

CEPF Final Project Completion Report

Instructions to grantees: please complete all fields, and respond to all questions, below.

Organization Legal Name	<i>Foundation for Ecological Research, Advocacy and Learning</i>
Project Title	Overcoming Barriers: Restoring Ecological Connectivity Across Linear Intrusions in the Shencottah Gap
CEPF GEM No.	62907
Date of Report	20 th February 2016
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CEPF Region:

Western Ghats, India

Strategic Direction:

1.2 Promote partnerships to identify, evaluate and advocate for suitable mechanisms that incorporate critical links (biological corridors) into the protected area network in the priority corridors.

Grant Amount:

\$ 145958

Project Dates:

June 1, 2013 - December 31, 2015

1. Implementation Partners for this Project (*list each partner and explain how they were involved in the project*)

Dr A.J.T. Johnsingh, a senior scientist with the Nature Conservation Foundation and WWF-India brought his expertise on understanding of the landscape and need to re-establish connectivity across the Shenchottah Gap. He provided valuable inputs towards the study design, carried out field visits along with Forest Department Officials and has contributed by providing suggestion and recommendations towards restoration and mitigation strategies.

Kerala Forest Department: Played a key role in inviting officials of the Southern Railways, National Highways, scientists, and conservation practitioners to a workshop to discuss the potential solutions to restore connectivity across the Shencottah Gap

Nishant M Sreenivasiah, a PhD scholar from the National Institute of Advanced Studies, with his understanding of elephant behavior in human dominated landscapes provided inputs towards identifying and developing mitigation structures.

Engineers from Kinetix Solutions Pvt. Ltd., Bangalore were involved in field assessments and in designing the proposed mitigation structures in consultation with a retired chief engineer of RITES, a Government of India Enterprise established under the aegis of Indian Railways.

The Wildlife Trust of India, New Delhi, provided a platform to present key recommendations on restoring connectivity from this project to officials from the Forest Department of Kerala and Tamil Nadu, Southern Railways, Public Works Department (PWD) and members of other civil society organizations.

Conservation Impacts

2. Describe how your project has contributed to the implementation of the CEPF ecosystem profile

The project identified two locations and developed mitigation structures that could restore connectivity between the Periyar and Agasthyamalai landscapes. More importantly, it brought together officials from Forest Department, Southern Railways, National Highway Authority of India, and civil society members to discuss issues of linear infrastructures and connectivity in the Shencottah Gap.

3. Summarize the overall results/impact of your project

Our project,

- Identified two potential crossing points across linear intrusions in the Shencottah gap to facilitate large mammal movement.
- Developed potential mitigation structures that can be built by the State/Central Government to enhance connectivity for large mammals across the Shencottah Gap
- Results from this study have contributed to developing the corridor management plan, which has been included into the Tiger Conservation Plans (TCP) for the Kalakad-Mundanthurai Tiger Reserve and Periyar Tiger Reserve.

Planned Long-term Impacts - 3+ years (as stated in the approved proposal)

- Better habitat connectivity in the Periyar-Agasthyamalai Landscape through inclusion of mitigation measures on the barrier effects on linear infrastructure into the design of road and railways in the Shencottah Gap.
- Mitigation measures for impact of linear barriers on habitat connectivity made part of policy.
- Technical guidelines to guide the implementation of national policy on linear intrusions available

4. Actual progress toward long-term impacts at completion

The project has shown dispersal of leopards across the Shencottah Gap, however currently linear intrusions remain a barrier for tigers and elephants, two important landscape species of conservation interest. The project identified two crossing points where mitigation structures need to be built to ensure connectivity is restored, not only for elephants, but also other herbivores and carnivores that are found within the Periyar Agastyamalai landscape.

The project held a workshop, which was attended by various stakeholders including officials from the Kerala State Forest Department, Southern Railways, National Highway Authority of India, scientist, and conservation practitioners. The workshop deliberated on the impacts of linear intrusions on wildlife, which included issues of mortality and disruption of movement. In addition, potential solutions that need to be adopted to avoid the negative effects of linear intrusions were also presented and discussed.

Some of the recommendations made by the project, specific to corridor management and connectivity have been included into the Tiger Conservation Plans (TCP) for the Kalakad-Mundanthurai Tiger Reserve and Periyar Tiger Reserve.

The Ministry of Environment, Forests and Climate Change (MoEFCC) has asked the Wildlife Institute to India to draft the National Guidelines for Linear Intrusions in forested habitats, however the draft is not yet available for public scrutiny and comments. Whenever the document is published, we will provide comments based on the lessons learnt from this project and other projects we are engaged with. The focus of this document is likely to be on mitigation of impacts, which has gained importance after the lengthy legal battle being fought with respect to widening of NH-7 in Central India.

Planned Short-term Impacts - 1 to 3 years (as stated in the approved proposal)

- A common forum to discuss and promote corridors in the Shencottah gap
- Identification of linear barriers and their likely impacts on movement of target species in the Shencottah region.
- Spatially explicit and quantitative framework for identification of "hot spots" caused by linear barriers and associated impacts.
- Management recommendations for mitigation of existing linear barriers for different stakeholders.

5. Actual progress toward short-term impacts at completion

A common forum to discuss issues of connectivity was facilitated by the previous Chief Wildlife Warden of the Kerala Forest Department. Along with FERAL, the Forest Department held a workshop that brought together officials of various ranks within the Forest Department to understand the status of connectivity and the challenges involved in restoring connectivity across the Shencottah Gap. The General Manager of Southern Railway and its team of engineers also attended this meeting, and information required to address issues of connectivity within the project landscape was shared during the daylong deliberations.

A team of Kerala Forest Department officials independently visited the project site to understand the current situation and made recommendations to the Chief Wildlife Warden to pursue the matter and to initiate the restoration. This was followed up by a team of scientists, conservation managers, officials of the Kerala State Forest Department and the concerned Divisional Forest Officers who visited the site and discussed various issues related to connectivity and wildlife management within the landscape. The team submitted a detailed report of the preliminary finding with recommendations made to the Chief Wildlife Warden for further perusal.

The results from the project have shown that linear intrusions are not barriers for leopards. However, it continues to hamper dispersal of tigers and elephants.

Results from field surveys indicate two locations where mitigation structures, an overpass and an underpass for animals, needs be constructed to restore and enhance connectivity across the Shencottah Gap. The technical details and costing has been submitted to the Kerala Forest Department to initiate the necessary steps with the State Government.

6. Describe the success or challenges of the project toward achieving its short-term and long-term impact objectives

This project has shown that scientifically carried out research and effectively communicating findings in workshops, meetings and other fora can generate interest and influence policy to acknowledge the importance of addressing issues of linear barriers in the Shencottah Gap. FERAL was successful in achieving this objective in the Shencottah gap due to the good support and response that we got from the Forest Departments of Kerala and Tamil Nadu.

Much needed support to bring the Sothern Railways and NHA representative to discuss impact of linear intrusions was only possible due to the support extended by the former Chief Wildlife Warden of Kerala State Forest Department. We were able to achieve this by presenting our work to him on a regular basis and due to the recommendations made by partnering scientists.

The concepts and fundamentals of scientifically restoring connectivity across linear intrusions is relatively new in India, there are a handful of examples where structures have been erected to facilitate large mammal movement. The prevalent perception of Forest Department's field staff of corridor restoration is that people will be resettled from the corridor. To dispel this we had to engage with them on a regular basis and involve them in our field visits and discussions. This was also required to prevent any negative or false information being conveyed to local residents. Senior officials from the Kerala Forest Department also participated in these interactions and facilitated in conveying the right message to ground staff on need to restore connectivity and the potential solutions that can be implemented in the project landscape.

During the course of the project, various platforms provided to FERAL by partnering institutions, and the Forest Department of Kerala and Tamil Nadu, has helped in bringing greater awareness amongst managers from different Government Departments, civil society groups and scientist on the potential to restore connectivity across the Shencottah Gap. The results have also highlighted the need to systematically evaluate structural and functional connectivity while considering restoration strategies and further emphasizing the importance of functional connectivity over structural connectivity.

Interactions with officials from the Railways, structural engineers, biologist and Forest Department has contributed to our understanding of different constraints the managers face to incorporate connectivity in their respective management/development plans. This allowed us to fine-tune our final recommendations on the kind of mitigation structures that were required to address issues of connectivity in the Shencottah Gap.

7. Were there any unexpected impacts (positive or negative)?

None

Project Components and Products/Deliverables

Component 1 (as stated in the approved proposal)

To leverage support at the State and Central Government levels to adopt corridors identified by FERAL and address issues of linear barriers within the Shencottah Gap.

1.1. Awareness materials targeting relevant departments (highways, railways, forests, electricity) including press note for a non-technical audience.

1.2. Proceedings of the seminar including a literature review of known linear barriers in the Western Ghats from both published and grey literature, particularly from conservation and research initiatives such as the CEPF made available.

1.3. Core group of individuals and institutions formed to address issues of linear barriers in Shencottah gap. Minutes of the first meeting made available.

8. Describe the results from Component 1 and each product/deliverable

A non-technical article on the current status of connectivity and restoration opportunities is currently being considered for publication in Sanctuary Asia magazine. In addition to the popular article, a detailed note highlighting the Shencottah Gap as an important elephant corridor that connects elephants disconnected by a distance of ~300m was written and sent to WTI. The objective of this article is to include a few critical corridors like the Shencottah Gap, which can be easily restored to ensure long-term survival of elephants and for landscape level management in the revised edition of the book "Right of Passage".

A brief note on the workshop and presentations made by various participants has been made available on the FERAL website.

www.feralindia.org/files/cepf/linearbarriers/final/CEPF_TV8AUG_Workshop.pdf

www.feralindia.org/files/cepf/linearbarriers/final/CEPF_TV8AUG_Workshop.zip

A group of scientists, Forest Department Officials, both retired and in-service, formed a network to recommend restoration strategies to the State Department. The members of this group or their representatives carried out a field visit along with the concerned Divisional Forest Officers

and discussed the issues of connectivity. During the deliberations, potential solutions and implementation strategies were also considered. A detailed note based on the field visit was prepared and submitted to the Chief Wildlife Warden of Kerala for consideration.

www.feralindia.org/files/cepf/linearbarriers/final/CEPF_FieldVisit_Dec2013.pdf

Component 2 (as stated in the approved proposal)

Identification of spatio-temporal "hot spots" along linear barriers in the Shencottah gap and short listing of mitigation methods to enhance large mammal connectivity.

2.1. Based on 1.3 adopt rapid and replicable protocols to identify and rank linear barriers in terms of impact on large mammal connectivity. Protocols field-tested and documented.

2.2. Results of field assessments of the effects of linear barriers on large mammal connectivity across the Shencottah Gap and made available via the Western Ghats Portal.

2.3. Technical reports incorporating mitigation methods prepared.

9. Describe the results from Component 2 and each product/deliverable

2.1 & 2.2. In the Shencottah Gap, modification of terrain while constructing the road and railway line has altered the slopes along these linear intrusions. This and associated incursion of houses and buildings are major deterrents to elephant and tiger dispersal and currently the Periyar and Agastyamalai populations are disconnected by a short distance (~300). We also found that vehicular traffic along the National Highway to be a major deterrent to elephants, especially due to the terrain and slopes around the intrusions. However, leopards frequently dispersed across these intrusions. Data from our past projects and the current project shows resident tigers, and during the project period no evidence of them dispersing across the linear intrusions were detected. Based on the results from this study, we identified two potential locations where mitigation structures need to be constructed. They occur within the MSL and Kottavasal corridors, corridors identified by FERAL on an earlier CEPF project. At MSL an underpass for large mammals, with realignment of the National Highway and at the Kottavasal corridor a wildlife overpass for large carnivores and elephants has been proposed.

www.feralindia.org/files/cepf/linearbarriers/final/webmaps/elephant_hotspot.html

www.feralindia.org/files/cepf/linearbarriers/final/webmaps/leopard_hotspot.html

www.feralindia.org/files/cepf/linearbarriers/final/CEPF_Barriers_Mammals_2016.pdf

2.3. A technical report on the kind of mitigation structures required to facilitate was developed by consultants hired by the project. The team included a biologist, engineers from a private company (Kinetix Solutions Pvt. Ltd.) involved in designing infrastructure projects, and a retired chief engineer of RITES.

www.feralindia.org/files/cepf/linearbarriers/final/CEPF_Shencottah_MitigationStructures_2016.pdf

Component 3 (as stated in the approved proposal)

Policy advocacy at the state and national level to draw attention to the problems posed by linear barriers and the need for mitigation in the Shencottah Gap.

3.1. Report on follow up with concerned government departments on presenting technical report and key recommendations.

3.2. Workshop with institutional stakeholders and decision makers to present finding of project and to seek commitments to implement mitigation measures into management plans. Proceedings and summaries from workshops including resolutions of participants made available.

3.3. Report on specific recommendations adopted/proposed by relevant institutional stakeholders to pursue adoption of viable mitigation measures.

10. Describe the results from Component 3 and each product/deliverable

3.1. The key findings from this project and the proposed mitigation structures has been shared with the forest department to pursue the implementation with the respective State and Central Government authorities.

www.feralindia.org/files/cepf/linearbarriers/final/CEPF_Shencottah_MitigationStructures_2016.pdf

3.2. The implementing agency, Southern Railways, is willing to consider suggestions from the Forest Department on implementing the required steps to enhance connectivity. However, issues of funding the mitigation structures should be pursued by the Forest Department with the concerned authorities at the State and Central Government.

The results from this project were presented to the Forest Secretary of Tamil Nadu, Chief Wildlife Warden of Tamil Nadu, Field Director of Kalakad Mundanthurai Tiger Reserve (KMTR), and officers from Kerala and Tamil Nadu at a workshop organized by the Tamil Nadu Forest Department in December 2014. FERAL was invited to present its work on the connectivity issues related to KMTR. During the post-presentation discussion, on request of the Forest Secretary, further deliberations were held and as suggested information requested was submitted to his office for perusal.

Similarly, we presented the findings from this project to Forest Department officials and scientist at a workshop held in Palakkad in May 2015.

FERAL also presented the finding from the project at the stakeholder meeting convened by WTI at Coimbatore in September 2015, where, a commitment from the Southern Railways or PWD to address issues of connectivity in the Shencottah Gap was not forthcoming.

3.3. Although the required information to get commitments from institutional stakeholders were provided at various occasions, there are no specific actions that they have adopted due to political and financial reasons.

Component 4 (as stated in the approved proposal)

Methodological framework developed for spatial indicators from the CEPF global monitoring framework, and tested in the Western Ghats context.

- 4.1. Agreement on datasets and metrics to be used for the analysis after discussion with CEPF and Moore Centre for Science and Oceans at Conservation International.
- 4.2. Working script with accompanying technical guidance for measuring change in natural habitat cover in CEPF priority sites over time.
- 4.3. Working script with accompanying technical guidance for measuring change in the amount of fresh water secured at CEPF invested sites and delivered to downstream users over time.
- 4.4. Working script with accompanying technical guidance for measuring change in the amount of CO₂ stored at CEPF invested sites over time.
- 4.5. Sample outputs of CEPF spatial indicators for the Western Ghats over the period 2008-2013.

11. Describe the results from Component 4 and each product/deliverable

Key results from the analysis of remote sensing data showed no significant change (2000-2013) in any of the services in nearly half the Western Ghats. In the remaining region, results showed a declining trend in NDVI as a proxy for biodiversity, but an increasing trend in carbon storage and hydrological services. When priority KBAs were compared with non-priority KBAs, a decreasing trend in NDVI was seen in a larger proportion of priority KBAs than non-priority KBAs. However, results from carbon services indicate a greater proportion of area with increase in sequestration in both priority and non-priority KBAs. The total amount of carbon sequestered by priority KBAs was almost twice that of non-priority KBAs. Results of the hydrological services show a greater proportion of area with increased in blue water services (stream flow, soil moisture, groundwater recharge) for both priority and non-priority KBAs. The total amount of blue water provided by priority KBAs was almost twice that of non-priority KBAs.

It is not possible to attribute the observed trends to interventions made by a single programme. Hence, our results represent a combination of conservation actions by different players. Our study suggests that freely available remotely sensed products like MODIS and Landsat can be used efficiently to analyze trends in ecosystem services as a response to conservation/anthropogenic factors at a given site. The framework provided in this study can be improvised to monitor impact of climate change on ecosystem processes and services, and in predicting future changes in the ecosystem. A detailed report on the above components is available on the FERAL website.

www.feralindia.org/files/cepf/linearbarriers/JAN2016/CEPF_WG_Monitoring_2016.pdf

The scripts and supporting documentation are available on GitHub

https://github.com/feralindia/CEPF_monitoring

https://github.com/feralindia/CEPF_monitoring/wiki

12. If you did not complete any component or deliverable, how did this affect the overall impact of the project?

Getting commitments from the PWD, did not affect the overall outcome. We had initially considered involving them in designing the mitigation structures, as this was not possible due to various reasons beyond the scope of the project timelines; we hired services of team which included biologists and engineers to design the mitigation structures.

13. Please describe and submit any tools, products, or methodologies that resulted from this project or contributed to the results

The tools developed by this project are published on GitHub at the following links:

https://github.com/feralindia/CEPF_monitoring

https://github.com/feralindia/CEPF_monitoring/wiki

CEPF Global Monitoring Data

Respond to the questions and complete the tables below. If a question is not relevant to your project, please make an entry of 0 (zero) or n/a (not applicable).

14. List any vulnerable, endangered, or critically endangered species conserved due to your project

None

Hectares Under Improved Management

Project Results	Hectares*	Comments
15. Did your project strengthen the management of an existing protected area?	n/a	
16. Did your project create a new protected area or expand an existing protected area?	n/a	
17. Did your project strengthen the management of a key biodiversity area named in the CEPF Ecosystem Profile (hectares may be the same as questions above)	n/a	
18. Did your project improve the management of a production landscape for biodiversity conservation	n/a	

** Include total hectares from project inception to completion*

19. In relation to the two questions above on protected areas, did your project complete a Management Effectiveness Tracking Tool (METT), or facilitate the completion of a METT by protected area authorities? If so, complete the table below. *(Note that there will often be more than one METT for an individual protected area.)*

n/a

Protected area	Date of METT	Composite METT Score	Date of METT	Composite METT Score	Date of METT	Composite METT Score

20. List the name of any corridor (named in the Ecosystem Profile) in which you worked and how you contributed to its improved management, if applicable.

n/a

Direct Beneficiaries: Training and Education

n/a

<i>Did your project provide training or education for . . .</i>	Male	Female	Total	Brief Description
21. Adults for community leadership or resource management positions				
22. Adults for livelihoods or increased income				
23. School-aged children				
24. Other				

25. List the name and approximate population size of any “community” that benefited from the project.

n/a

Lessons Learned

27. Describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building. Consider lessons that would inform projects designed or implemented by your organization or others, as well as lessons that might be considered by the global conservation community

28. Project Design Process (*aspects of the project design that contributed to its success/shortcomings*)

At the very early stages of the project, a lot of care and attention was paid to get the Forest Departments involved in designing and carrying out field assessments. This was required to ensure that they take the findings from this study to the next level, the implementation phase. We also ensured that ground staff and officers were frequently updated about our ongoing field activities and involved them in some of our surveys.

When the project was designed, it was assumed that there would be limited interest among various stakeholders to address issues of connectivity in the Shencottah Gap. However, with the help of the Chief Wildlife Warden of Kerala we were able to have constructive discussions with stakeholders on the kind of possible mitigation strategies. This was very useful as it set the tone and the need for mitigation structures to address connectivity issues on the right track. Our experience in other landscapes has been that, such discussions often result in polarized views and no meaningful outcomes are possible due to these differences.

The intensive field surveys undertaken in a systematic and robust framework provided the baseline to identify locations and the kind of mitigation structures required for restoring connectivity across the Shencottah Gap. This provided a strong background for dialogues with concerned policy makers. In addition, the experience has helped us to develop monitoring protocols for other landscapes and especially to address issues of linear intrusions and dispersal.

29. Project Implementation (*aspects of the project execution that contributed to its success/shortcomings*)

To ensure successful implementation the project sought guidance from senior scientists, retired Forest Department Officials, and conservation biologists, to design field surveys and to carry out field assessments to provide their recommendations to the Government. We also consulted species experts to seek their expertise in identifying potential crossing locations where mitigation structures can be constructed and species-specific requirements in designing the mitigation structures. We also consulted a private company involved in designing structures and the retired chairperson of RITES, these interactions have helped in refining the mitigation structures and in developing cost effective structures.

Frequent interactions with Forest Department Officials and presenting findings from the project in different fora helped garner support to address connectivity issues in the project site. This was also possible as a few interested officials provided us the required opportunities to present our results and made field assessments. These field visits were also useful as they gave us an

opportunity to interact with field staff, Divisional Forest Officers and were used to discuss the kind of solutions that the project was considering.

Building conservation networks involving various State and Central Agencies can be time consuming. Sustaining such networks often presents a challenge when priorities of these agencies change due to new development goals and policy changes. This can slow down ongoing dialogues to initiate conservation action and needs to be sustained beyond the project period.

We had to keep the analysis and presentation of results flexible to provide feedback and inputs to various requests made by the forest officials. These included generating simple maps, tables, and sharing spatial datasets. This led to better communication of the findings from this project and facilitated in providing inputs to their corridor management plans.

30. Describe any other lessons learned relevant to the conservation community

Without guidelines for linear intrusions within forested landscapes, the developing agency has no requirement to address issues of connectivity. While they are not averse to this idea, implementation is hampered due to funding constraints. Unless the guidelines for linear intrusions is accepted by the MoEF & CC, after incorporating public suggestions and comments, installing mitigation structures will be limited to a few examples funded by civil society or by the forest departments. The proposed guidelines should also include non-forested habitats, as important corridors need not be restricted only to forested patches. More importantly, the costs of these mitigation structures should be borne by the project proponent and cannot be transferred to the Forest Department. Projects that consider realignment should be given a higher green rating as compared to projects deploying mitigation structures. Including such provisions within existing policy will greatly facilitate better use of wildlife habitats and also promote responsible development which is needed to meet long term conservation goals.

Sustainability / Replication

31. Summarize the success or challenges in ensuring the project will be sustained or replicated

The approach adopted by the project, of having a stakeholder workshop in the early stages of the project proved helpful in getting the required support from the Forest Department and to also send the right message to other line departments. We have adopted the same approach in other landscapes as well.

Our major challenge was to get the respective PWDs to survey the area and develop appropriate mitigation structures. However, we hired services of a team headed by a biologist, which included a private firm engaged in similar projects; and a retired chairman of a Government of India initiative involved in designing railway structures, and ensured mitigation structures for this project were designed within the project period.

32. Summarize any unplanned activities that are likely to result in increased sustainability or replicability

The Periyar Tiger Reserve and the Kalakad – Mundanthurai Tiger Reserve are two sites chosen to implement the Biodiversity Conservation and Rural Livelihood Improvement Project, a government of India project funded by the World Bank. While there are no specific provisions under this project to construct the proposed mitigation structures, other aspects of improving habitat and landscaping should be negotiated by the State Forest Departments with MoEF&CC and the World Bank and activities which restore connectivity should be considered.

Safeguards

33. If not listed as a separate Project Component and described above, summarize the implementation of any required action related to social, environmental, or pest management safeguards

None

Additional Comments/Recommendations

34. Use this space to provide any further comments or recommendations in relation to your project or CEPF

None

Additional Funding

35. Provide details of any additional funding that supported this project and any funding secured for the project, organization, or the region, as a result of CEPF investment

None

Donor	Type of Funding*	Amount	Notes
Foundation for Ecological Research, Advocacy and Learning	A	120,346	Part of Salaries, infrastructure, vehicles, equipment costs

** Categorize the type of funding as:*

A Project Co-Financing (other donors or your organization contribute to the direct costs of this project)

B Grantee and Partner Leveraging (other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF funded project)

C Regional/Portfolio Leveraging (other donors make large investments in a region because of CEPF investment or successes related to this project)

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, and publicized in our newsletter and other communications.

Please include your full contact details below:

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