazards			
	Disease transmission			

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Planning	Management Plan	Up to date Management Plan exists, Plan implementation		Planning
	Zonation			
Administrative	Funds/ Budget	Budget allocations		Input
		Regularity of budget		
		Capacity to manage own resources		
		Special funds		
		Accounting system	Management capacity, budget management, spending capacity, auditing mechanism	
	Infrastructure	Facilities for basic management	Staff housing, transportation, communication	Input
		Facilities for specific management		Input
Management programmes	Habitat management	Weed eradication, brushwood eradication, restocking of grasslands, water development, soil conservation etc.		Process
	Conservation education	Interaction with students, awareness programme for target groups, celebration of the wildlife week		
	Research & monitoring	In-house monitoring programme, research projects, collaborative projects, technical skill development of staff		
	Coordination & collaboration			

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Legal uses (with reference to forest villages)	Grazing			Output
	Poles/ bamboos for bonafide use			
	Public right of way			
Illegal Uses	Extraction of natural resources			Output
	Poaching			
	Grazing			
	Fishing			
	Intrusion			

It is also proposed that five different criteria (0-4) of wildlife management scenario in the Core Zone should be developed, with the optimal condition as satisfactory, having the highest rating for each variable, sub-variable and parameter, and the lowest rating for unsatisfactory condition. The management scenario for the Core Zone should be based on the information contained in the Tiger Conservation Plan, rules and regulations, guidelines and other existing planning instruments. While the Committee can structure its own criteria, some broad criteria along with their rating explanations are proposed as under.

Criteria	**Value**
CONNECTIVTY	
Over 90% of the Core Zone perimeter is contiguous to other forest areas will genetic and biological resources and ecological processes	4
Over 76% of the Core Zone perimeter is contiguous to other forest areas	3
Over 50% of the Core Zone perimeter is contiguous to other forest areas	2
The Core Zone exists almost in isolation.	1
The Core Zone exists in total isolation, with no ecological connectivity	0
BIOLOGICAL STATUS	
Biological attributes are conserved with specific action plans to preserve endangered species and their habitats	4
Biological attributes are conserved with important species under a general plan	3

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Several biological attributes are under partial degradation, but the most significant attributes are not impacted	2
Several biological attributes are under severe degradation, with no plan for conserving such attributes	1
Important biological attributes are under severe degradation, with no plan for their conservation	0
CHANGE IN LAND COVER	
Very resistant to biological invasions/ disturbances, with very low impact	4
Resistant to biological invasions/ other disturbances, with low impact	3
Moderately resistant to biological invasions/ disturbances, with moderate impact	2
Low resistance to biological invasions/ disturbances, with high impact	1
No resistance to biological invasion/ disturbances, with very high impact	0
WEED INVASION	
No problem of weed/ unwanted species	4
The invasion of weed/ unwanted species has very low effect	3
The invasion of weed/ unwanted species has serious effect, but are manageable, avoidable and early reversible	2
The invasion of weed/ unwanted species has probably harmful effects, but could be reversed in the long-term	1
The invasion of weeds/ unwanted species has very serious and irreversible effects	0
POACHING	
Absolutely no problem of poaching	4
Poaching has almost no effect in the Core Zone	3
Poaching has serious effect, but are manageable, avoidable and early reversible	2
Poaching has harmful effects, but could be reversed in the long-term	1
Poaching has serious and irreversible effects	0
MANAGEMENT PLAN	
The Core Zone is under a valid Management Plan	4
Management Plan under preparation, with an out of date plan over 5 years old	3
Management Plan not revised for over 4 years, with no other planning instruments	2

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Very outdated Management Plan of over 10 years old, with no forthcoming revision	1
No Management Plan at all, and no plans for preparation	0
PLAN IMPLEMENTATION	
Clearly understandable management prescriptions/ recommendations for development works, budgets and other operational plans	4
Generally understandable management prescriptions/ recommendations for development works, budgets and other operational plans	3
Confusion in using the Management Plan as a basis for development works, budgets and other operation plans	2
Difficulty in using the Management Plan as a basis for development works, budgets and other operation plans	1
Conservation initiatives/ actions carried out in a disorganized manner	0
REGULARITY OF ALLOCATIONS	
Budget allocations reach within the prescribed deadline	4
Budget allocations reach within the prescribed deadline, with occasional variations	3
Budget allocations always reach with predictable variations	2
Budget allocations are generally irregular	1
Budget allocations are irregular	0
CAPACITY OF GENERATING OWN FUND	
The Core Zone has a legal mechanism to raise its own funds for investment in its own development	4
The Core Zone has a legal mechanism to raise its own funds for investment in its own development, without adequately structured administrative and financial systems	3
The Core Zone has a legal mechanism to raise its own funds for investment in its own development but it is prevented by the administrative and financial structure	2
The Core Zone has a legal mechanism to raise its own funds for investment in its own development but the administrative and financial structures prevent it from being utilized directly	1
The Core Zone does not have to any legal mechanism to raise its own funds for investment in its own development	0

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NON-GOVERNMENTAL SUPPORT FUNDS	
The Core Zone regularly receives support funds from non-governmental organizations	4
The Core Zone almost regularly receives support funds from non-governmental organizations	3
The Core Zone receives support funds from non-governmental organizations with some variations	2
The Core Zone sometimes receives support funds from non-governmental organizations	1
The Core Zone does not receive support funds from non-governmental organizations	0
BUDGET MANAGEMENT	
Adequate budgets are proposed and spending programme is well-defined	4
Budget proposal acceptable, the spending programs not well-defined	3
Budgets proposal acceptable, but spending is limited due to budgetary constraints	2
Budgets not structured properly, spending uncontrolled	1
No budget nor a spending plan	0
EXPENDITURE MECHANISM	
Timely and systematically programmed spending, required returns prepared regularly	4
Spending not always timely, required returns not regularly prepared	3
Expenditures often delayed and programming is weak, required returns prepared infrequently	2
Expenditure in a haphazard manner, required returns are inadequate	1
Expenditures always untimely, no required returns prepared	0
STAFF	
Staff strength is adequate, with excellent personal management. Staff training, orientation and skills are satisfactory for the management needs of the Core Zone	4
Staff strength is not adequate, excellent personal management. Staff training, orientation and skills are satisfactory for the management needs of the Core Zone	3
Staff strength is sub-optimum for vital management activities. Personal management is more or less adequate. Though adequately trained, it can be improved	2
Staff strength is inadequate. Professionalism leaves much to be desired	1
Staff strength is very low, and it lacks professionalism seriously	0

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BASIC MANAGEMENT FACILITY	
Existing facilities sufficient in quantity and quality, and are strategically placed to support managerial activities	4
Not enough facilities, but good in quality and make it possible to carry out most of managerial activities	3
Not enough facilities, nor of the best quality, but are placed strategically to develop important activities	2
Not enough facilities and are of poor quality, conditions do not allow for the many of the managerial needs to be met	1
No facilities and/ or so bad that they cannot be made use of	0
TOURISM MANAGEMENT	
Perfect tourism management policy with no impact on the ecology of the Core Zone	4
Good quality tourism management policy with no impact on the ecology of the Core Zone	3
Good tourism management policy with slight impact on the ecology of the Core Zone	2
Ineffective tourism management policy with visible impact on the ecology of the Core Zone	1
Unsatisfactory management policy with clear impact on the ecology of the Core Zone	0
HABITAT MANAGEMENT	
Planned and effective habitat management linked to the objectives and needs of the Core Zone	4
Enough planned habitat management programmes, but still with serious gaps	3
Limited planned habitat management programmes, and still with still gaps	2
Very few unplanned programmes with considerable gaps	1
No habitat management programme	0
CONSERVATON EDUCATION	
Planned and effective conservation education and awareness programme linked to the objectives and needs of the Core Zone	4
Planned education and awareness programme, but still with gaps	3
Planned education and awareness programme, but still with serious gaps	2
Very few unplanned conservation awareness programmes	1

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No conservation education and awareness programme	0
RESEARCH & MONITORING	
Comprehensive programme of research and monitoring relevant to management objectives and needs. Well-staffed and regular activities	4
Comprehensive research and monitoring programme, but irregular and is readily directed towards the objectives and needs of the management	3
Unplanned research and monitoring activities, not directed towards the needs of the management. No regular allocations for research by the Park Management.	2
Some systematic studies by outsiders and not by the Park Management	1
No research and monitoring activities by the Park Management or by outsiders	0
COMMUNICATION AND COORDINATION	
Well planned communication and coordination system, with no complaint from the stakeholders	4
Well planned communication and coordination system, but with complaints from the stakeholders	3
No planned communication and coordination with all types of stakeholders, but it occurs as and when required, there are gaps	2
Very low communication and coordination among the stakeholders	1
No communication and coordination among the stakeholders	0
EXTRACTION OF NATURAL RESOURCES	
No extraction of natural resource	4
Extraction, but with no perceptible impact	3
Extraction, with negative impact on non-threatened species	2
Extraction, with negative impact on endangered species and or natural communities	1
Extraction, causing damage to the Core Zone	0
GRAZING	
No grazing	4
Grazing, but with no perceptible impact	3
Grazing, with negative impact on non-threatened species	2
Extraction, with negative impact on endangered species and or natural communities	1

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Extraction, causing damage to the Core Zone	0
POACHING	
No poaching	4
poaching, but with no perceptible impact	3
poaching ,with negative impact on non-threatened species	2
poaching, with negative impact on endangered species and or natural communities	1
poaching, causing damage to the endangered species	0

The Committee can also develop the methodology of collecting, analyzing, crosschecking information/ data and verifying the same with the data collected from some other sources. The results/ findings of the monitoring and evaluation programme should be reported very clearly so that the Park Management can act upon the recommendations and make the required improvements.

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