

Chapter 10

Preparation of Management Plan and Tiger Conservation Plan

A Management Plan is a document, prepared by a planning process, which sets out the values and objectives of management for a Protected Area. By presenting strategies and operational schedules, the plan shows how these objectives can be achieved within a time bound framework⁸². The National Wildlife Action Plan 2002-16⁸³, provides that each Protected Area should have its own Management Plan, based on sound scientific and ecological data. Further, the Management Plans are being prepared based on guidelines issued by Wildlife Institute of India *i.e.*, “A Guide to Planning Wildlife Management in Protected Areas and Managed Landscapes” generally referred to as Sawarkar’s guidelines. Further, in respect of Wildlife Sanctuaries and National Parks which were notified as Tiger Reserves under section 38 V of Wildlife (Protection) (Amendment) Act, 2006, the management of these Protected Areas are to be in accordance with Tiger Conservation Plans (TCPs) approved by National Tiger Conservation Authority (NTCA). Detailed guidelines for preparation of TCP were issued by NTCA during 2007.

10.1 Preparation of Management Plans

As per the Sawarkar’s guidelines, Management Plans should broadly include Protected Area status, boundaries and landscapes, strategies, results of previous management practices, and proposed / prescribed management practices for the current plan, considering thematic and zonal requirements of the Protected Area, duly incorporating the year-wise plan of operations / proposed budget. Tiger Conservation Plan should have different chapters for core and buffer areas including SWOT⁸⁴ analysis with plan objectives, plan for corridors, *etc.* The core and buffer plans should have different theme plan⁸⁵ based on the requirements.

In Karnataka, the Management Plans are prepared by the PA managers and approved by PCCF-WL who is also the Chief Wildlife Warden for all the Protected Areas except Tiger Reserves (TRs). With reference to TRs, the TCPs prepared are forwarded by PCCF-WL and got approved from NTCA.

10.1.1 Shortcomings in Management Plans

The deficiencies and observations noticed in MP / TCPs of sampled Protected Areas are given below:

⁸² Para 4, page 3 of A Guide to Planning Wildlife Management in Protected Areas and Managed Landscapes by Vishwas B Sawarkar

⁸³ Para 1 of Chapter II

⁸⁴ Acronym for Strengths, Weaknesses, Opportunities and Threats and is a structured planning method that evaluates those four elements of a project or plan.

⁸⁵ Separate sub-plans developed for azonal components.

- ❖ Out of 14 sampled PAs, there was a delay in preparation of MP/TCP in seven⁸⁶ PAs for the period beyond the previous plan periods. Also, in MM Hills which was declared as a Sanctuary in May 2013, approved MP was not in place even after three years. In reply, PCCF-WL stated that wherever there was delay in preparation of new MP, earlier MPs were being implemented. PCCF-WL also stated that in respect of newly declared Sanctuaries, appropriate scientific reports are being solicited from scientific community / institutions and preparations of sound Management Plans are underway. The reply is not acceptable since the wildlife habitats are constantly being affected by different factors, and the current Management Plan should be based on these factors which might not have been foreseen in the earlier Plan. The preparation of subsequent plan should have been started well in advance and been in place before expiry of current plan, something which has not been done.
- ❖ In respect of three⁸⁷ PAs wherein additional areas were included to the Wildlife Sanctuaries during 2011, no indicative plans / revised plans were prepared so as to address the issues relating to these areas. Since the plans are drawn up for ten years, this process provides for any mid-course corrections that could be found necessary during the implementation of Plan. However, it was observed that except Management Plan of Kudremukh NP (2003-13), none of the MPs had provision for mid-term revision. However, mid-term revision of MPs was not conducted in any of the PAs. In reply, PCCF-WL stated that in respect of Someshwara WLS, the newly approved MP covers extended area and new MPs are being prepared for Cauvery and Mookambika Sanctuaries.
- ❖ Control forms, are forms to record events and management activities, problems and their magnitude, events that are important from management standpoint and track management activities⁸⁸. Control forms would be a source of management reference during revision of plan / management review / mid-course corrections. However, it was observed that control forms were not provided for in the MPs of five PAs. Further, in respect of eight sanctuaries / NP / TR, though the MP / TCP provided maintenance of control records, these were not maintained.
- ❖ Compartments are the smallest units of forests and compartment histories are valuable in monitoring a wide range of activities and events which in turn contribute to evaluation of natural / man induced impacts, efficiency of management prescriptions, planning of management actions. Compartment histories provide a repository of management history⁸⁹. It was, however, observed that only MP of Kudremukh National Park provided for maintenance of compartment history to be maintained for recording habitat elements, events and management aspects relating to a compartment. Unfortunately, this was also not maintained even at Kudremukh.

⁸⁶ Bandipur, Brahmagiri, Dandeli- Anshi, Kudremukh, Nagarhole, Pushpagiri, Talacauvery

⁸⁷ Cauvery, Mookambika and Someshwara Wildlife Sanctuaries

⁸⁸ Para 39, Executive summary, Sawarkar's guidelines

⁸⁹ Para 40, Executive summary, Sawarkar guidelines

- ❖ Sawarkar's guidelines provide that MPs are to provide for maintenance of Record of Deviations and implemented targets for indicating the record of targets implemented and changes adopted in Management Strategies. However, only three⁹⁰ MP / TCPs provided for maintenance of Record of Deviation and implemented targets and this record was not maintained even in these Divisions.

The issues brought out above indicate the system deficiencies in the planning process.

10.2 Deficient coverage of issues relating to Human Wildlife Conflicts

As per Paragraph 25 of Sawarkar guidelines, the concerns relating to Human Wildlife Conflicts (HWC), also known as man-animal conflicts, are to be drafted in the Management Plan. Mitigation of HWC is a major challenge to a PA Manager as they consume much of their time and resources. Hence, the Management Plans should identify causes behind HWC for adoption of appropriate mitigation measures as a Theme Plan, sub plans reflecting the common interests of all zones of Management Plan, identifying causes such as cropping pattern, encroachments, *etc.*, and identify locations / beats / compartments prone to HWC, and adoption of mitigation measures (EPT, solar fencing, *etc.*). This is necessary in view of increased HWC as detailed in **Paragraph 4.1.**

We noticed that MPs of Pushpagiri, Brahmagiri and Talacauvery Wildlife Sanctuaries had not identified the causes for HWC in their Theme-Plan for mitigation of HWC and also not identified locations / beats / compartments prone to HWC.

In the MPs of Pushpagiri, Brahmagiri, Talacauvery sanctuaries and Nagarhole Tiger Reserve, Theme Plan had not identified locations for deployment of mitigation measures like EPT, solar fencing, location of elephant depredation camps.

TCP of Nagarhole TR prescribed construction of service road around Protected Area to monitor the various measures such as EPT / Solar Fencing. However, the same was not executed in the PA. Since these PAs are part of a landscape with very high incidences of HWC, detailed plan should have been prepared.

10.3 Rehabilitation / Resettlement and status of encroachments

Rehabilitation / resettlement is the viable solution for reducing the human wildlife interface thereby reducing anthropogenic pressure on the wildlife and their habitats. Since delay in rehabilitation would not only increase the cost but also would lead to higher incidences of HWC, it is necessary that rehabilitation is taken on priority as planned. The current status of progress of rehabilitation is deliberated in **Paragraph 6.3.**

⁹⁰ Kudremukh National Park, Nagarhole and Bhadra Tiger Reserves

During scrutiny of Management Plans and progress of rehabilitation, it was noticed that rehabilitation and resettlement were not taken up as planned. The MP / TCP targets for rehabilitation, and families actually rehabilitated in Kudremukh NP, Nagarahole and Dandeli Anshi tiger Reserves, are shown in **Table 10.1:**

Table 10.1: Achievement of MP / TCP rehabilitation of targets in Kudremukh National Park, Dandeli- Anshi and Nagarahole Tiger Reserves

(Number of families)

Year	Kudremukh National Park (2013-23)		Dandeli Anshi Tiger Reserve (2014-24)		Nagarahole Tiger Reserve (2014-24)	
	Target	Ach	Target	Ach	Target	Ach
MP/TCP targets and achievements →						
2014-15	90	45	300	104	100	69
2015-16	102	53	300	58	100	4
Total	192	98	600	162	200	73

(Source: Details furnished by the Department)

As per the above table, a total of 992 families were planned to be rehabilitated during 2014-16. However, only 333 families were rehabilitated which indicates a shortfall of nearly 66 per cent in achievement of MP / TCP targets.

Further, MPs of Kudremukh NP and TCPs of Dandeli-Anshi and Bandipur Tiger Reserves contained Theme Plans for preventing / addressing encroachments by consolidation of boundaries, demarcation of boundary on the ground, periodic inspection, etc. We observed that the progress in eviction of encroachments in these PAs was very slow which had been discussed in **Paragraph 6.1** of this report.

PCCF-WL in reply stated that rehabilitation is a complex issue and that there are no easy and short term solutions. PCCF-WL, also, stated that in Nagarahole TR, for balance of around 1,200 families, no lands are available for rehabilitating them. We feel that though rehabilitation is a complex phenomenon and land available for rehabilitation is limited, in Kudremukh NP and Dandeli-Anshi TR, where cash compensation is being paid, allocating more funds could speed up the process. Further, in Nagarahole TR, in spite of availability of land and funds, the relocation of 195 applicants is still under progress indicating slow progress in the matter.

10.4 Deficient Fire Management Theme Plan in the Management Plans

Fire protection is a measure common to all zones where fire is a recurrent problem affecting habitat and ecology of protected areas. It becomes necessary that the issue is adequately addressed in the MP / TCP for taking preventive measures. Sawarkar's guidelines (Paragraph 96) provide that theme plans, sub plan of management of specific issues, are included in the Management Plan for problems like fire protection, maintenance of water resources, etc.

We observed that there were no theme plans for fire on scrutiny of MPs relating to six ⁹¹ Protected Areas. We also noticed that vulnerable compartments / areas were not identified and vulnerability maps not prepared. This map would be handy to focus on areas which require regular attention for taking appropriate preventive measures like location and quantum of firelines to be maintained, location and numbers of fire watchers to be deployed, period of deployment, *etc.* Thus, vulnerability map helps in containing destruction of more area due to fire incident.

10.5 Anti-poaching operations

Poaching is one of the major threats for decrease in number of wild animals on account of killing for their meat and body parts. Management Plans should adequately chalk out a plan to protect wildlife from poaching by drawing separate Action Plan. The planning should include identification of vulnerable areas / species, deployment of anti-poaching staff, planning beats, usage of latest technologies, *etc.*

We noticed that Management Plans of Sharavathi WLS, Madikeri and Kudremukh Wildlife Divisions did not provide for GPS based monitoring measures such as use of *Huli / Hejje* software⁹² to monitor the patrolling activities conducted by Anti-poaching Camps. Further in Kudremukh NP, floating / temporary camps were not established despite being provisioned for in MP. Several incidents of poaching were reported as brought in **Paragraph 7.1.**

10.6 Theme plan for *Hadlu* (Wetlands) Management

Hadlus are marshy swamps surrounded by open grass lands and are a unique feature of Nagarahole Tiger Reserve. The soil is clayey, perennially moist and support luxuriant growth of sedges⁹³ and grasses round the year. Therefore, this habitat is most suited for mega-herbivores like Asian elephants and Indian gaurs and also supports other ungulates like chital and sambar. However, the TCP has observed that these special habitats are being overtaken by woody vegetation and weeds like *Chromolaena odorata*, *Lantana*, *etc.*

Hadlus also play a vital ecological role in the prey-predator relationship and these remain as one of the preferred hunting grounds for the tigers. Many times in the past it has been observed that tigers use these *hadlus* to hunt their prey and also hide the kill for many days. As per management objectives proposed for *hadlus*, these have to be preserved through periodic weeding, wood cutting and fire line tracing in order to arrest the process of natural succession. Further, *hadlus* should be monitored through satellite data so as to maintain the ecological services of the *hadlus* to the wild animals on a long-term. Though it was stated in the TCP, that the area under *hadlus* is coming down but the extent of decrease was not assessed.

⁹¹ Pushpagiri, Brahmagiri, Talacauvery, Someshwara and Mookambika WLS and Kudremukh National Park (2003-13)

⁹² These are software loaded to GPS enabled instruments which will be with watchers and help in assessing the area patrolled, uploading images of animals sighted *etc.*

⁹³ Sedges are grass like plants growing in the marshy area.

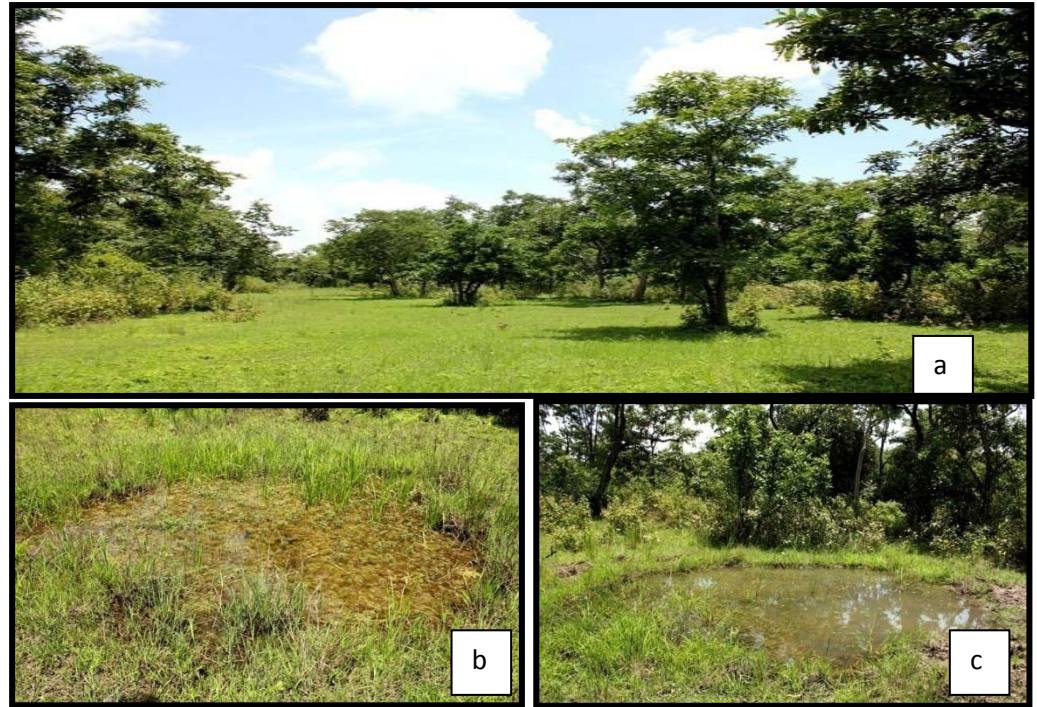


Figure 10.1: (a) Images of *Hadlu* in Nagarahole Tiger Reserve. (b) & (c) close up of *Hadlu*
Source: Images taken during field visits by Audit.

However, scrutiny of records revealed that as per TCP 5 *hadlus* per annum were to be maintained and specific efforts for preserving *hadlus* were not taken up by means of periodic weeding, wood cutting and fire line tracing during the years 2014-15 and 2015-16. Also, preparation and monitoring of inventory of vegetation profile in *hadlus*, and their satellite based monitoring have not been taken up, though provided for in the TCP.

Though the importance of *hadlus* and the necessity of their management had been specifically assessed in the TCP, no measures were taken during 2014-16 to address the issue which could lead to loss of this magnificent ecological entity.

Box No .4

Best Practices

Management Plan of Kudremukh National Park (2013-23) consists of a Theme Plan for eco-restoration of habitat through soil and moisture conservation and assisted natural regeneration (Water Management Plan - Para 6.4.6, page 219 of Management Plan). This is one of the best Theme Plans related with habitat improvement.

Following are the main features of this Theme Plan:

- ❖ Three major rivers, three minor rivers and 176 water holes have been identified in the Theme Plan, giving proper coverage to drainage basins.
- ❖ Details of water holes and tanks which were de-silted in previous years (2003-12) have been included in the Theme Plan which will provide a better insight about execution of de-silting works in future.
- ❖ The Theme Plan has identified and delineated the micro water sheds in Kudremukh National Park showing the existing water bodies / water holes and drainages in the National Park.
- ❖ The Theme Plan has identified 30 water holes and 15 check dams / culverts which have to be created / constructed during the next 10 years citing the beats / ranges where these have to be created.

10.7 Monitoring and Evaluation

The prescriptions of TCP of Nagarhole Tiger Reserve (2014-24) with reference to monitoring and evaluation in respect of different parameters, and their implementation have been brought out in **Table 10.2** below:

Table 10.2: Evaluation of issues identified in the TCP of Nagarhole TR

Issues	Remarks
Monitoring of biological parameters like flora, fauna indicating health of whole Nagarhole ecological system	Not done
Monitoring the status of species, such as four-horned antelopes, wild dogs, avian fauna	No species except tigers and elephants were assessed
Annual monitoring of water resources, invasion of weeds, regeneration of native species, availability of fodder	Not done
Assessment of socio-economic parameters of tribals living inside Protected Area	No socio-economic parameters were assessed regarding tribals
GIS based monitoring system to identify encroachments	Not evolved

Thus it could be seen that except for estimation of elephants and tigers which are being done at all India levels, no other monitoring works, though prescribed in the TCP, were taken up by the PA Management.

Moreover, it was noticed that the Management Plans of other sampled National Parks / Wildlife Sanctuaries did not include any monitoring mechanism related with biological parameters, status of species, annual monitoring of water resources, assessment of socio-economic parameters and GIS based monitoring system to identify encroachments.

In the absence of monitoring of the prescribed parameters, there was no system in place to monitor the status of the above indicators of health of the wildlife habitat in any of the National Parks / Wildlife Sanctuaries.

10.8 Climate Change and its impact on Western Ghats

The Management Plans and Tiger Conservation Plans are to include strategies for addressing the site specific / landscape level threats and challenges in addition to issues of global importance since all the factors affecting the habitat are to be addressed in it. Climate change is one of the major issues relating to environment in recent years and has affected rainfall patterns in many parts of the globe⁹⁴. The Western Ghat region is also affected on account of climate change.

Climate change in Karnataka has already had its effect on the rainfall pattern and the average rainfall in Madikeri, Mysuru, Hassan, Dakshina Kannada and Chamarajanagar had reduced during the period 1971-2005 as per the report of Karnataka State Action Plan on Climate Change -1st Assessment. The report has also projected change in rainfall pattern during the period 2021-50 As Kudremukh NP, Nagarhole NP, Bhadra WLS, Bandipur NP, MM WLS, BRT

⁹⁴ Intergovernmental panel on Climate change report 2013, Available at https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/drafts/WG1AR5-TS_FOD_All_Final.pdf

WLS and parts of Cauvery WLS are situated in the Western Ghat region, they are bound to get impacted by the reduced rainfall. Further, scientists of Centre for Ecological Sciences, Indian Institute of Science also have forecasted decreasing trend in the rainfall pattern over Western Ghats between 2013 and 2020 as detailed in **Box No. 5**.

Box No. 5

A study was conducted in 2016 by Energy and Wetlands Research Group, Centre for Ecological Sciences, Indian Institute of Science⁹⁵ on “Time Series MODIS NDVI based vegetation Change Analysis with Land Surface Temperature and Rainfall in Western Ghats”. The study which was also financed by Ministry of Environment, Forests and Climate Change, analysed the trends in rainfall time-series data using statistical methods and modelled using autoregressive integrated moving average which indicated decreasing trend in the rainfall pattern over forest and agricultural / grassland areas from 2013 to 2020 in Western Ghats, revealing the likely grave situation threatening water and food security in peninsular India with the increasing trends in deforestation in the ecologically vital Western Ghats.

Reduction in rainfall will result in reduced availability of fodder and water for wildlife forcing animals to move out of their habitats and stray into human habitations leading to increased Human Wildlife Conflict cases. Already, the increased HWC cases were noticed during the last two years at Bandipur TR as detailed in **Paragraph 4.1.1**.

The other impacts of climate changes are:

- ❖ Climate change would cause change in ecology of habitats which may not be conducive to all the floral species found in the WG-NBR region. These changes have the potential to cause species extinction which would be having catastrophic impacts in this species-rich region⁹⁶. Therefore, there is need to establish gene bank / germ plasm⁹⁷ banks⁹⁸ so as to conserve these species for *ex-situ* conservation and re-introduction into their natural habitats. However, no such efforts have been made even though this was to be done as per Karnataka State Action Plan on Climate Change - 1st Assessment undertaken at the behest of the Government of Karnataka (March 2012).

⁹⁵ Ramachandra T V, Uttam Kumar and Anindita Dasgupta, 2016, Time-series MODIS NDVI based Vegetation Change Analysis with Land Surface Temperature and Rainfall in 112 Western Ghats, India, ENVIS Technical Report 100, Sahyadri Conservation Series 53, Energy & Wetlands Research Group, CES, Indian Institute of Science, Bangalore 560012.

⁹⁶ Report of Intergovernmental Panel on Climate Change, Para 11.21.6. Climate Change 2001: Impacts, Adaptation, and Vulnerability available at <http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=432>

⁹⁷ Gene banks are a type of biorepository which preserve genetic material and Germ plasm are living genetic resources such as seeds or tissues that are maintained for the purpose of animal and plant breeding, preservation, and other research uses.

⁹⁸ Para 6.9 of Karnataka State Action Plan on Climate Change – 1st Assessment, prepared by EMPRI and TERI

- ❖ Climate change has the potential to increase the number of fire incidences as per studies conducted in United States of America⁹⁹ and Canada¹⁰⁰. Therefore, research and studies need to be focusing more on this issue for taking adequate precautionary measures. However, it was observed that no such research activities were undertaken by the Department.

Even though climate change is a global phenomenon which needs to be taken seriously, its impact has already started to be felt in the PAs. However, climate change and its impact have not been addressed virtually in any MP / TCPs of any of the PAs except in TCP of Nagarhole TR.

In reply, PCCF-WL stated that the Centre for Ecological Science, IISc is working on this aspect and there are no clear prescriptions in this regard.

10.9 Best practices noticed in Management Plans of Protected Areas of other Nations

Detailed milestones and performance indicators are spelt out in the Management Plans of Amboseli ecosystem, Kruger National Park and other PAs of Kenya. In Management Plans of Australia, Kenya, Canada and South Africa, it is observed that the draft Management Plan is put up in the public domain for a short period like two months for soliciting the opinion of the public. The Management Plan would then be finalized after taking into account these opinions. Also, in countries like Australia and Kenya, the locals are included in the Management Committee having a say in the management of the PA.

However, our MP / TCPs neither contained performance indicators nor are the plans finalised involving locals and other stakeholders, as done in other countries. The *modus operandi* followed in the aforesaid countries are worth emulating.

In reply, PCCF-WL stated that the PAs in Karnataka are not comparable in size to the PAs in Africa and efforts are being made with the help of scientific community / institutions to draw the Management Plans indicating some of the key milestones and indicators.

In the Exit Conference, the Government accepted the audit concern about deficiencies brought out in the MP/TCP and stated that remedial measures would be taken.

Recommendation 16: Management Plan / Tiger Conservation Plan may be prepared in advance before the expiry of the previous plan. Management Plan / Tiger Conservation Plan should be drawn covering the issue relating to human wildlife conflict, fire management etc., from a holistic point of view for better management and conservation. Best practices of other countries may be considered for adaptation wherever suitable.

⁹⁹ Virginia H. Dale et al, Climate Change and Forest Disturbances, Available at: <http://bioscience.oxfordjournals.org/content/51/9/723.full.pdf>

¹⁰⁰ Gillette et al (2004) Detecting the effect of Climate Change on Canadian forest fires, Available at: <http://onlinelibrary.wiley.com/doi/10.1029/2004GL020876/epdf>