

Measures to Reduce Mortality of Elephants on Railway Track in Kerala and Tamil Nadu

**Committee Report
Project Elephant Division,
MoEFCC**

SEPTEMBER 2021

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Site Visit Report of the Committee Constituted by Project Elephant Division of Ministry of Environment, Forests and Climate Change

Background

In response to the directives of the Hon'ble National Green Tribunal (NGT), Southern Bench, in the meeting of the Central Project Elephant Monitoring Committee (CPEMC) held on 28th July 2021 it was decided to constitute a Committee to review the steps taken by the Railways and Forest Department to contain the mortality of elephants on railway track in Kerala and Tamil Nadu. The members of the committee are as follows:

<i>S. No.</i>	<i>Name and Designation</i>	
<i>01</i>	<i>Shri. Harikumar Rt. PCCF Kerala, Member CPEMC</i>	<i>Chairman</i>
<i>02</i>	<i>Dr. K. M. Selvan Scientist – D, Project Elephant MoEFCC</i>	<i>Member Secretary</i>
<i>03</i>	<i>Dr. Bilal Habib Scientist – E, WII Dehradun</i>	<i>Member</i>
<i>04</i>	<i>Dr. Pajna Paramita Panda National Coordinator, Elephant cell</i>	<i>Member</i>
<i>05</i>	<i>Shri. Jatin Kumar Divisional Engineer, East Palakkad SR</i>	<i>Member</i>
<i>06</i>	<i>Representative of Kerala Forest Department</i>	<i>Member</i>
<i>07</i>	<i>Representative of Tamil Nadu Forest Department</i>	<i>Member</i>

The ToR of the Committee

- | | |
|--------------|--|
| <i>(i)</i> | <i>The Committee will review the action taken by Southern Railways and Kerala Tamil Nadu Forest Departments to contain the mortality of elephants on railway track, efficacy and effectiveness of actions/measures taken in field.</i> |
| <i>(ii)</i> | <i>The Committee shall also suggest additional measures apart from existing ones for reduction/minimization of elephant deaths due to train hits.</i> |
| <i>(iii)</i> | <i>The Committee shall suggest who will bear the cost of additional measures.</i> |

Site Visit and Interaction with Stakeholders

The Committee conducted the site visit on 4th September 2021. Members of the Committee interacted with forest officials of Kerala and Tamil Nadu Forest Departments and Railway officials of Southern Railways. The Committee members along with all the stakeholders conducted survey of the railway track from Palakkad Junction to Madukarai railway station. After the site visit the Committee members had detailed deliberations with Railway officials and the Forest Department officials.

The Railway Line

The Palakkad-Podanur electrified broad gauge double line railway track of Southern Railway passes through the Reserve Forest in eastern Ghat between kanjikode and Madukarai railway stations. The track between KM 485/920 to 534/470 is separated by twin single lines – “A” and “B”. The Podanur – Palakkad down Line is “A” Line laid during the year 1861 and Palakkad - Podanur UP line is “B” line which was constructed in 1974 and is in the Ghat Section both in Kerala and Tamil Nadu states. The length of “A” line is 48.26km and “B” line is 52.56 km with 8 stations. The railway line passes through the foothills of the mountains of Walayar. Conflict in Line B started mostly after the year 2000 when human habitation thrived in the area and paddy cultivation was taken up by the villagers. The total distance of railway line is 39.05 km from Palakkad Jn. to Madukarai in A line and 3Km excess track length in B line i.e. 42.046Km for easing out the vertical gradient in B line.

Table 1: Distance between Stations from Palakkad Jn. to Madukarai

S. No.	Station Name	Chainage (km)	Distance to
01	Palakkad Jn	534.47	0
02	Kottekkad	528.00	6.47
03	Kanjikode	520.83	7.17
04	Chullimada (A line)	514.97	5.86
05	Walayar	509.59	5.38
06	Ettimadai	500.52	9.07
07	Madukarai	495.58	4.92

Railway Line in Kerala

In Kerala side, the railway line extends from Palghat Jn. to Walayar. The track between

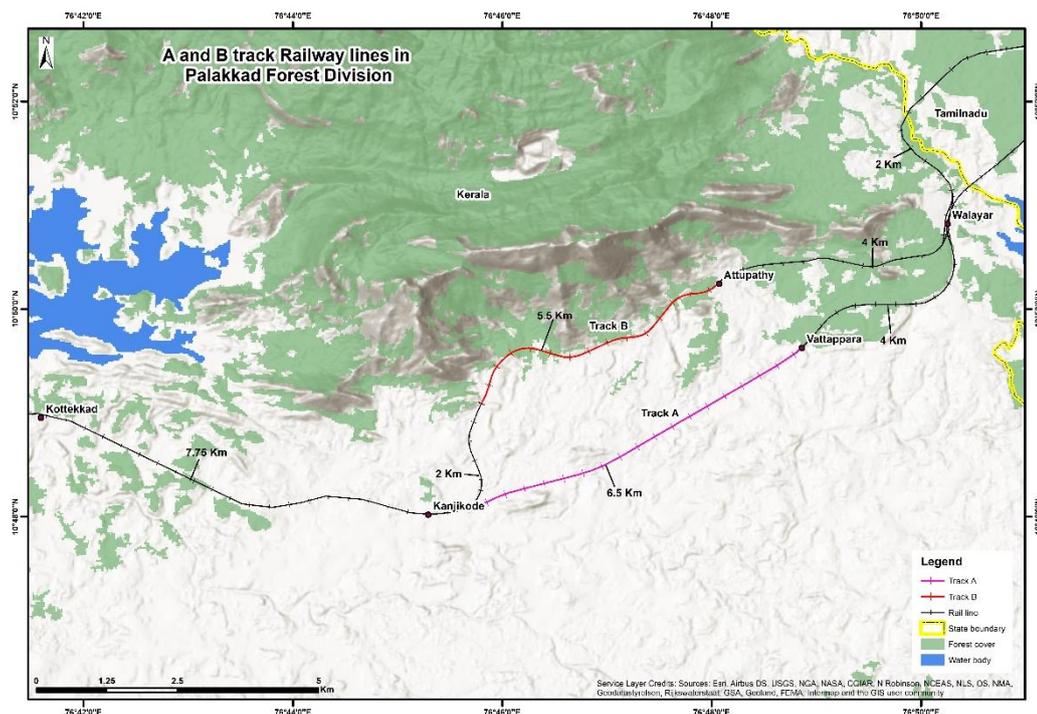


Figure 1: Location of various railway stations on railway track from Kottekkad to Walayar

Palghat and Kottakkad runs parallel in A and B line. The forest area starts from Kottakkad Railway station where 2 km of track is identified for elephant crossing. Next railway station from Kottakkad (Halt Station) is Kanjikode which is 7.75km far in railway track chainage. From Kanjikode, the railway line diverges into unparallelled track in Line A and Line B with line B closer to Ghat. Line A Kanjikode to Walayar is 10.5 km and B line is with 1 Km extra length to ease out the vertical gradient in ghat section. In Line A, the forests lie on both sides of the 4km track from Vattappara to Walayar. Line B from Kanjikode to Walayar is 11.5km passing through Valladi and Attupathy.

In Line B, forest lie on one side of the track between Valladi to Attupathy towards the hills and on both sides of the track from Attupathy to Walayar. Elephants generally move from Kottakkad to Walayar through northern boundary of railway track. Because of the presence of Walayar mountains, at many places, there are steep slopes along the railway track which makes the movement of elephants risky along the railway track. Sometimes the elephants cross the Line B and move towards Line A track.

Railway Line in Tamil Nadu

In Tamil Nadu side, there are three railway stations namely, Podanur, Madukarai and Ettimadai. The Coimbatore-Palakkad section has busy train traffic and a double line to cater for it. The railway track diverges from Walayar in 2 unparallelled track and meets at Ettimadai station. After Ettimadai, both the tracks again diverge to meet at Madukarai Station. Between Ettimadai and Podnaur the track goes completely outside the forests.

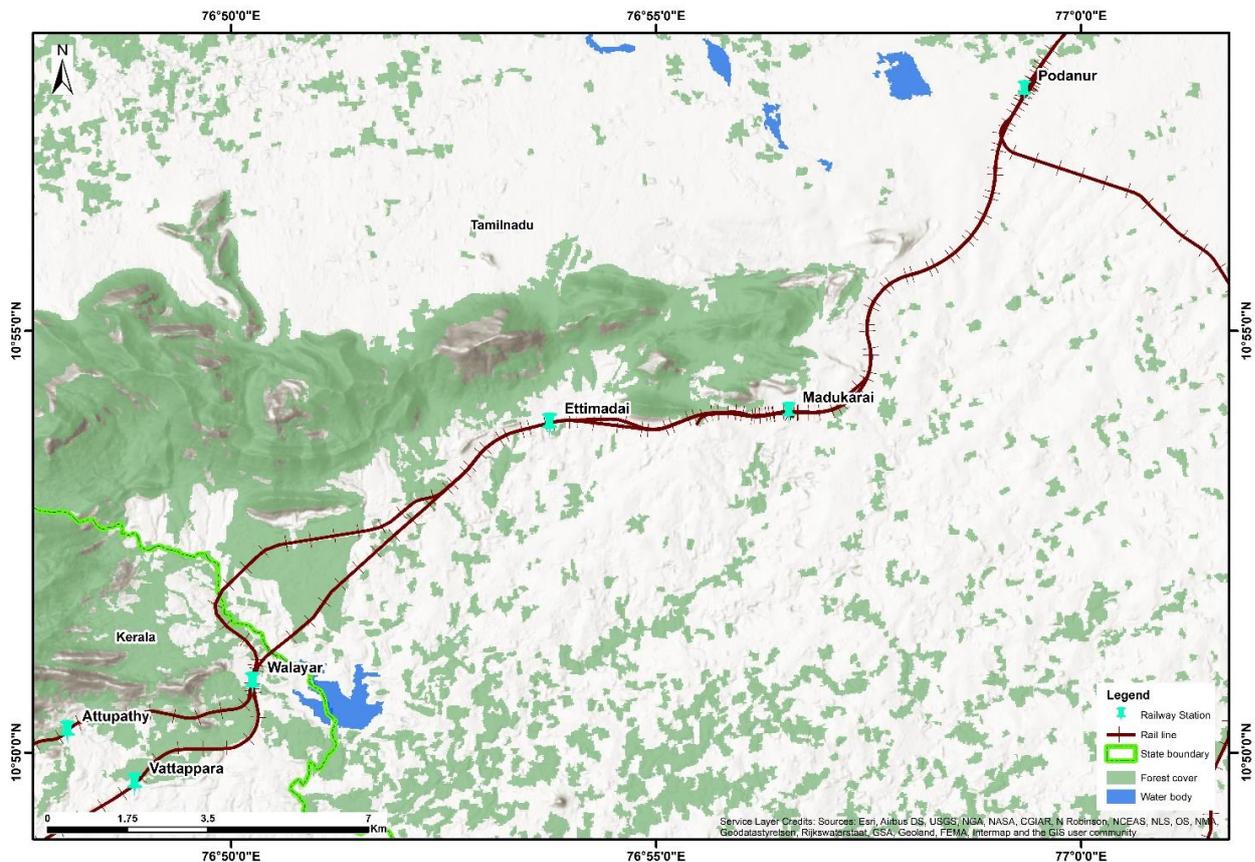


Fig.2: Location of various railway stations on railway track from Podanur to Walayar

Death of Elephants in Kerala & Tamil Nadu in Coimbatore- Palakkad Railway Track

Elephants have been reported from Walayar Mountains as early as 1900. The Coimbatore and Palakkad Forest Divisions of Tamil Nadu and Kerala (Southern Railways, Coimbatore-Palakkad section) are facing an acute problem of elephant mortality due to train hits. The railway records show elephant death during the year 1978, while newspaper records show elephant deaths during the year 1970 and 1980. Between 2002 and 2021, 22 elephants have died on the railway track in this section in 18 conflict cases. From 2006-2010, accidents have taken place every year. However, there were no accidents recorded between 2011 to 2015. But death of 4 elephants in 2016 followed by 5 elephants in the subsequent two years (between 2019-20) have necessitated the attention to be drawn into the actions being taken by the Railways and State Forest Departments of Tamil Nadu and Kerala to contain the death of elephants occurring in the railway track between Coimbatore and Palakkad Railway line. The death of elephants recorded in the railway line between Coimbatore- Palakkad from 1978 to 2021 is as below:

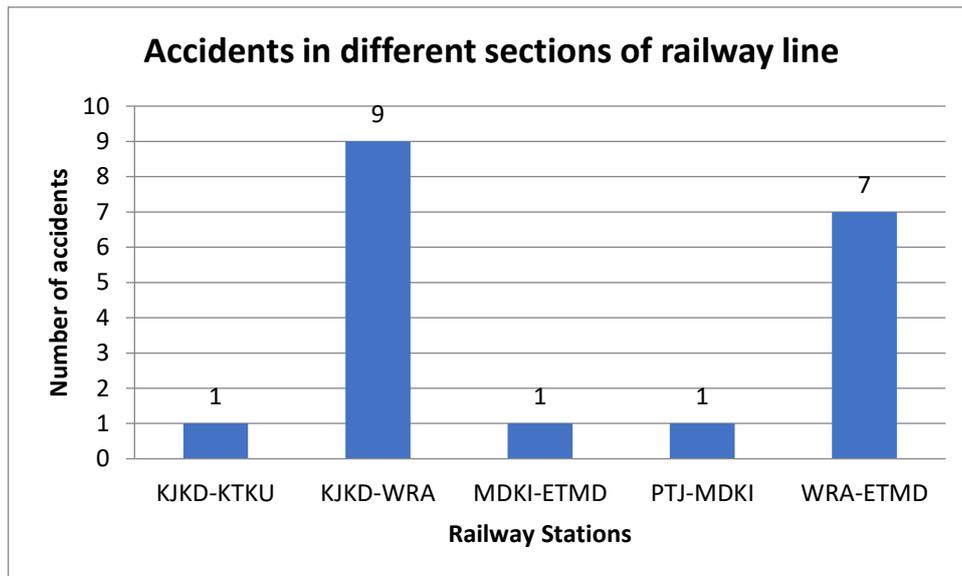
Table 2: Details of reported elephant deaths on railway track in Kerala and Tamil Nadu

State	Date/Time (Hrs)	No. of Elephants/Sex	Line/Location
Kerala	21.09.2002/22:50	02/Female & calf	B: 511/23 -27
	02.11.2006/21:30	01/Male	A: 511/32 – 512/10
	28.09.2007/02:15	01/Calf	B: 511/27-29
	03.06.2009/22:35	02/Female & Calf	B: 516A/33 – 517/7
	16.07.2009/00:38	01/Female	B: 512/27-29
	16.08.2010/21:50	01/Calf	B: 511/35
	27.11.2016/07:10	01/Male	B: 514/5-3
	24.12.2019/22:57	01/Male	B:526/19-17
	19.08.2020/05:50	01	B: 510/0-511
	07.11.2020/18:10	01	B: 514/500
	Total accidents: 10	Total elephants dead: 12	
Tamil Nadu	1978/21:00	02/Unsexed	A: 507/600-700
	04.02.2008/01:07	03/Male (1), Female (1), Calf (1)	B: 492/9-11
	17.07.2009/01:20	01/Male	A: 506/20-22
	20.06.2016/00:54	01/Female	A: 497/4
	09.07.2016/05:05	01/Male	B: 508/17-19
	29.07.2016/06:05	01/Female	B: 506/21-19
	02.08.2019/23:00	01/Elephant Calf	B: 507/19 -17
	08.08.2020/05:45	01	B: 506/13-07
	15.03.2021/01:20	01/Male	B: 506A/09
	Total accidents: 9	Total elephants dead: 12	

Analysis of Death of Elephants in the Southern Railway Line

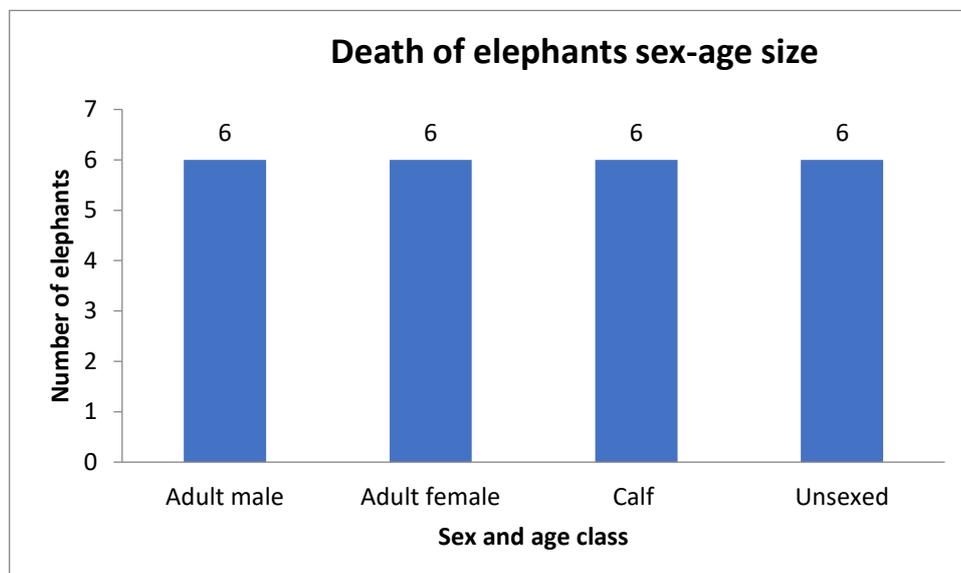
1. Death of elephants across stations:

Till date, 24 elephants have been killed in 19 accidents on both the lines, of which 12 each have been killed in Kerala and Tamil Nadu. On the B line, 15 accidents have taken place in which 19 elephants have died and on the A line, four accidents have taken place in which 5 elephants have died. Out of 19 accidents, 9 have taken place between Kanjikode and Walayar railway section in Kerala side and 7 between Walayar and Ettimadai in Tamil Nadu side.



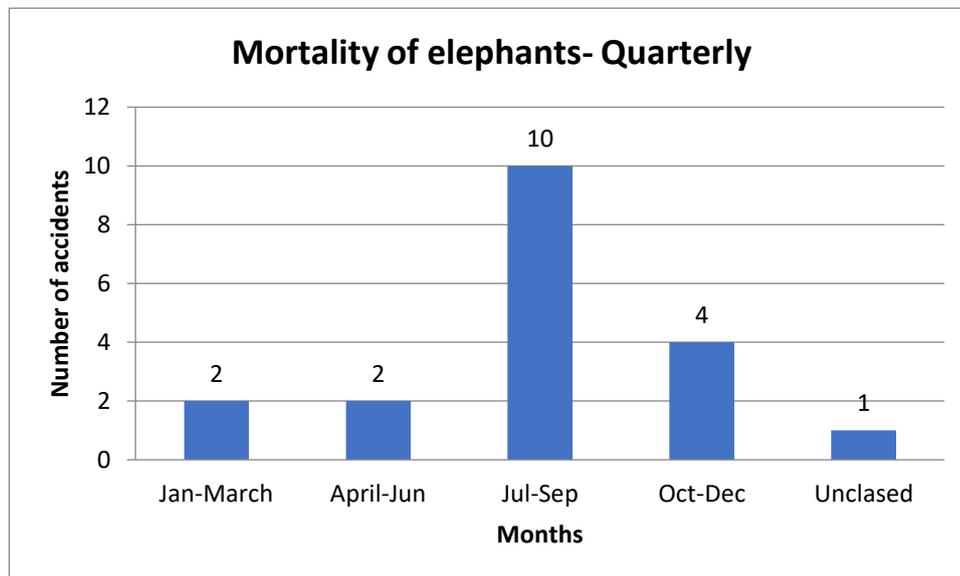
2. Death of elephants according to age-sex class:

In most of the cases elephants from a herd have died. Out of 24 elephant deaths, six were adult male, six adult female, six calves and six unsexed.



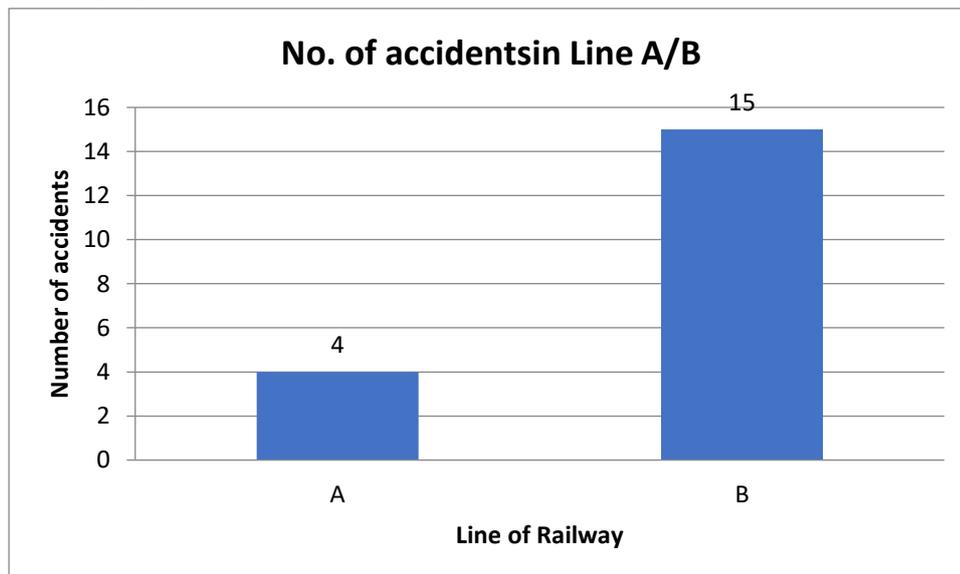
3. *Death of elephants according to season:*

Seasonal mortality data show that most of the accidents have taken place during monsoon and winter seasons between July to December.



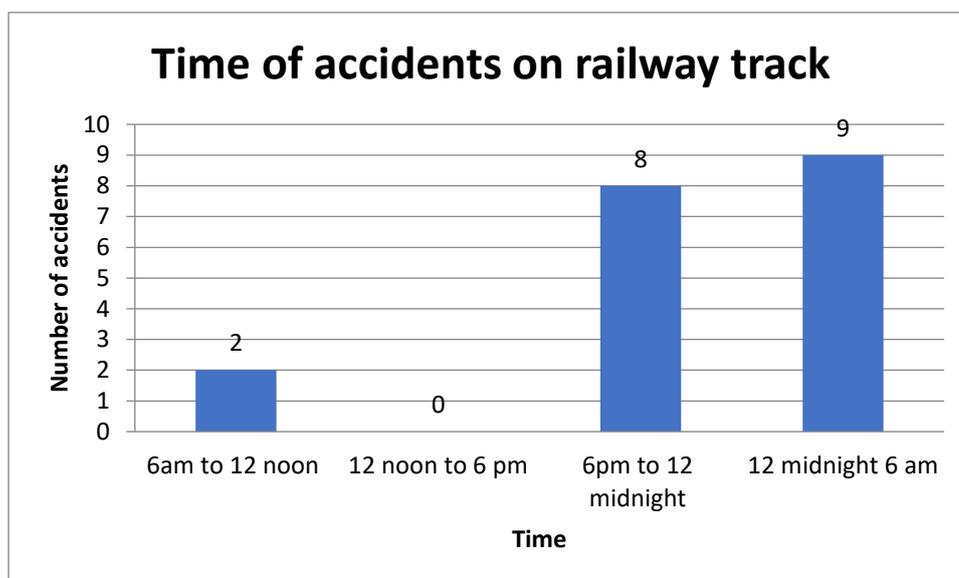
4. *Death of elephants in Line A and B:*

Of the 19 elephants hit cases recorded in Coimbatore-Palakkad railway line, most of the accidents (15) occurred on Line B. Of the 19 accidents, 4 accidents have taken place in Line A.



5. *Time of accidents:*

Of the 19 accidents recorded in the Southern Railway between Coimbatore and Palakkad, 17 accidents occurred between 6pm to 6am indicating poor visibility on railway track a prime reason behind accidents. Only 2 accidents occurred after 6 am (one at 6.05am and the other at 7.10am) which were both early in the morning. No accidents occurred in broad daylight.



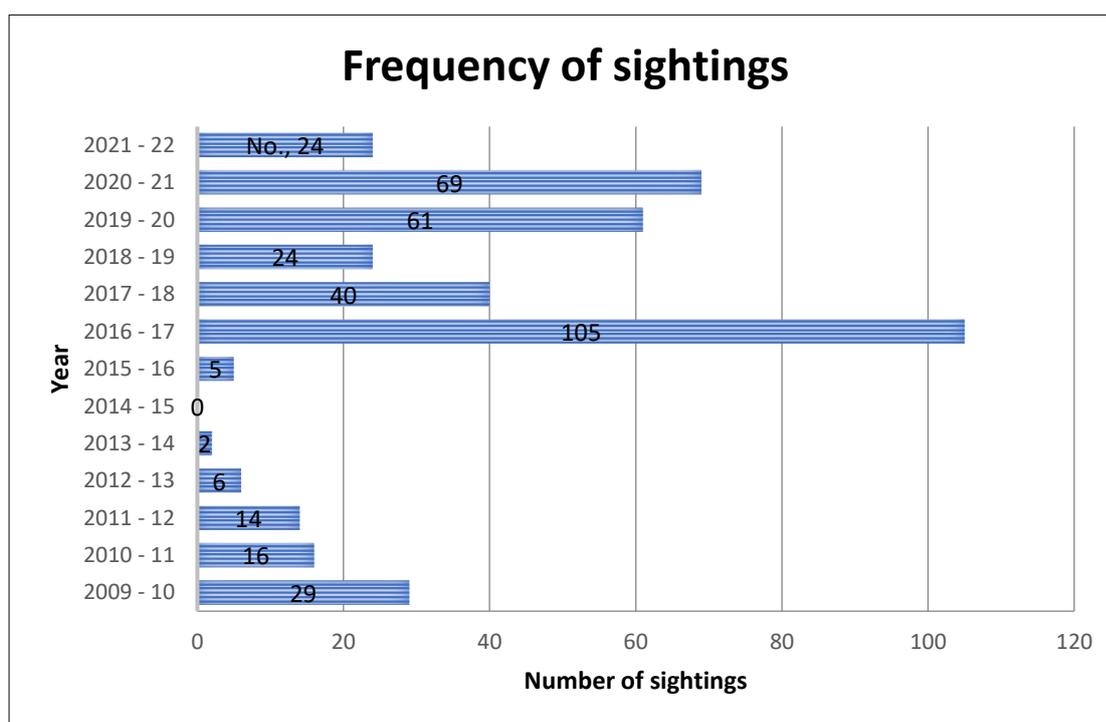
6. *Frequency of sighting of elephants*

Railways has taken in record all the elephant sightings as reported by multiple sources including loco pilots of trains, keyman doing foot inspection, staff working on railway track and elephant watchers engaged by forest. Because of the measures taken by the Forest Department of Kerala and Tamil Nadu, Southern Railways, the number of deaths of the elephants has been reduced despite increase in the frequency of elephants being sighted along the railway track between Palakkad Jn. to Madukarai. The Table 3 gives the details of the elephant deaths along the track in TN and Kerala State.

There has been drastic increase in the frequency of elephants along the railway track from Palakkad Jn. to Madukarai as reported by the Railway Department. In the last decade or so, barring 2014 – 16 the frequency of sighting of elephants have increased. The increase is from 2 sightings during the year 2013 -14 to 105 sightings during the year 2016-17. The continuous increase in the frequency of sightings along the railway track is cause of concern for both forest departments of the respective states and Southern Railways. The details of number of sightings across the years are provided in Table 3 and Figure 2. The details of increase with respect to line A and line with chainage information are provided in Annexure A and B.

Table 3: No. of times Elephants seen along railway track by loco-pilots from 2009 - 2021

Year	No. of Occasions
2009 - 10	29
2010 - 11	16
2011 - 12	14
2012 - 13	06
2013 - 14	02
2014 - 15	0
2015 - 16	05
2016 - 17	105
2017 - 18	40
2018 - 19	24
2019 - 20	61
2020 - 21	69
2021 - 22 (Till 1 st Sep. 2021)	24



Measures Taken to Minimize Elephant Deaths

To prevent death of elephants due to train hits, the State Forest Departments of Kerala, Tamil Nadu and Southern Railways have undertaken the following mitigative strategies:

1. Clearance of Vegetation on the sides of the Railway Track:

Railways have been regularly clearing the vegetation along the railway tracks to facilitate clear sighting of elephants crossing across the railway tracks. Initially around 5m area was

being cleared by Railways. But since 2019-20 further widening of vegetation clearance is being done to improve visibility. In certain strategic places vegetation clearance has been done to almost 15m from the railway track which has facilitated the loco pilots in having clear peripheral vision along both sides of the railway tracks. However, in some areas, the Railways cannot clear the vegetation beyond 5m as the land comes under the Forest Department. During the inspection, Railways Official requested Forest Officials to carry out similar vista clearance in their land jurisdiction adjacent to track. Similarly, it was put forth by Railways to request cutting/pruning of trees in the forest land which are infringing the clear visibility. Necessary afforestation can be done in lieu of cut trees in elsewhere identified locations.



2. Speed restrictions at Vulnerable Sections:

Speed restriction of 45kmph is imposed for 13.9 km of vulnerable section in ‘A’ line from 18.00 hrs to 06.00 hrs and in ‘B’ line, a total of 19.41 km of vulnerable section has a permanent speed restriction of 45kmph from 18.00 hrs to 06.00 hrs on account of frequent crossing of wild elephants. During daytime, a Permanent Speed Restriction of 65kmph for Passenger/Express Trains and 25kmph for Goods train (in Down Direction) has been imposed by Railways for a length of 18.84 km in A Line and a Permanent Speed Restriction of 65kmph for passenger/Express Trains and 35kmph (in Down direction) for goods train has been imposed for a length of 27.5km in Line B while passing through these vulnerable areas.



3. Signage boards to pre-warn the train drivers:

Signage boards are erected at desired locations jointly identified as per the latest coordination meeting between Railways, Palakkad Division and State Forest Department to alert loco drivers. However, the number of signages erected in Tamil Nadu side is less. As discussed during



inspection, further boards can be erected at the required location as per the request and advice of Forest Dept. The signages signify the areas where frequent movements of elephants are recorded. Also the Railways have installed signages with “W” sign indicating that the loco drivers shall blow horn at such points to pre warn elephants the approaching of a train in the track.

4. Sensitizing Programmes and awareness workshops for Train Drivers/Guards/Station Masters on elephant conservation:

Regular training and sensitization programmes are held by Railways with Forest Department to train and sensitize the loco pilots and various other officials of the Railways. Joint meetings are held between Supervisors and Officers of Railways and forest rangers of Forest Department to sensitize loco pilots/guards/keymen/trackmen on elephant conservation and working on railway track. Workshops have been held on human-elephant interaction with participation of officers of the level of DRM/PGT, Divisional Engineer/ Railways and Forest Department Divisional Officers.

5. Wires with low voltage current at boundary to deter elephants:

In Kerala forest area, solar fencing at ground level with electric voltage of 12V have been installed for a length of 7.1km in Line B near railway track and 3.2 km in Line A to deter elephants from crossing the railway tracks. Installation of hanging solar fencing is under process.



6. Lights to ward away elephants from Railway cutting:

Solar lights have been provided by Railways at both ends of the cuttings between Kanjikode and Walayar Railway line passing through two cuttings- at Km 510/900-511/200 and 512/200-400 to ward away elephants from both ends of the cuttings and pre warn them of the presence of railway tracks. The solar lights also help in improving the visibility of loco pilots at night.



7. Elephant Ramps:

Ramps have been constructed at suitable locations at KM 506A/100, 506/400, 506A/300 in Ettimadai - Walayar section in Tamil Nadu at high bank location for passage of elephants without getting entrapped near railway track area. The steep embankments near the railway track make it difficult for elephants to cross the railway tracks many a times resulting in trapping of elephants in the steep passage and at times getting killed. Railways have constructed ramps at suitable locations in Railway embankment areas along with Cess widening work in consultation with Forest Department of Kerala and Tamil Nadu.



8. Widening of Cutting & Cess making:

Earth work for widening of cutting has been done between Km 513/500-519/400, Km 500/00 – 505/00 on 'B' Line to provide sufficient space to move away from railway tracks on sighting of trains approaching on the railway track. Cess widening including provision of ramps at three more locations between Kanjikode and Madukarai is in progress. Manmade pond water facilities have been constructed at toe of cutting to provide water to elephants.



9. Installation of audio alarm with honey bee sound:

Audio alarm has been installed at Level Crossing number No. 154 between Kanjikode and Walayar on 'A' line to drive away the elephants. This system has been adopted based on the successful trial conducted in NFR earlier.



10. To keep the Railway track free from Food waste:

Food and garbage on railway tracks is a major source of attracting elephants. Necessary announcements are made at stations by Railways to warn passengers not to throw waste and garbage on railway tracks. The pantry car operators are also instructed to refrain from throwing food and waste on tracks.

11. Regular meetings with DFO/Palghat and DFO/CBE (Forest) and DEN/East/Palghat(Railways)

Regular meetings are held between Railways and Forest Departments to keep both the Departments abreast on the updates and also maintain a communication channel to avert mishaps in future. A WhatsApp group has been created with Forest officials and Railway officials including Control offices as part of the group. The real-time movement of elephants entering into Railway track side are immediately reported by Forest officials in the group and immediate lookout caution (Or cautious Speed) for LPs n ALPs are issued immediately by Railways at the reported locations.

12. Engagement of elephant trackers:

Elephant trackers have been engaged by State Forest Departments to regularly patrol the railway tracks and communicate the information on the movement of elephants near the railway tracks. Whatsapp group has been created to inform the State Forest officials and also alert Railway control officials on real time movement of elephants. The locopilots are pre-

warned by Railway Control upon receiving information of elephant sighting near the railway track.

13. Erection of watch towers:

A watch tower is erected in Tamil Nadu side between Walayar and Madukkarai to locate movement of elephants



Section Wise Observations of the Committee

For the ease of understanding, we have divided the railway track into different sections based on information provided by Railways. The section wise information along with chainage and distance is provided in Table 4.

Table 4: Different sections between Stations from Palakkad Jn. to Madukarai Jn.

S. No.	Junction Name	Chainage	Distance (km)
Section - 1	Palakkad Jn - Kottekkad Jn	534.47 – 528.00	6.47
Section - 2	Kottekkad Jn – Kanjikode Jn	528.00 – 520.83	7.17
Section - 3	Kanjikode Jn – Walayar Jn	520.83 - 509.59	11.24
Section - 4	Walayar Jn - Ettimadai Jn	509.59 – 500.52	9.07
Section - 5	Ettimadai Jn - Madukara Jn	500.52 – 495.58	4.92

Section 1:

Kottekkad Jn. to Kanjikode Jn. (7.17 km): There is patch of forest on both the sides of railway from chainage 527.000 to 525.000. As per information provided during the visit, the elephants use this patch as a refuge during daytime. This small patch of forest is dotted with canal all along the patch. The other side of the patch is dotted with villages. The details of frequency of elephant sighted along this stretch are given in Table 5.

Table 5: No. of times elephants seen along railway track by loco-pilots from 2009 – 2021 between Kottekkad Jn. and Kanjikode JN.

S. No.	Year	No. of Elephant sighting along the track
01	2009 - 10	2
02	2010 - 11	4
03	2011 - 12	4
04	2012 - 13	0
05	2013 - 14	1
06	2014 - 15	0
07	2015 - 16	0
08	2016 - 17	2
09	2017 - 18	10
10	2018 - 19	2
11	2019 - 20	3
12	2020 - 21	2

The occurrence of elephants in this section has shown increasing trend from 2016 onwards. Considering the quality of habitat on other side of the track and topography, the elephants probably frequently use this section of the track for crossing. It is critical to provide elephant crossing structures. The surrounding landscape from Kottekkad to Kanjikode along with the sensitive stretches of the railway track is shown in Figure 4. Also death of a male elephant was recorded in 2019 in this section of the railway track.

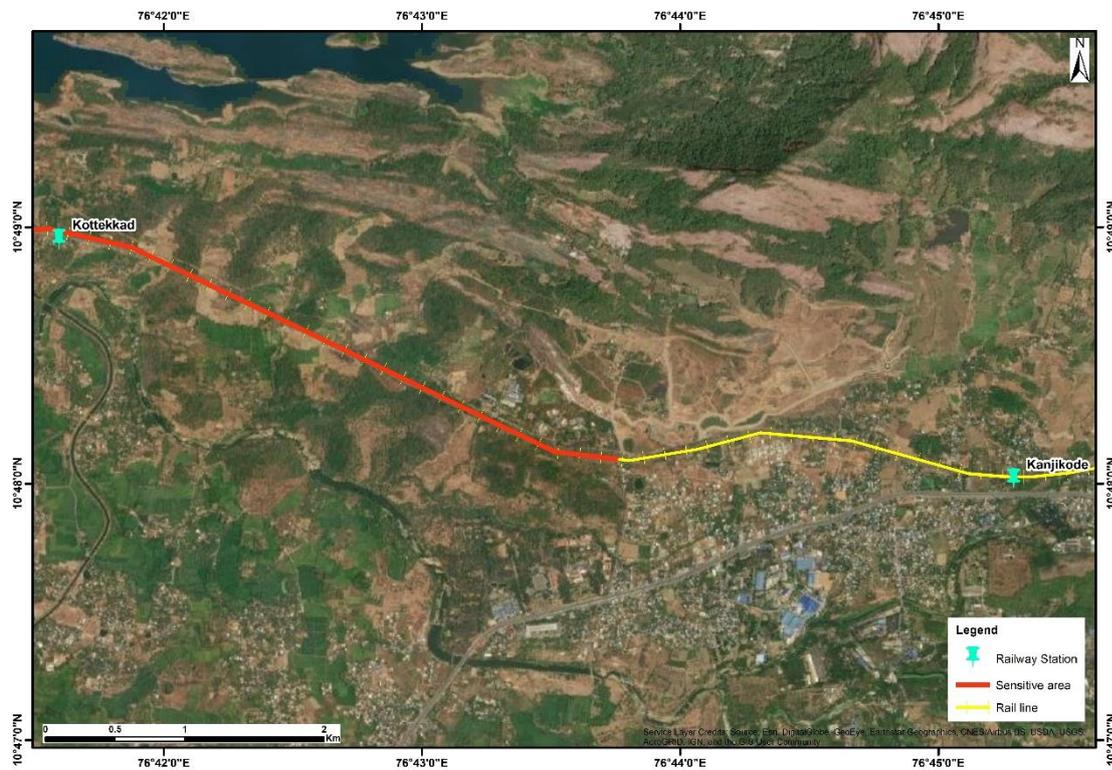


Figure 3: Section 1 of the Railway track from Kottekkad to Kanjikode showing surrounding landscape. The red line shows the sensitive area along the railway track.

Section 2:

Kanjikode to Walayar (11.24/12.24 km): From Kanjikode to Walayar via A line the total distance is 11.24 kms whereas it is 12.24 km (approx.) via B Line. B line is much closer to elephant habitat as compared to line A. The approximate distance between A and B line varies from 500 m to 2.5 km. The last stretch of railway line in both A and B passes through dense habitat patch. The frequency of elephant sighting in this stretch has increased significantly especially on Line B. During last five years, the frequency of sighting has increased very significantly on line B (Table 6). Line B has forest on both sides at multiple sites. The surrounding landscape from Kanjikode to Walayar along with the sensitive stretches of the railway track is shown in Figure 4.

Table 6: No. of times elephants seen along railway track by loco-pilots from 2009 – 2021 between Kanjikode Jn. and Walayar Jn.

S. No	Year	Line A	Line B
01	2009 - 10	6	9
02	2010 - 11	7	4
03	2011 - 12	0	0
04	2012 - 13	0	6
05	2013 - 14	0	1
06	2014 - 15	0	0
07	2015 - 16	0	1
08	2016 - 17	0	23
09	2017 - 18	7	11
10	2018 - 19	0	7
11	2019 - 20	11	38
12	2020 - 21	10	35

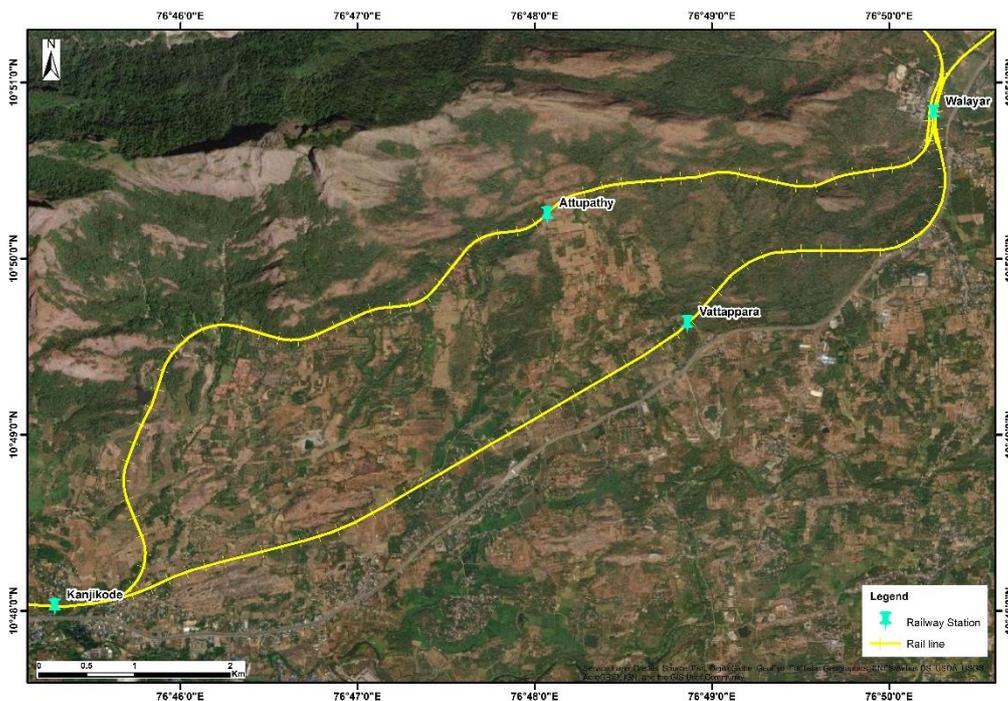


Figure 4: Section 2 of the Railway track from Kanjikode Jn. to Walayar Jn. showing surrounding landscape.

Section 3:

Walayar to Ettimadai (9.07/10.70 km): The total distance from Walayar Jn. to Ettimadai Jn. via A Line is 9.07 km whereas it is 10.70 km (approx.) via B Line. B Line is much closer to elephant habitat as compared to Line A. The approximate distance between A and B line varies from 200 m to 1.7 km. The initial stretch of railway lines both A and B passes through dense habitat patch. The frequency of elephant sighting in this stretch has increased significantly especially on Line B. During last five years, the frequency of sighting has increased very significantly on Line B (Table 7). Line B has forest on both sides at multiple sites. The surrounding landscape from Walayar to Ettimadai along with the sensitive stretches of the railway track are shown in Figure 5.

Table 7: No. of times elephants seen along railway track by loco-pilots from 2009 – 2021 between Walayar Jn. and Ettimadai Jn

S. No	Year	Line A	Line B
01	2009 - 10	4	6
02	2010 - 11	0	1
03	2011 - 12	0	0
04	2012 - 13	0	0
05	2013 - 14	0	0
06	2014 - 15	0	3
07	2015 - 16	0	5
08	2016 - 17	0	20
09	2017 - 18	0	4
10	2018 - 19	1	8
11	2019 - 20	1	14
12	2020 - 21	5	24



Figure 5: Section 3 of the Railway track from Walayar Jn. to Ettimadai Jn showing surrounding landscape.

Section 4:

Ettimadai to Madukara (4.92 km): From Ettimadai to Madukarai the total distance is 4.92 kms. Out of 4.92 kms, almost 3 kms are very sensitive for the elephant movement. The frequency of elephant sighting in this stretch has increased marginally (Table 8). The surrounding landscape from Ettimadai to Madukarai long with the sensitive stretches of the railway track are shown in Figure 6.

Table 8: No. of times elephants seen along railway track by loco-pilots from 2009 – 2021 between Ettimadai Jn. and Madukarai Jn.

S. No	Year	Railway Track
01	2009 - 10	0
02	2010 - 11	0
03	2011 - 12	0
04	2012 - 13	0
05	2013 - 14	0
06	2014 - 15	1
07	2015 - 16	0
08	2016 - 17	2
09	2017 - 18	2
10	2018 - 19	0
11	2019 - 20	1
12	2020 - 21	2

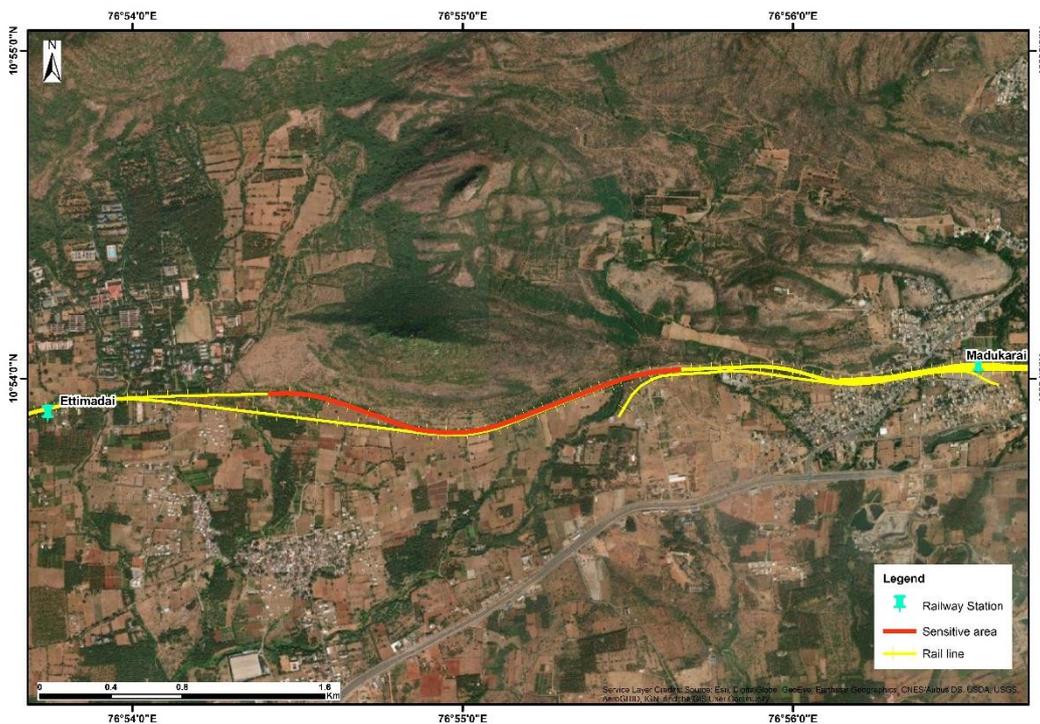


Figure 6: Section 4 of the Railway track from Ettimadai Jn. and Madukarai Jn. showing surrounding landscape

General/Overall Recommendations of the Committee

1. **Vegetation/Vista clearance:**

The vegetation near the railway tracks needs clearing for clear visibility of the loco pilots. Railways have already been clearing 5-15m area on either side of the railway tracks. However, in certain areas the land is under the Forest Department. Railways require the permission of the Forest Department for pruning of trees in such areas.

Recommendation: Suggested vegetation clearance is 10-15m on both sides of the railway tracks. Railways shall continue to clear the vegetation on either side of railway tracks on a regular basis. In areas where land falls under the Forest Department, respective State Forest Department shall prune or tend the vegetation in forest area. No clear felling of trees should be resorted to.

2. **Cutting of earth for slope preparation:**

In certain strategic points, ramps have been created by Railways to facilitate smooth passage of elephants especially across the embankments. This requires cutting of earth, leveling and maintenance of slope. The permission of Forest Department is required to cut the portions of earth in the forest land.

Recommendation: Forest Department agreed to allow Railways to cut portions of earth for preparation of ramps that shall aid in easy passage of elephants especially in embankments. The ramps constructed should be wider and at least 50 m in width for the elephant herds to pass through with ease.

3. **Construction of underpasses:**

In an Inter Ministerial meeting held on 05.03.2010, it was decided to construct two underpasses at 505A/400-500 and at 506/900-506/A-000 in Line B between Ettimadai and Walayar stations. In the Inter Ministerial meeting it was decided that the State Forest Department of Tamil Nadu shall provide the budget for the construction of the two underpasses and Railways shall execute the construction work. However, as no fund was made available by State Forest Department of Tamil Nadu, the underpasses have not been constructed. Railways expressed their limitations to source the fund and mentioned that the same, being policy matter, needs to be decided at competent authority level as it was already approved at Ministry level to be sourced by Forest. At present, ramps have been provided by Railways but underpasses may facilitate easy passage of elephants.

Recommendation: Two underpasses may be created at 505 A/600 and 506 B/900 in Line B in Tamil Nadu side. Funding for construction of the underpasses may be considered from Railways.

4. **Communication:**

Forest Department has engaged forest tracks for tracking the real time movement of elephants. Whatsapp groups have also been created for transmission of information on movement of elephants across the railways tracks. However, installation of early

warning systems on railway tracks shall facilitate quicker transmission of information with minimized human interaction.

Recommendation: The installation of GSM based alert systems to warn the approach of elephants towards railway tracks may be explored. One of the early warning system as proposed by WII is as below:

Level crossings with early warning system

Level-crossings for animals, in combination with fencing, cattle guards and animal warning systems would allow for free and safe movement of wild animals across the railway track. These sites have been selected based on high probability of animal movement and suitable terrain.

The width of the level crossings is to be 50 m. There should be no ballast between the tracks on these crossings, and the ground should be levelled with surrounding area using cement. The track near the end of the fence (at beginning and end of the crossing) should have cattle guards of minimum 3 m width, to discourage animals from entering the fenced portions of the track. The design of level crossings for animals is provided in Figure 7. Early warning systems should be installed at these sites at appropriate locations. These devices must function to emit sounds to dispel any animals present at the site after getting triggered by an approaching train that is within 1 km of level crossing. Cattle guards are to be provided at all places where fencing ends viz., road level crossing.

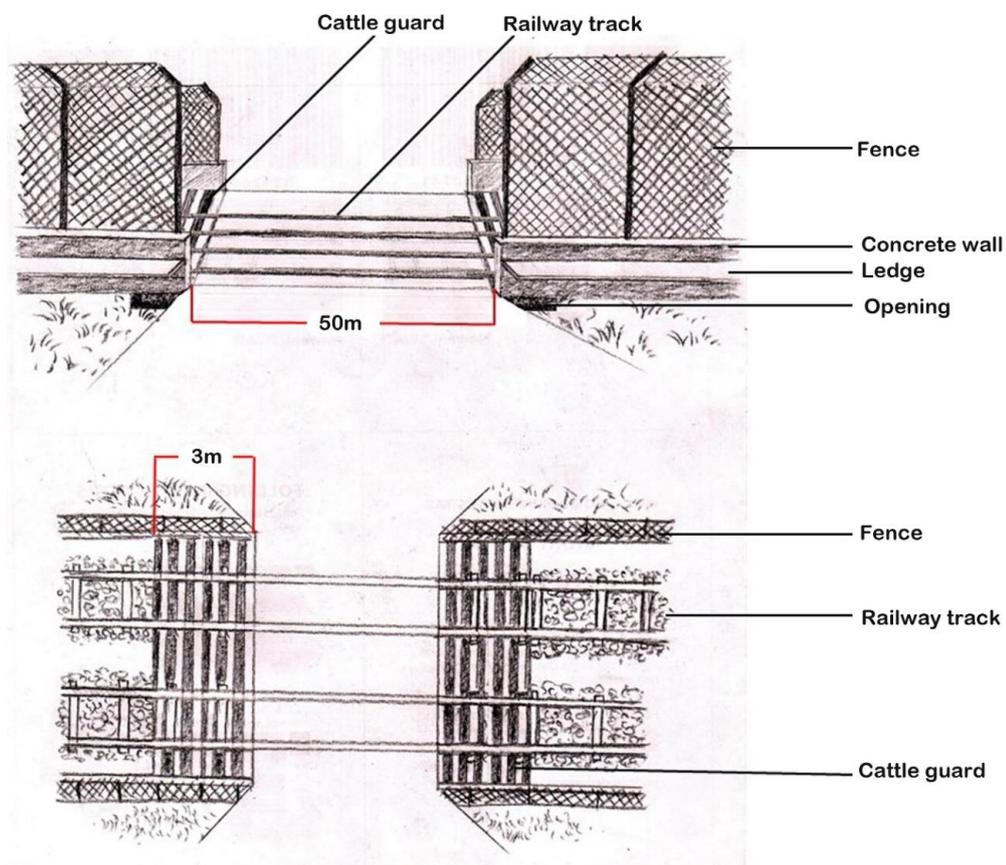


Figure 7: Layout of level crossings for animals

5. Operation of trains in Line A/B:

Of the 18 accidents that occurred between 2002 – 2021, 14 (78%, n=18) have occurred on Line B and 4 in Line A. However, Railways has limitation in transferring the entire traffic from Line B to Line A as good trains mostly operate at night through Line B as the gradient in Line A is steeper towards Podanur making it difficult to operate good trains on Line A.

Recommendation: The suggestion of shifting of few passenger trains operating at night from Line B to Line A needs to be explored. Future developments for additional trains shall be planned to be directed in Line A and any new line towards Line B shall be avoided.

6. Solar fencing:

Solar fencing has been erected by Railways at many strategic places in Kerala parallel to Line B to prevent crossing of elephants from forests/plain lands towards Line B and subsequently to Line A. Railways is constructing hanging fences in Kerala side for a distance of 1.5km which shall be operational within a month. Similarly strategic locations in Tamil Nadu side needs to be identified for erection of solar fencing.

Recommendation: The vulnerable stretch of fencing in Kerala side is 4.5km. The cost of jointly incurring the cost by Railways and Kerala FD may be explored. Solar fencing may also be erected in Tamil Nadu side and joint incurring of expenses may be explored. The areas for installation of solar fencing may be identified jointly by Railways and Tamil Nadu Forest Department.

7. Rail fencing:

In the inter Ministerial meeting held on 2010 it was decided to erect rail fencing to prevent crossing of elephants towards the railway track. Rail fencing has thereby been erected in certain locations in Kerala side. However, the proposal of erecting rail fencing may not be relevant now due to initiatives like solar fencing. However, desirability shall be finalized after joint inspection.

Recommendation: Joint inspection by Railways and Kerala FD may be conducted to identify and finalize the location of rail fencing.

8. Solar lighting:

Solar lighting has been installed in Kerala side for better visibility of loco pilots at night.

Recommendation: Similar solar lights may be installed in Tamil Nadu side at strategic locations for better visibility. The installation of solar lights jointly by Railways and Forest Department may be explored.

9. Speed restriction on trains:

A speed restriction of 45 km per hour at night and 65 km per hour during daytime has been imposed on Railways to avert train accidents in the area. Railways are also monitoring the speed of trains through speedometer.

Recommendation: The existing speed restriction imposed for 45 km per hour at night and 65 km per hour during daytime shall continue.

10. Covering of drainage area:

In certain areas the drainage along the line of railway tracks is open where incidences of elephant calves slipping and getting stuck have been recorded.

Recommendation: As per the request of Tamil Nadu Forest Department, KM 477-00 to 497-400 can be covered with RCC slab to ensure smooth passage of elephant herd. The open drainage shall be covered with RCC slabs by the Railways.

11. Whistle board and speed indicators:

Railways has installed Whistle boards at strategic points to alert loco pilots to blow horns in such locations to pre warn the elephants on the movement of trains. Similarly speed restriction indicators have also been installed by Railways for loco pilots to maintain the speed restriction on the railway tracks.

Recommendation: Signage boards are installed in Kerala side. Similarly, signboards may also be erected in Tamil Nadu side after joint inspection with Railways for alerting the loco drivers of speed restrictions and blowing horns at vulnerable points. The installation of signboards jointly by Railways and Forest Department may be explored.

Horn – signal-signages should be erected in all curves. Loco pilots should blow horn regularly to pre warn elephants of train movement on railway track.

12. Creation of emergency road:

Railways reported that there was no road connectivity between KM 507 to 509 on Line B and an emergency earthen road needs to be prepared for easy accessibility to railway track. Railways requested the permission of Kerala Forest Department in creation of an earthen road for the purpose.

Recommendation: The Chief Conservator of Forest, Palakkad agreed in principle for which necessary request to be made from Railways as per their requirement

13. Plastic, food and garbage management:

Passengers commuting in Railways tend to throw plastics, food or garbage on railway tracks which attracts elephants towards railway tracks. This may become a major factor for accidents which needs to be immediately attended to.

Recommendation: Railways passengers and pantry cars need to be regularly sensitized to not throw plastics, food or garbage on railway tracks. Railways may engage 6-7 watchers to ensure plastics are regularly removed from railway tracks.

14. Anti depredation watchers:

Few anti depredation watchers have been engaged in Tamil Nadu side for driving away elephants from crop raiding. The frequency of crop raiding incidences has decreased after engaging anti depredation watchers.

Recommendation: Five more anti depredation watchers may be engaged in Tamil Nadu side. Night watch surveillance programme may be charted out jointly by Railways and Forest Department.

15. Watch tower:

A watch tower is erected in Tamil Nadu side between Walayar and Madukkarai to locate movement of elephants.

Recommendation: A watch tower towards Line A may be constructed. Tamil Nadu Forest Department may submit the requirement for construction of the watch tower to Project Elephant Division in the APO of the State Forest Department being submitted.

16. Intrusion Detection System:

This system uses the “Distrinuted Optical Fibre Sensing” as the core technology. The working principle of the system depends on the change in light illumination properties of reflected light in the optical fiber. This system can be coupled with TCAS (Train Collisions Avoidance System) to avoid the hit/death of elephants by trains. This is being tested by Railways in Assam.

Recommendation: This system may be deployed along the railway track.

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Annexure I:Committee constitution

**F.No. 6-1/2021-PE
Government of India
Ministry of Environment, Forests and Climate Change
(Project Elephant Division)**

Indira Paryavaran Bhawan,
Aliganj, Jor Bagh Road,
New Delhi-110003
Phone No. 24695067

Dated 3rd August 2021

OFFICE MEMORANDUM

Sub: Constitution of the Committee to investigate the deaths of elephants due to train hit in the Tamil Nadu and Kerala-reg.

As per the direction of Hon'ble NGT, Southern Bench, in the meeting of the Central Project Elephant Monitoring Committee (CPEMC) held on 28th July, 2021, it was decided to constitute a Committee to review the steps to be taken by Railways and Forest Departments to contain the mortality of elephants on railway track. The members of the committees are:

- (i) Shri. Harikumar, Rtd. PCCF, Kerala & Member of CPEMC (Chairman of the committee)
- (ii) Dr. K.M Selvan, Scientist D, Project Elephant Division, MoEF&CC (member secretary of the committee)
- (iii) Dr. Bilal Habib, Scientist E, Wildlife Institute of India
- (iv) Dr. Pajna Paramita Panda, National Coordinator, Elephant Cell
- (v) Shri Jatin Kumar, Divisional Engineer, East Palakkad, Southern Railways
- (vi) Representative of Kerala Forest Department
- (vii) Representative of Tamil Nadu Forest Department

2. The Committee shall have following Term of Reference:

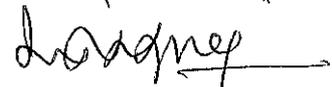
- (i) The committee will review the action taken by Southern Railways and Kerala and Tamil Nadu Forest Departments to contain the mortality of elephants on railway track. Efficacy and effectiveness of action/measures taken in field.
- (ii) The committee shall also suggest additional measures apart from existing ones for reduction/minimization of elephant deaths due to train hits.
- (iii) The committee shall suggest who will bear the cost of additional measures.
- (iv) Any other matter with the permission of ADGF (WL), MoEF&CC.

3. The committee shall have following Term and Conditions:

- (i) The term of the Committee will be for duration of 8 weeks from the date of issue of this OM.

- (ii) The traveling allowance, daily allowance and sitting fees etc. will be payable to Non- official members of the committee through RTGS as per prevailing norms in Government of India after submission of original bills, whereas official members will get reimbursement of TA/DA from their respective organizations.

4. This issues with the approval of the Competent authority.



(Dr. K.Muthamizh Selvan)
Scientist D' (Project Elephant)
Email: km.selvan@gov.in

Distribution:

1. PPS to Addl. DGF (WL), MOEF & CC
2. PPS to IGF (PE), MOEF & CC
3. PPS to IGF (WL), MOEF & CC
4. All Members of the Committee
5. All members of the CPEMC

Copy forwarded for information and necessary action to:

1. Principal Chief Conservator of Forests & Chief Wildlife Warden of Kerala and Tami Nadu.
2. Director, Wildlife Institute of India.
3. General Manager, Southern Railways.

Annexure II: Proceedings of the CPEMC Meeting

F. No. 6-1/2021 -PE

Government of India

**Ministry of Environment, Forests & Climate Change
(Project Elephant Division)**

Indira Paryavaran Bhawan,
Jor Bagh Road, Aliganj,
New Delhi-110003

Dated 3rd August, 2021

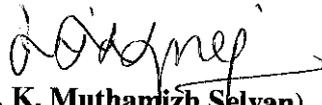
OFFICE MEMORANDUM

Subject: Proceedings of the Meeting of the Central Project Elephant Monitoring Committee (CPEMC) with Southern Railways, Kerala & Tamil Nadu Forest Department and WII to discuss the mitigation measures to prevent death of elephants due to train hits held at 14:30 hrs on Wednesday, 28th July, 2021 at the MoEF&CC

The undersigned is enclosing herewith the approved Proceedings of the Meeting of the Central Project Elephant Monitoring Committee (CPEMC) with Southern Railways, Kerala & Tamil Nadu Forest Department and WII to discuss the mitigation measures to prevent death of elephants due to train hits held at 14:30 hrs on Wednesday, 28th July, 2021 at the MoEF&CC the Ministry of Environment, Forests and Climate Change under the Chairmanship of Additional Director General of Forest (Wildlife).

2. This issue with the approval of the Additional Director General of Forest (Wildlife) Ministry of Environment, Forests & Climate Change.

Encls: as above


(Dr. K. Muthamizh Selvan)
Scientist 'D' (Project Elephant)
Email id: km.selvan@gov.in
Telephone No. 011-24695067

Distributon:

- As per list enclosed.

Copy to :

1. Dr. K. M. Selvan, Scientist D, Project Elephant Division, MoEF&CC.
2. PSO to Additonal Director General of Forest (Wildlife), MoEF&CC.
4. PPS to Inspector General of Forests (Project Elephant), MoEF&CC.
5. Dr. Prajna P. Panda, National Coordinator, Elephant Cell, MoEF&CC.

Proceedings of the Meeting of the Central Project Elephant Monitoring Committee (CPEMC) with Southern Railways, Kerala & Tamil Nadu Forest Department and WII to discuss the mitigation measures to prevent death of elephants due to train hits held at 14:30 hrs on Wednesday, 28th July, 2021 at the Ministry of Environment, Forests and Climate Change

The virtual meeting of the Central Project Elephant Monitoring Committee (CPEMC) with Southern Railways, Kerala & Tamil Nadu Forest Department and WII to discuss the mitigation measures to prevent death of elephants due to train hits was held at 14:30 hrs on Wednesday, 28th July, 2021 under the Chairmanship of Shri Soumitra Dasgupta, ADG (WL), MoEF&CC. List of participants is annexed.

2. Shri Brijendra Swaroop, IGF (PE) welcomed all the participants and informed that the CPEMC was constituted by Hon'ble Supreme Court to look into the matters of mitigation of HEC and this meeting has been convened on behest of the Order of Hon'ble NGT on the basis of newspaper clipping in Hindu. He then requested the Chair of the meeting to give the opening remarks.

3. Shri Soumitra Dasgupta, ADG (WL) welcomed all participants of the meeting and informed that the CPEMC was constituted to look into the issue of elephant conservation including that of HEC. Following the line, the Hon'ble NGT has requested the Committee to look into the issue of death of elephants due to train hits with Railways, States of Tamil Nadu & Kerala and WII. He observed that the Railways and State Forest Departments have already initiated several measures to prevent death of elephants due to train accidents but in spite of all the steps being taken death of elephants in these tracks continue. Ministry has also propagated the linear infrastructure policy to include the mitigative measures such as underpasses/overpasses and early warning system is being tested on a pilot basis in WII. We need to ascertain the adherence to the speed restrictions imposed in the vulnerable stretches. He requested IGF (PE) to seek comments of the participants.

4. IGF (PE) requested Southern Railways to present on the issues related to death of elephants in the railways track as indicated in the Court Order of Hon'ble NGT.

5. Shri Jatin Kumar informed that

- Palaghat station connects to Kodulud station in two lines – Line A and B. Of the total track length of 48 and 52 km. of A and B Line respectively, 13.9km in A line and 19.41 km in B line are identified as elephant corridors.
- An Inter Ministerial meeting between Railways and MoEF&CC was held on 05.03.2010 under the Chairmanship of Advisory (Safety) to finalise the general advisories to prevent accidents involving elephants. Based on the decision taken, Railways has undertaken several measures such as clearing of vegetation, erection of signages, sensitization programmes, information sharing with station masters to warn loco drivers, installation of powerful locomotive beams, imposition of speed restriction, erection of solar fencing, provision of solar lights and elephant ramps, widening of cutting and cess making, regular meetings, installation of honey bee sounds etc.
- Two underpasses which were identified to be constructed in Tamil Nadu upon the deposit of funds by State Forest Department have not been constructed by Railways due to want of funds. He requested Ministry to expedite the funding process for the creation of underpasses by Railways.

- It was observed that death of elephants were mostly in late nights or early morning and especially in Line B where animals cross the track to reach water bodies.
- He suggested provision of more ramps and widening of cutting at additional locations and creation of water bodies nearer to elephant habitat to avert train accidents.
- Vulnerable areas identified are Madukarai- Ettimadai- Kanjikode which extends to 10km.

6. DFO, Palakkad presented on the death of elephants due to train hits between Kottekad & Walayar. He informed that

- In Line A forests lie on both sides of the 4km track from Vattapara to Walayar. In Line B, forest lie on one side of the track between Valladi to Attupathy towards the hills and on both sides of the track from Attupathy to Walayar.
- Elephants generally move from Kottekad to Walayar through northern boundary of railway track. Sometimes the elephants cross the Line B and move to Line A track.
- Watch tower is erected at Attupathy to monitor movement of elephants
- It is difficult to control the movement of elephants from Attupathy to Walayar which is a good elephant habitat.
- He suggested erection of more solar fences in Line B between Valladi to Atupathy.

7. CCF, Palakkad informed that due to steps taken by Kerala FD and Railways, no death of elephants has been recorded since December 2019. However, some gaps need to be filled. He suggested the following measures:

- Hanging fences needs to be installed in Line B.
- Eight elephant crossing lines are mostly frequented by elephants.
- More watch towers need to be erected to increase visibility.
- Continuous blowing of horns in forested areas has proved effective and should be continued.
- Speed restrictions may further be reduced.
- Habitat improvement activities inside forest should be made inside the forests.

8. DFO, Venkatesh, Coimbatore informed the following:

- In Tamil Nadu side, A line 1.5 km and B line is 2.5km and death of elephants is occurring since 2008.
- Movement of elephants is being recorded through camera traps, watch tower and whataspp group.
- Water bodies have been created, early warning system have been installed.
- Visibility in Line B has now increased.
- Deep cutting outside forests should be done by Railways.

9. Director, WII informed that continued efforts should be made to ensure that death of elephants due to train hits does not recur in areas where this has been controlled. Information on elephant movement needs to be collected. Modern technologies should be used to get idea on crossing points so that adequate measures can be made for site specific interventions.

10. Shri Vinod Rishi suggested instituting studies to find underlying reasons regarding the movement of elephants. He suggested to explore the area where the elephants are heading so that suitable habitat improvements could be made in the location.

11. Shri Hari Kumar suggested said that long term measures like creation of underpasses should be expedited. Water bodies should be created in the forests to reduce the movement of elephant outside forest areas.

12. Ms. Prachi Mehta felt underpasses and overpasses are one of the solutions to mitigate death of elephants due to train hits. Bio fences can be erected to restrict movement of elephants towards rail tracks. Change of cropping pattern in the area should also be explored.

13. Shri N. Vasu informed that real time movement of elephants especially during winters is critical and information should be shared with loco drivers. Fencing of areas can sometimes prove as death traps for elephants. Therefore careful planning needs to be done prior to erection of fences along the rail tracks. Further reduction in speed restriction should be explored in certain areas. He suggested on site visit to come up with detailed recommendations.

14. ADG (WL) informed that several measures have been undertaken by Railways and SFDs. However, it needs to be introspected if these measures are proving effective on ground. Underpasses and overpasses need to be inbuilt in linear infrastructure projects. Early warning systems should be implemented and real time information flow on the movement of elephants is critical.

Based on the discussions, the following decisions were made by the Chair:

- i. A Committee should be constituted by this Ministry comprising of officials of Ministry, State FDs of Tamil Nadu & Kerala, Railways and one expert from CPEMC to objectively review the steps to be taken by Railways and Forest Departments to contain the mortality of elephants on railway track.
- ii. The Committee shall submit report within 45 days.

The meeting ended with thanks to the Chair.

List of participants:

1. Shri Soumitra Dasgupta, ADG (WL), MoEF&CC
2. Shri Brijendra Swaroop, IGF & Director, Project Elephant, MoEF&CC
3. Dr. Dhananjai Mohan, Director, WII.
4. Shri Sudhir Panwar, Principal Chief Engineer, Southern Railways
5. Shri Trilok Kothari, Divisional Railway Manager, Palaghat Division, Southern Railways
6. Shri Anantharaman, Senior Divisional Engineer Coordination, Palakkad Division, Southern Railways
7. Shri Ravi Kumar, Chief Engineer General, Southern Railways
8. Shri Jatin Kumar, Divisional Engineer, East Palakkad, Southern Railways
9. Shri Pramod, CCF, Eastern Circle, Palakkad
10. DFO, Palakkad
11. Shri Venkatesh, DFO, Coimbatore
12. Shri A. D. Baruah, APCCF, Tamil Nadu
13. Shri Subhash Malkhede, APCCF, Karnataka
14. Shri Hari Kumar, CPEMC Member,
15. Shri N. Vasu, CPEMC Member
16. Ms. Prachi Mehta, CPEMC Member
17. Shri Vinod Rishi, CPEMC Member
18. Shri R. K. Srivastava, CPEMC Member
19. Dr. Parag Nigam, Scientist F, WII
20. Dr. Bilal Habib, Scientist E, WII
21. Dr. K. M. Selvan, Scientist D, Project Elephant Division, MoEF&CC
22. Dr. Prajna P. Panda, National Coordinator, Elephant Cell, MoEF&CC
23. Shri Lakshmi Narayan, Project Scientist, Elephant Cell, WII
24. Dr. Ankush Dubey, Project Veterinarian, Elephant Cell, WII
25. Shri Udhay Raj, GIS Specialist, Elephant Cell, WII
26. Ms. Medha Kulshreshtha, Legal Associate, MoEF&CC



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