



CONSERVATION REFERENCE SERIES NO. 3

RIGHT OF PASSAGE

ELEPHANT CORRIDORS OF INDIA



Eds: Vivek Menon, Sandeep Kumar Tiwari, P.S. Easa
and R. Sukumar



RIGHT OF PASSAGE



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FOREWORD



भारत सरकार, पर्यावरण एवं वन मंत्रालय
Government of India, Ministry of Environment & Forests
इन्दिरा गाँधी राष्ट्रीय वन अकादमी
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The fragmentation of wildlife habitats is one of the major threats to the long-term conservation of species. Large animals like elephants, which require extensive areas for survival, are more affected because of loss of habitat contiguity. The adverse effects of fragmentation leading to isolation have been debated for many years leading to several publications listing their deleterious impacts on wildlife.

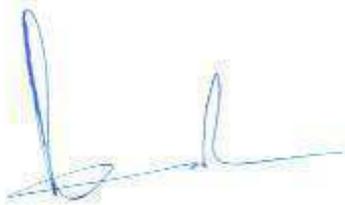
Biological corridors have been suggested as one of the measures that help overcome the ill-effects of fragmentation ensuring genetic exchange within and between populations. Corridors connecting elephant habitats have thus been the topic of discussion for the last few decades and numerous discussion meetings and symposia have been organized on elephant corridors in the country. However, there was lack of clarity even in the definition of an elephant corridor. This has led to the misinterpretation of elephant habitats as elephant corridors. There have also been disagreements among experts on the length, width, priority, frequency of elephant use and other aspects of elephant corridors.

This publication on elephant corridors in India is thus a significant contribution to elephant conservation. The publication is an outcome of concerted efforts by the Wildlife Trust of India and a number of acknowledged elephant experts, who they have succeeded in bringing together under a common umbrella. This is unique in that all these experts (both scientists and forest officers) have come together to contribute to solving a long-pending issue. It is also unique because each corridor has been visited by experts and endorsed by the wildlife authorities of the concerned states adding to the authenticity of the details.

The authors of this publication have also taken care to put the information into a format that can serve as a ready-reckoner for elephant corridors. The location maps

are very useful and informative. Details such as geographical co-ordinates, vegetation, land-use, habitations, biotic pressures and the human artefacts in the corridors in addition to suggestions for conservation actions will help in formulating strategies for maintenance of these crucial corridors. The prioritization of the corridors will be definitely helpful to wildlife managers.

This publication is thus a significant contribution to the elephant conservation programme in the country and could be a reference to all concerned in taking up corridor-related programmes. The publication could also be cited as a good example of collaboration and co-operation. The scientific experts, wildlife managers and the Wildlife Trust of India can be proud of their contribution to a landmark publication.



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PREFACE

The Asian elephant once possessed a vast kingdom that ranged across southern Asia, from the Tigris–Euphrates basin in the west across the Indian subcontinent into Indo-China, various islands in the southeast, and northward up to the Yangtze river and even beyond. If you look at a map depicting the distribution of the elephant today, you will see a shattered kingdom, a vastly reduced range broken into fragments, a few drops of colour splashed accidentally on a worn out southern Asian fabric. This is the tragedy facing the Asian elephant today—existence in isolation. Over a hundred such fragments are scattered across its range, with over 40 isolated populations on the island of Sumatra alone. India, too, comes close in the number of distinct elephant populations across the four regions they are found, with little chance of intermingling as nature would have otherwise permitted.

The long-term survival of a large-bodied, long-ranging animal such as the elephant can be ensured only through maintaining viable populations within viable habitats. For maintaining viable habitats it is vital that we maintain large, unfragmented landscapes. How large these landscapes should be is open to discussion, but it is clear from studies of the elephant's home range, population dynamics and elephant-human conflicts that this should be of the order of several hundred square kilometers at a minimum in the short term, and certainly several thousand square kilometers to ensure long-term viability.

India does, fortunately, have a few areas where the above conditions are still met. The problem is that even here the options of keeping these landscapes without disintegrating further are fast disappearing. As the country moves into the high gear of economic growth, the symbols of development—roads, railway lines, dams and canals, pipelines, mines, expansion of settlement and cultivation—threaten to permanently rip apart the tattered habitat fabric. In many places, the linkages literally hang by a thread.

It is imperative that we begin the process of consolidating landscapes for elephants and other wildlife through protecting and strengthening existing corridors, or creating corridors where this is feasible and the situation not too late. This is not an easy process. Each corridor represents a different situation in terms of ownership, importance, feasibility and costs. It may take years to set up a particular corridor. To give some examples, two (among several) elephant corridors I had identified during the mid-1980s have finally been created in Karnataka through the participation of the government. (Karnataka Forest Department and Project Elephant of the Govt. of India in one instance, and NGOs [Wildlife Trust of India and Asian Nature Conservation Foundation] in another) during 2001–03!

This report, jointly published by Wildlife Trust of India and the Asian Elephant Research and Conservation Centre (a division of the Asian Nature Conservation Foundation), is a compilation of identified “corridors” across the elephant’s range in the country. Given the fragmented nature of the elephant’s habitat this task is by no means an easy one. Although we do have reasonably detailed surveys of elephant distribution in some regions of the country, such as parts of the south and the north, we still do not have sufficient information about habitat status to identify and evaluate the viability of many corridor-like situations in the east-central and northeastern regions.

We sincerely hope that this report will provide the much needed initial data on elephant corridors for actual planning for their creation to begin. Each potential corridor will have to be “ground truthed” for determining its importance, feasibility of creation and cost involved. This document should be useful to various agencies, including the central and state governments (Ministry of Environment and Forests, and the state Forest Departments), national and international conservation NGOs, researchers and donors. While this data base on elephant corridors would continue to be updated, I can only hope that this information will keep conservation agencies busy in the coming years to help preserve the habitat for a magnificent animal that has been a part of our land and culture for millennia.



Raman Sukumar
Professor of Ecology, Indian Institute of Science and
Hon. Director, Asian Elephant Research and Conservation Centre
and Trustee, Wildlife Trust of India



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EXECUTIVE SUMMARY



Fragmentation and shrinkage of wildlife habitat has threatened the existence of many species. Mega-herbivores like the elephant with a large home range and equally large food requirements have been among the most affected species. This is one of the causes of increased human–elephant conflict and damage to property and life. Strategies to reduce the adverse effect of habitat fragmentation have been widely discussed and one proposed method for moderating the negative effects of habitat fragmentation is the preservation and restoration of biological corridors or the linear landscape between any two habitats.

In 2001, the Wildlife Trust of India (WTI) took up the challenge to pragmatically attempt on ground to minimize the effects of habitat degradation and fragmentation. It attempted to address this problem through its Wild Lands programme which aims at creating a buffer to the already existing Protected Areas of the country by identifying, prioritizing, securing and/or managing privately owned wild lands of critical importance thereby contributing to the conservation of threatened wild species. A project was initiated to identify elephant corridors in the country and to groundtruth them by collecting details on the land and its people. These corridors, it was thought, could then be secured by WTI itself, the Government or any other organisation. A preliminary list of corridors prepared by the Directorate of Project Elephant in the Ministry of Environment and Forests, Govt. of India was considered a good compilation to start with. The list, which had 166 corridors to begin with, was used as a baseline and a long and cumbersome field exercise was begun.

Field surveys were carried out from November 2001 to April 2004 during which Field Officers of WTI and its partner, the Asian Elephant Research and Conservation Centre (AERCC) had discussions with the officials of state forest departments, knowledgeable members of NGOs and scientists before personally visiting the short-listed corridors for comprehensive groundtruthing. Various parameters of the corridor were entered into a pre-designed format and marked on a 1:50,000 topographical map. The identified corridors were verified once again by senior members of WTI in most parts of India while the ones in southern India were verified by AERCC.

Corridor status

A total of 88 elephant corridors were identified as being currently in use in the country. Of these, 12 are in north-western India, 20 in central India, 14 in northern West Bengal, 22 in north-eastern India and 20 in southern India. Of the total, 77.3% of the corridors are being regularly used by elephants. Based on standard analysis, about one-third (31%) are of ecologically high priority and 67% are of medium priority. Fragmentation of elephant habitat was most severe in northern West Bengal followed by north-western India, north-eastern India and central India respectively. The least fragmentation was noted in southern India. Only 28.5% of the corridors in the country are one kilometer or below in length. However, on a regional basis, about 65% of the corridors in southern India are one kilometer or below in length.

In southern India, 65% of the corridors are under the Protected Area network and/or under Reserve Forests and 65% of the corridors are fully under forest cover. In comparison, for example, 90% of the corridors in central India are jointly under forest, agriculture and settlements and only 10% are completely under forest. On a country-wide basis, only 24% of the corridors are under complete forest cover.

Settlements and the resulting biotic pressure in corridors are serious issues and throughout India, only 22.8% corridors are without any major settlements. This listing of corridors with a preliminary groundtruthing and mapping completes the first phase of the elephant corridor project of WTI. It now recommends that state governments formally declare these areas as 'elephant corridors' and bring them under legal protection so that it takes forward the process from a stage of endorsement (which has been done already) to a stage of protection. WTI recommends individual Conservation Action Plan Outlines for each corridor and plans to work with state governments in fully securing these for elephant movements as part of a larger elephant conservation and conflict mitigation strategy.



CHAPTER-1



Asian Elephants in India: A Review

P.S. Easa

The elephant has always been considered as an embodiment of strength, size and intelligence. It has been looked upon with mixed feelings of love, worship and fear. The human culture in elephant range countries is so clearly associated with the elephant that it was the subject of a number of classical works of literature. Elephants were also a part of human society and were maintained in captivity for use in war, festivals, timber-logging and marriage processions.

Asian elephants once ranged over a vast area from the Tigris and Euphrates in West Asia to South East Asia (Olivier, 1978). However, their present distribution is confined to Bangladesh, Bhutan, Myanmar, China, India, Indonesia, Cambodia, Laos, Malaysia, Nepal, Sri Lanka, Thailand and Vietnam (Santiapillai, 1987). Though the number of Asian elephants in the wild is estimated to be about 44,000–56,000, they are threatened because of habitat loss, shrinkage and degradation. Fragmentation of available habitats has confined most of the populations to small islands. In addition, the threat from poaching for ivory has considerably reduced the number of tuskers, most often leading to a highly skewed sex ratio. Developmental programmes and encroachment within and around elephant habitat has led to loss of traditional movement paths of elephants. All these have contributed to increased human–elephant conflict, which often leads to loss of human and elephant lives.

The historical range of the elephant in India has shrunk, confining the elephants into distinct geographical zones (Jerdon, 1874; Ali, 1927; Daniel, 1980). Elephants

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in the Andaman and Nicobar islands are considered to be feral, and are the descendants of a captive stock. The Indian sub-continent has an estimated population of about 27000–29000 elephants, which is about 50% of the world population. These range in eleven Elephant Reserves spread over about 110,000 km² forests in north-east, central, north-west and south India (Bist, 2002).

The north-eastern population

Elephants in north-eastern India range in the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura (between 21° 58'–29° 27' N and 89° 42'–97° 24' E). The north-eastern elephant population was contiguous with that of Bhutan, Bangladesh, Nepal and Myanmar. The 9000-odd elephants in the region are now discontinuously distributed and exist as 15 populations in an area of about 8900 km² (Choudhury, 1999). The range extends from near northern West Bengal (near the Indo-Nepal international border), along the Himalayan foothills up to the Mishmi Hills and the eastern Brahmaputra plains of Assam and Arunachal Pradesh (Choudhury and Menon, unpublished draft Action Plan). Then it takes a 'U' turn and covers eastern Arunachal Pradesh, the plains of upper Assam and the foothills of the Naga Hills, the Garo Hills of Meghalaya through the Khasi Hills, parts of the Brahmaputra plains and the Karbi plateau. Elsewhere in the south, scattered populations survive. Choudhury (1991, 1992, 1995, 1999 and 2001), Williams and Johnsingh (1996 a and b), Gurung and Lahiri Choudhury (2000) and Marak (2002) give the details of elephant conservation issues in the area.

The elephant population on the north bank of Brahmaputra extends from northern West Bengal through the Himalayan foothills and the bhabar-terai tract (called the Duar in this part of the country) touching southern Bhutan, northern Assam and Arunachal Pradesh. In eastern Assam, the range also covers part of the floodplains of the Brahmaputra and Lohit Rivers. About 7900 km² area is available to an estimated population of 2700–3000.

Elephants on the south bank of the Brahmaputra are divided into eastern, central and western populations. The eastern population is spread over lower Dibang Valley, Lohit, Changlang and Tirap in Arunachal Pradesh, Tinsukia, Dibrugarh, Sibsagar, Jorhat and Golaghat in Assam and Mon, Tuensang, Mokokchung and Wokha in Nagaland. The population lost its contiguity with the North Bank in the seventies and the central area of South Bank in the eighties (Choudhury, 1995 and 1999). An estimated 1100–1200 elephants occupy about 4500 km² of forests in the area. However, tea plantations are being used during movements.

The population in the central area extends from Kaziranga National Park across the Karbi Plateau, parts of central Brahmaputra plains and the basin of the Diyung river to the foot of Meghalaya plateau in Assam and Meghalaya. Elephants are separated from the south bank-western population due to the expansion of Guwahati city,

clearing of forest for *jhum* and human habitation along National Highway 40 connecting Shillong and Guwahati. The extent of elephant habitat is about 5050 km² with an estimated population of 2900-3000.

The elephant population in the western areas is seen in parts of Assam and Meghalaya along the foot of the Meghalaya plateau covering the Garo and Khasi Hills. It covers Kamrup and Goalpara districts in Assam, and Ri-Bhoi, West Khasi Hills, East Garo Hills, West Garo Hills and South Garo Hills, in Meghalaya. The seasonal range of this population also extends to areas of Bangladesh. The habitat available to an estimated 2800-3000 elephants is about 6850 km².

There are a few isolated populations in Dhansiri-Intanki covering part of Karbi Anglong district of Assam and Kohima district of Nagaland. It covers the Dhansiri and Daldali Reserve Forests in Karbi Anglong and Intanki Sanctuary in Kohima. About 300–350 elephants are estimated in about 1050 km². Elephants regularly move between Dhansiri and Intanki across the inter-state boundary. Inside Assam, they move between Dhansiri and Daldali and adjacent forests. A population of elephants numbering about 35–40 is distributed in Barail-Jaintia Hills along the southern face of the Barail Range of Assam and Jaintia Hills of Meghalaya. The population is small, scattered and considered non-viable.

A small population of elephants occurs in the forests of Tripura, especially in the southern areas of Dholai district. About 50 elephants exist in an area of about 2100 km² in Dampa Tiger Reserve of Mizoram and Gumti Wildlife Sanctuary in Tripura. This tiny population is in contiguity with the population of the Chittagong Hill tracts in Bangladesh. Two herds of about eight elephants were also reported from Ngengpui sanctuary and two or three are reported in Palak Dil area of Saiha district. A small herd is distributed in an area of about 140 km² in Tilbhum, Longai and Patharia Hill forests of Southern Assam. Laokhowa and Burhachapori Wildlife Sanctuaries have a population of about 10–15 elephants. The seven elephants in Orang National Park, 30–40 in Amcheng Hill Reserve Forests and 10–15 in Gibbon Wildlife Sanctuary are the other small populations in Assam. The Anko Range in Manipur has about 50 elephants, which is contiguous with those of the Somra tract of Myanmar.

The northern West Bengal population

The elephants in northern West Bengal form the western most extension of the north-east Indian elephant population. There are about 300 elephants in this region spread over Darjeeling and Jalpaiguri districts covering nine forest divisions. Although the elephant population in this region is only about 1% of the total elephant population of India, the human–elephant conflict is one of the highest in the country. Northern West Bengal has a forest area of 3050 km² covering about 24% of the total geographical area of the region. However, the elephant holding area is mostly

confined to an elevation of 900 m and the elephant habitat is about 2200 km² which lies in the terai, western Dooars and eastern Dooars. The terai and the western Dooars region of North Bengal has patchy forest with human habitation and tea gardens through which regular movement of elephants occur.

The north-western population

The north-western elephant population in India was once distributed over parts of Uttar Pradesh from Katerniaghat Wildlife Sanctuary to the Yamuna River (Singh, 1978). Currently the elephant occupies about 10,000 km² forests in the outer Himalaya and the Shivalik Hill ranges and parts of the terai and bhabar tracts. About 1000 elephants are distributed as six isolated populations in Katerniaghat Wildlife Division, in and around Dudhwa Tiger Reserve, between Sharda River and Haldwani town, Haldwani and Khoh River, Khoh and Ganga rivers and between River Ganga and Yamuna (Javed, 1996; Johnsingh *et al.* unpublished draft Action Plan)

The elephant habitats in the north-west has six Protected Areas, viz. Corbett National Park, Rajaji National Park, Sonanadi Wildlife Sanctuary, Dudhwa National Park, Kishanpur Wildlife Sanctuary and Katerniaghat Wildlife Division. The altitude varies from 200–1000 m. The vegetation in this tract is mostly moist and dry sal forests interspersed with northern tropical dry deciduous forests, northern tropical moist deciduous forest and bamboo thickets. Himalayan sub-tropical forest, cane brakes, seasonal swamp forest and plantations of teak, eucalypts, poplar and ailanthus are also met with.

The elephants in the range form six populations with about 150–200 elephants west of the River Ganga occupying about 1500 km². About 4000 km² between the Ganga and Gola Rivers has about 650–700 elephants whereas the 1800 km² stretch between Gola and Sharda River has only 50 elephants. About 50 elephants are distributed over 2500 km² between Khatima Range and Katerniaghat. The crude density of elephants in the area is reported to be 1 per 10 km² with a sex ratio of 1:2.5 (Williams, 2002).

Human habitation resulting in developmental programmes and associated activities has led to habitat fragmentation and degradation of the remaining elephant habitat. A number of breaks have been identified in this elephant range. About 10 corridors that are crucial have been identified in this elephant range. A growing human population has encroached on elephant habitat as they depend on the forest for fuel, fodder and small timber needs. The dependence on forest for livestock grazing and conversion of natural forest into monoculture plantations of tea, eucalyptus, etc. have degraded the habitat and exotics like *Lantana* and *Parthenium* have also taken root. The impact of 'Gujjar' settlements on the habitat is multifarious. Lopping of trees and grazing and the use of water holes by buffaloes are a few of the problems to be addressed (Dabadghao and Shankarnarayan, 1973; Johnsingh *et al.*, 1990;

Johnsingh and Joshua, 1994). One of the major direct impacts on the elephants is the railway track passing through Rajaji National Park and Dudhwa Tiger Reserve. Twenty elephants were killed by train-hits in Rajaji National Park between 1987 and May 2002. Though the collective attempt of WTI, the Northern Railways and Uttaranchal Forest Department has helped in averting accidents since 2003 (Menon *et al.*, 2003), the problem is perennial and needs to be addressed for a permanent solution.

Sunderraj *et al.* (1995), Javed (1996), Williams (2002), Johnsingh *et al.* (2004) and Menon *et al.*, 2003 have dealt with the conservation problems of the area. Conservation measures requiring immediate attention are the maintenance of the elephant corridors ensuring elephant movement, the rehabilitation of Gujjars and other human settlements outside the Park. About 25,000 workers are engaged in sand and boulder mining in the river beds within the Reserve forest adding more pressure on the surrounding habitat. Habitat improvement programmes have to be carried out to make it a better elephant habitat. Control of poaching is also proposed for the conservation of elephants.

The central population

The elephant habitats in central India extend over 17000 km² in the states of Orissa, Jharkhand and southern West Bengal and hold a population of about 2400–2700 elephants (Chowdhury, unpublished draft Action Plan). Biogeographically, this region falls in the Chhota Nagpur plateau in the north of the Eastern Ghats (Rodgers and Panwar, 1988). A major portion of the forests of Jharkhand, southern West Bengal and north-western portions of Orissa is deciduous. The elephant habitats in Chhota Nagpur are in the Palamau, Singhbhum and Dalbhum forest. To the north of the Mahanadi River, elephants are distributed in Baripada, Karanjia, Keonjhar, Bamra, Rairakhol, Angul, Dhenkenal, Athamalik and Athgarh Forest Divisions in Orissa. Eastern Ghats extending from the south of the Mahanadi River upto Mahendragiri, Boudh, Nayagarh, Phulbani, Baliguda, Kalahandi, Raygada, Parilakhmundi and Ghumsur North Forest Divisions in Orissa form the elephant habitat in the area. Singh (1989), Datye (1995), Tiwari (2000), Nigam (2002), Swain and Patnaik (2002), Sar and Lahiri Choudhury (2002) and Singh *et al.* (2002) have dealt with elephants of the area.

Orissa has about 57% of the elephant habitat in central India with 1800–2000 elephants spread over about 11,000 km² (Swain and Patnaik, 2002). Nearly 44% of the elephant habitat falls within eleven Protected Areas, viz. Similipal National Park, Similipal Wildlife Sanctuary, Hadgarh, Kuldiha, Satkosia gorge, Baisipali, Chandaka-Dampara, Kotgarh, Lakhari, Khalasuni and Badarma. Three Elephant Reserves, viz. Mayurbhanj, Mahanadi and Sambalpur have also been declared.

Chowdhury (unpublished draft Action Plan) identifies four zones of larger habitats in

Orissa and two in Jharkhand. The first, including Similipal Tiger Reserve and Kuldiha and Hadgarh Wildlife Sanctuaries, has an area of 3200 km² with an estimated population of about 491 (Prusty and Singh, 1994). This zone along with the adjacent forests of Noto and Garsahi could be an ideal habitat for the long-term conservation of elephants. The Satkosia-Baisipalli zone, situated in the central Orissa, has the Satkosia gorge and Baisipalli Wildlife Sanctuaries. This with the adjacent 800 km² Reserve Forests could form a larger landscape of about 1760 km² (Chowdhury, unpublished draft Action Plan).

The south Keonjhar plateau, with about 2600 km² is spread over Deogan, Ghatgan and Telkoi Ranges of Keonjhar Forest Division and Kamkhya and West Ranges of Dhenkenal Division. The area is believed to have about 200–250 elephants. Madanpur-Rampur-Kotgarh-Chandrapur zone in the Eastern Ghats have about 800 km², of which about 80% is fragmented due to shifting cultivation. About 300–400 elephants are estimated to be present in this area.

The elephant habitat of Jharkhand is about 6000 km² in extent and forms about 28% of the forests in the state holding about 600–700 elephants. The Palamau and Dalma Wildlife Sanctuary form about one third of the elephant habitat. Mines of iron, manganese and copper are the major threats (Singh and Chowdhury, 1999).

The Palamau Tiger Reserve with about 1250 km² area harbors an estimated 100–125 elephants. The second zone of Dingbhum-Dalbhum-Bonai includes Saranda, Kolhan and Porahat Forest Divisions. This is contiguous with Joda and Koira Ranges of Bonai Division of Orissa and Dalma Wildlife Sanctuary of Jharkhand. About 2900 km² of forests in the zone has a population of only 350–450 elephants.

In addition, there are five isolated populations in Orissa and three in Jharkhand. The Bamra Hills has two Protected Areas, viz. Khalasuni and Badarma. This constitutes an Elephant Reserve with a population of 257 elephants in an area of 427 km². Kapilas and Chandaka-Dampara Wildlife Sanctuaries hold about 40–50 and 50–60 elephants respectively. The Lakhari Valley Wildlife Sanctuary has about 50–60 elephants in an area of 185 km². About 10–15 elephants are spread over an area of 130 km² in Mahendragiri. The three isolated populations in Jharkhand are:

- a) Hazaribagh, Chatra and Gaya with about 40 elephants
- b) Ranchi and Gumla with 11 and
- c) Rom-Musabani forests with 20–30 elephants.

The elephant habitat in Midnapore, Bankura and Purulia districts in the southern part of West Bengal are considered as range extensions of the adjoining Dalma Wildlife Sanctuary of Jharkhand. The area is tropical moist deciduous forests interspersed with dry deciduous forests. About 50–60 elephants move annually to West Bengal

during the paddy season from September to February. There is also a resident population of about 26 elephants in the region (Chowdhury *et al.*, 1997). The area is mostly under agriculture with no Protected Areas. The Mayurjharna Elephant Reserve with an area of 414 km² has been recently declared to conserve about 60 elephants.

The central Indian habitat of elephant is one of the most fragmented and degraded because of encroachment, shifting cultivation and mining activities. The northern part of Orissa has the highest number of mines of iron, manganese and chromate. The southern part has about 9% of the total forest area under shifting cultivation.

The southern population

The south Indian population is distributed over the Western Ghats and parts of the Eastern Ghats in Kerala, Tamil Nadu, Karnataka and Andhra Pradesh (Sukumar, 1989). Most of the elephant ranges in this region are hilly with the tropical evergreen, semi-evergreen moist deciduous, dry deciduous and dry thorn forests in addition to high altitude grasslands and forest plantations. Elephants in the south could be considered to consist of eight populations based on habitat contiguity (Sukumar and Easa unpublished draft Action Plan). Easa (1989, 1994), Sivaganesan (1991), Sukumar (1989) and Syam Prasad and Reddy (2002) describe various aspects of elephant conservation in the region.

About seven elephants appeared in Andhra Pradesh in 1984 and established in the dry deciduous forests of Koundinya Wildlife Sanctuary. A second herd of 22 joined the first in 1986 (Syam Prasad and Reddy, 2002). The population is reported to be on the increase and occupies an area of about 356 km².

Northern Karnataka is the northern-most limit of elephant distribution in south India and elephants are distributed in Uttara Kannada and Belgaum districts. About 40–60 elephants occur in the moist and dry deciduous forest mainly of the Dandeli Wildlife Sanctuary.

The crestline of the Karnataka portion of the Western Ghats has a population which occurs as small scattered groups in the forest of South Kanara, Mangalore, Shimoga and Chickmangalur. The total number of elephants is believed to be less than 60.

The Bhadra-Malnad area also holds a small population. The Malnad plateau on the east of the Ghats is separated from the rest of the tract by coffee plantations and other cultivations. The elephant habitat is mostly in the Bhadra Wildlife Sanctuary of about 827 km² and is considered to have tenuous links with the Pushpagiri and Brahmagiri Range.

The Brahmagiri-Nilgiris-Eastern Ghats population extends from the Brahmagiri Hills to the south through the Eastern Ghats in the states of Karnataka, Tamil Nadu and

Kerala with a splinter group in Andhra Pradesh. About 6300 elephants are distributed over 12000 km² of habitats. A number of the Protected Areas including the Bandipur, Nagarhole, Mudumalai, Wayanad, Biligirirangan swamy Temple, Kaveri and Brahmagiri fall within the area. The diversity in vegetations ranging from dry thorn forest to the montane shola grasslands make it one of the best Elephant Reserves in the country with a demographically and genetically viable population. This is the largest population of elephants in the country and possibly in Asia as well.

The large extent of habitat with diverse vegetation types and a number of cash crop cultivated areas and human settlements within also makes it one of the most complex regions in terms of conservation challenges. Maintenance of habitat contiguity through existing corridors or through consolidation of habitat while mitigating the ill-effects of human–elephant conflict and control of poaching, fire and other degradation factors would help in maintaining the integrity of habitat.

The Nilambur-Silent Valley-Coimbatore elephant population is connected to the Nilgiris through the high altitude mountainous portions of Silent Valley and Mukurthi National Parks. It is also distributed within the forests of Nilambur South and North Divisions, Mannarkad Division and Silent Valley National Park. The vegetation types include evergreen, semi-evergreen, moist deciduous, dry deciduous, dry thorn scrub and shola forests and grasslands. Though a large stretch of virgin forest is found in the area, a portion is subjected to forestry operations, cash crop cultivation and pressures from human habitations. There are a few constrictions through which the elephants move either throughout the year or in certain seasons. Maintenance of these corridors through appropriate measures, relocations of selected private holdings and stringent protection measures can ensure the long-term survival of this otherwise viable population.

The Anamalais-Parambikulam elephant population is one of the best conserved with about 4500 km² of diverse habitat and about 1600 elephants (Easa *et al.*, 1990). Elephants range over Tamil Nadu and Kerala. The Indira Gandhi Wildlife Sanctuary and the Palani Hills form the Tamil Nadu part of the habitat. Parambikulam, Chinnar, Thattekad, Peechi and Chimmoni Wildlife Sanctuaries, Eravikulam National Park and the forests of Chalakudy, Nemmara, Vazhachal, Malayattur, Munnar and Mankulam Forest Divisions form the Kerala part of the elephant habitat. The vegetation types range from dry thorn scrub forest to high altitude shola grasslands with evergreen and moist deciduous forests equally dominating.

Though vast and varied in habitats, the area also has probably the largest number of reservoirs for irrigation and electricity generation, tea and cardamom estates and forest plantations in addition to extraction of forest produce (especially reeds). The population is also under pressure because of poaching. Encroachments especially in the Mathikettan shola areas have reduced the effective habitat depriving the elephants of some of the traditional movement paths.

Human–elephant conflict in this region is largely concentrated around the Valparai areas. The maintenance of the traditional paths through the elephant corridors, resettlement of some of the human habitations for consolidation of elephant habitat, improvement of degraded habitat and monitoring for prevention of poaching are the most crucial measures for long-term conservation of this population.

The Periyar-Srivilliputhur population is spread over Kerala and a small portion of Tamil Nadu. Periyar Tiger Reserve with adjoining Ranni, Konni, Achankovil, Punalur and parts of Thenmala Forest Divisions form the elephant habitats in Kerala whereas Srivilliputhur and parts of Theni Divisions of Tamil Nadu form the habitat in Tamil Nadu. The vast stretch of evergreen forests is the uniqueness of the area. The dry deciduous forest along the foothills of Varashunad Hills is also prominent. There are extensive plantations of tea and eucalypts especially in the southern part. There are about 1500 elephants in the area.

This is probably one of the compact elephant habitats in the south without much human habitations. Though the large-scale poaching of elephants have resulted in the removal of a number of tuskers, one of the major issues in the area is the disturbance caused by the Sabarimala pilgrimage, which attracts millions of people within a short period. Stringent anti-poaching activity, measures to improve the degraded habitats and reducing the pressure on the area from pilgrims are the priorities for conservation.

Agasthyamalais is the southern-most elephant population in the country and consists of Kalakked-Mundanthurai Tiger Reserve, Neyyar, Peppara and Shendurney Wildlife Sanctuaries and Reserve Forests of Thiruvananthapuram Forest Division. A part of the Agasthyamalai Biosphere Reserve, the habitat supports about 300 elephants.

Elephants in India, although enjoying protection in Elephant Reserves, are threatened with ever-increasing pressure on the habitat. Conservation efforts should be focused mostly to consolidate the habitat especially by reducing or removing biotic pressure through site-specific programmes. The central Indian population is perhaps the most fragmented one and the habitat is further threatened due to the mining activities. However, some of the sub-populations, especially in the north-east are also highly vulnerable. The skewed sex ratio due to selective removal of tuskers, human elephant conflicts leading to intolerance among the affected people and the policies for economic development in elephant habitats are also of great concern. An integrated approach involving all the stakeholders could probably ensure the long-term conservation of this magnificent animal.



CHAPTER-2



What is an Asian Elephant (*Elephas maximus*) Corridor?

Arun Venkataraman

The negative effects of fragmentation threaten many species today and strategies to reduce their impact have been widely discussed (Saunders *et al.*, 1991; Huxel and Hastings, 1999). A proposed method for moderating the negative effects of habitat isolation is the preservation and restoration of linear landscape elements (corridors that structurally link otherwise isolated habitat remnants) (Saunders and Hobbs, 1991). These corridors are meant to increase landscape connectivity by facilitating movement of organisms between habitat fragments and thus minimize the risk of inbreeding and extinction, increase local and regional population persistence and facilitate colonization (Doak and Mills, 1994, Fahrig and Merriam, 1994, Sjorgen, 1991, Simberloff, 1988).

In common usage, a corridor has been defined as:

1. A gallery or passageway into which compartments or doors open into
2. A gallery or passageway connecting several apartments of a building
3. A narrow passageway or route (Merriam Webster and Co, 1961).

A common attribute of these definitions most relevant to their ecological applications, are the terms “passageway” and “connecting”. The term “passageway” or “gallery” connotes the concept that the corridor is narrow relative to the habitats being connected.

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In ecological literature corridors are one of three landscape elements, the other two being patch and matrix (Forman and Godron, 1986). The principles of landscape ecology have defined corridors as narrow strips of lands, which differ from the matrix on either side. Corridors may be isolated strips but are usually attached to a patch of somewhat similar vegetation (Forman and Godron, 1986). This definition characterizes corridors in terms of their shape and spatial context but does not discuss its functional role. Forman and Godron (1986) also emphasize the possible transport function of corridors, arising as a consequence of their shape and context, rather than as a necessary condition to ascribe the term "corridor" to a linear element.

Even with the above definitions, the necessary criteria for determining whether a linear landscape element is a corridor or not, is ambiguous. One definition emphasizes function (passageway from one location to another) while others discuss form and context (narrow and contrasting with the environment on its edges). Thus, when the significance of corridors to maintenance of biological diversity is debated (Noss, 1987, Simberloff and Cox, 1987, Saunders and Hobbs, 1991a) disagreements arise due to divergent interpretations of the corridor concept.

Corridors have also been described as linear patches of natural vegetation providing habitat for species that are not adapted to the surrounding habitat, as temporary use areas or as a permanent part of their home ranges. Maelfait and De Keer (1990), in a study of invertebrates in Belgium, recognized their use for migration but emphasized the role corridors played as habitat. While summarizing the role of corridors, Saunders and Hobbs (1991), included both the habitat (form) and movement (function) role of linear patches. Emphasis was however placed on facilitated movement. Merriam (1991), stated "Corridors may or may not be involved in achieving connectivity among patches or fragments", thus inferring that a definition does not require a functional role of facilitating movement. Laan and Verbbo (1990), were among few to recognize that a strip of vegetation as habitat or as a facilitator of movement are not necessarily equivalent and are difficult to differentiate. A failure in reconciling these definitions of corridors has led to a controversy over their value.

It is thus seen that the facilitated movement function of a linear landscape element is the most commonly assumed distinguishing characteristic of a corridor. Soule and Gilpin (1991) provide a clear and concise definition; "a linear two dimensional landscape element that connects two or more patches of wildlife (animal) habitat that have been connected in historic times; it is meant as a conduit for animals". Rosenberg *et al.* (1995) went many steps further in clearing the confusion over function and mathematically defined corridors. They first defined **habitat** as "a patch that provides for survivorship, natality (birthrate) and movement. If average survivorship and natality rates allow for a stable or growing population that produces immigrants it is a source patch; otherwise it is a sink that is dependant on immigrants to sustain its population" and **corridor** as "a linear landscape element that provides for sur-

ivorship and movement but not natality (birthrate) between other habitats”. Thus not all of a species’ life-history requirements may be met in a corridor. They further provided a model which provided a decision making rule for discriminating among possible passages connecting habitat patches so that a dispersing animal could maximize its likelihood of successful dispersal. This model allowed for a definitive definition where “a corridor is a linear landscape element where the immigration rate to the target patch is increased over what it would be if the linear patch was not present”.

Relevance of the above definitions to elephant corridors

While considering the relevance of the above definitions for elephant corridors it is obvious that the management implications of such definitions have to be clearly evaluated. These definitions have been strongly influenced by principles of population and community ecology, which while useful when defining a corridor, provide little indication towards the actual consequences of having an elephant corridor and the ensuing management and conservation action required for its management. It is thus essential to incorporate the “desirability” of an elephant corridor in its definition.

Asian elephants are long ranging species with extensive habitat and nutritional requirements. Furthermore the population biology and genetics of the species require fairly unhindered gene flows across populations to ensure long-term viability. In fragmented, human transformed landscapes, that typify most elephant habitats in Asia today, corridors thus ensure that nutritional, demographic and genetic needs are met. In these kinds of landscapes, corridors are likely to be surrounded by human settlements. Elephant usage of corridors may thereby lead to elephant-human conflict through a multitude of mechanisms.

The “desirability” of a corridor is the result of an interplay of the positive and negative social and ecological attributes described above and even though a landscape element could be defined a corridor using population and community ecology principles, it could be rejected on purely social grounds. These attributes could play a dual role of both “defining” and prioritizing corridors for conservation action.

In addition to the “desirability” it is also useful to define attributes that characterize corridors. These are

- Form
- Spatial Context
- Habitat Structure
- Function

Form

The form of an elephant corridor pertains to its own specific shape and geometry and in the context of the habitat patches it connects.

The definition, linear landscape element is quite apt. Linear implies a tendency to appear as a straight line in a single dimension. While corridors could have width and thus be two dimensioned, it is essential they be much narrower than the habitat patches they connect. Corridors however do not necessarily have to be straight.

How narrow should they be with respect to the habitat patches they connect? It is recommended that a subjective criterion is that the corridor should be narrow enough to experience a significant risk of being severed in a relatively short span of time. Risks could include sudden habitat loss caused by land-use changes or de-notification and consequent land use changes, the effect of developmental activities creating obstacles on a corridor and impeding movement, e.g. roads, railway lines, geographical events such as land-slides or earth-quakes and increased human activity on its periphery. A highly threatened corridor could thus be a narrow strip of private forest or revenue forest where a spread of agriculture could disrupt elephant movement in a short time span. A narrow corridor with a protected area status could be threatened through de-notification and consequent exploitation for agriculture or the expansion or increase in intensity of human activity on its periphery. A narrow strip of habitat connecting two larger habitats could even be a portion of flat land at the foothill of mountainous terrain that is not conducive for elephant movement. These attributes should thus influence decisions on the definition and prioritization of corridors for conservation action.

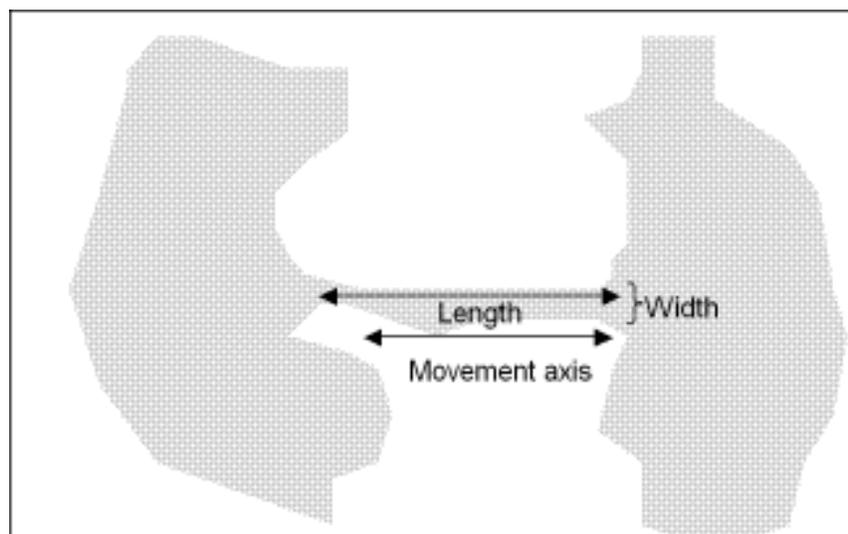


Figure 1: Dimensions of a corridor: Length and Width

For management purposes it is essential that the length and width of a corridor be carefully defined. It is recommended that the width be measured perpendicular to an axis parallel to the movement required to travel from one habitat patch to another. The length is the distance between the two patches along this axis. Figure 1 illustrates this axis and the measurements. All white areas in this figure and subsequent ones are settlements and stippled areas are elephant habitat.

Spatial context

There are two dominant issues here:

- a. Spatial context of a corridor with respect to its connectivity to habitat patches it connects
- b. Spatial context of a corridor with respect to other passages/corridors

Habitat patch connectivity

Assuming that habitat within a corridor comprises vegetation similar to that within the habitat patches it connects, it is desirable though not essential that habitat in a corridor is physically contiguous with the habitat patches. This is provided that the gap between the habitat patches and the extremities of the corridor are minimal and not obstructed (e.g. by water bodies, terrain) to allow for quick and easy movement from the habitat patches to its extremities.

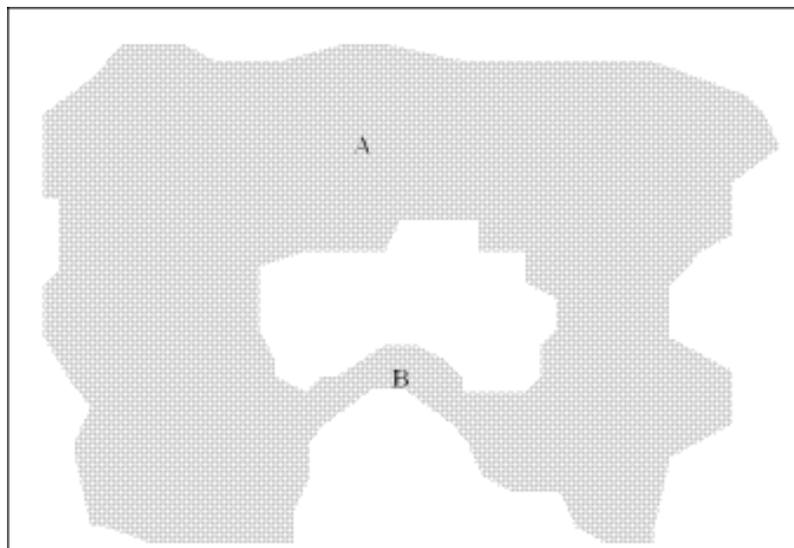


Figure 2: Two types of passages; assessing their relative importance.

Other passages and corridors

Figure 1 indicates a typical corridor that is easy to identify and design conservation action for. However, if such a corridor is in proximity to other corridors or relatively narrow passages, how does one assess its importance with respect to others? We could consider two scenarios.

The first scenario depicted in Figure 2 indicates a typical corridor, passage B, in close proximity to a wider passage, passage A. To evaluate the relative importance of A over B one could consider the following attributes of each:

1. Probability of severance due to the threats described above
2. Importance by evaluating elephant usage, considering home range fidelity

In the above scenario passage A is much wider than passage B and therefore the chance of its severance is much lower. In addition passage A could comprise a portion of a protected area (and hypothetically passage B could be privately owned) and therefore the risk of severance of A through the threats mentioned above could be minimal.

A finite risk does however exist through de-notification or if subjected to a developmental activity like a road being built through. If passage B is not used by elephants (because of terrain or other ecological factors) obviously it is not an elephant corridor. However, if used by even a few elephants it acquires importance as :

- a) Herds or solitary elephants that use the passage traditionally will continue to use it through its existence
- b.) If severed, herds could then use passage A, but will spend a fair amount of time adapting to its use.

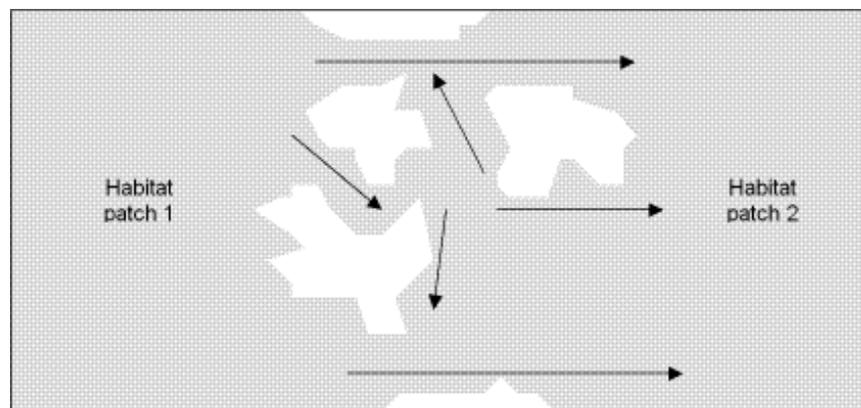


Figure 3: Multiple passages through a fragmented habitat

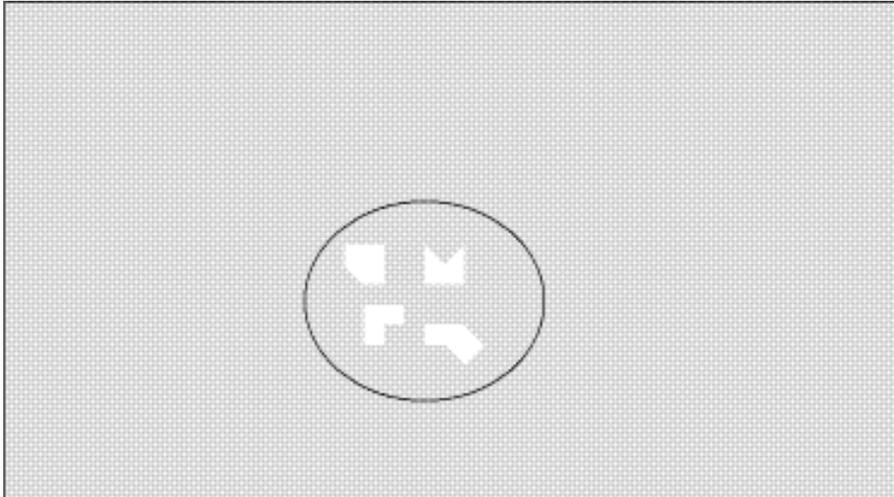


Figure 4: A small fragmented landscape in an otherwise intact habitat

In the interim period they could then move through settlements causing elephant-human conflict. In summary when prioritizing corridors for conservation action, passage B is assigned greater importance than passage A.

In the second scenario, a fragmented habitat could result in several passages. Figure 3 depicts such as scenario. This is a complex situation where defining corridors among these passages (depicted by arrows) requires some thought and is important as in a country like India, a number of elephant habitats resemble this. It may be useful to describe this kind of habitat as a "constrained habitat".

Ideally all such passages such be called corridors

Ideally all these passages should be called corridors and receive conservation action to ensure that movement from habitat patch 1 to habitat 2 is maximized. Obviously this is impractical, as it would then require all round relocation or reduction of settlement areas that is expensive and requires significant voluntary cooperation from inhabitants in terms of accepting a disruption of lifestyle and livelihood. It is therefore imperative to identify the specific passage that facilitates the maximum movement of elephants and is therefore important for connectivity between patch 1 and 2 and define only that as a corridor. This is similar to the model described by Rosenberg *et al.* (1995). Such a corridor may facilitate movement because of preferable terrain or habitat.

Figure 4 shows a small fragmented landscape in otherwise intact habitat. It may be useful to ignore passages created by this fragmentation entirely as elephant movement is unrestricted elsewhere.

Habitat structure in corridors

Forman and Godron (1986) did indicate that corridors are usually connected to a patch of somewhat similar vegetation. While this is usually true as most corridors are relics of contiguity existing in historical times and therefore have vegetation of the connected habitat patches, one could conceive of deviations. Habitat patches may often have cultivated land separating them. If these lands are sparsely populated, lie fallow, are not obstructed by human artifacts such as houses or other structures and could ensure a quick passage of elephants with no resulting conflict, there is no reason to not consider these corridors. Corridors could also be sparsely covered with relic vegetation of the connected habitat patches or even be reforested with quick growing trees like eucalypts or acacia (D. K. Lahiri Choudury, *pers. comm.*).

Function of corridors

There is little doubt that the function of corridors is to facilitate the movement of elephants from one habitat patch to the other. One could even add the term accelerated here and therefore define corridors as "linear landscape elements which facilitate accelerated movement across habitat patches".

Corridors should not be thought of a habitat where increased residency could promote conflict in adjoining settlements (D.K. Lahiri Choudury, *pers. comm.*). Therefore restoration programmes should not focus on habitat improvement that could encourage elephants to stay within corridors. A similar concept is within Rosenberg *et al.* (1995) definition where corridors provide survivorship but not natality.

In terms of sources and sinks, it is essential to iterate that elephant corridors only connect source patches, where survivorship and natality (birthrate) for a stable or growing population exist. Unlike a number of other species elephant corridors connecting sources with sinks (which are entirely dependent upon on immigrants to sustain their populations) are undesirable. This is because by definition, sinks do not support viable populations and are usually marginalized because of human settlements. Corridors promoting elephant movement into such sinks could greatly escalate conflict levels. However, there could be sinks that contain habitat of good quality have little human presence and do not have viable populations for historic reasons e.g. past hunting levels. In such cases corridors connecting such sinks with sources could encourage the creation of additional viable populations. In India such sinks are very rare or absent.





CHAPTER-3



Documenting Corridors: the Process

Sandeep Kumar Tiwari¹ and P.S. Easa²

The dynamic process of habitat loss and fragmentation has profound implications on the conservation of biodiversity. Closely coupled with the issue of large-scale loss of natural habitats is the challenge of maintaining and conserving biodiversity in landscapes dominated by human beings. Remnants of the natural environment increasingly occur as mosaic of large and small patches, survivors of an environment that has been carved up to develop new forms of productive land use. Understanding the consequence of habitat change and developing effective strategies to maintain biodiversity in disturbed landscapes is a major challenge to both scientists and land managers. For land managers, the challenge is to design and implement land-use strategies that will ensure the conservation of natural resources in the face of competing demand for land use. This could be done for example, by enhancing landscape connectivity, by means of corridors—the bandages for a wounded natural landscape (Soule and Gilpin, 1991).

Wildlife habitats in India are no exception to the ubiquitous phenomenon of fragmentation and degradation. This has adversely affected the status of populations of larger herbivores like elephants which have a large home range and food requirement. This has led to increased conflict between humans and elephants resulting in crop raiding, loss of human and elephant life and damage to property thereby putting the survival of both species at stake.

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In 2001, the Wildlife Trust of India (WTI) took up the challenge of minimising the effect of habitat degradation and fragmentation through its 'Wild Lands Programme' which aims at creating a buffer to the already existing Protected Areas of the country by identifying, prioritizing, securing and/or managing privately owned wild lands of critical importance and thereby contributing to the conservation of threatened wild species. A project was initiated to identify and verify elephant corridors in the country. The task was very challenging despite there being a lot written on elephant corridors of India (Davidar, 1972; Ali, 1990; Johnsingh *et al.*, 1990; Johnsingh, 1992; Easa, 1993; Badola and Mishra, 1995; Khan, 1995; Ramakrishnan, 1995; Sunderraj *et al.*, 1995; Sivasubramanian and Sivaganesan, 1996; Williams and Johnsingh, 1996; Ramakrishnan *et al.*, 1997; Sukumar *et al.*, 1998; Yadav, 1998; Sivaganesan and Kumar, 1999; Choudhury, 1999; Sivaganesan and Sukumar, 2000; Choudhury and Sar, 2000). A list of corridors prepared by the Directorate of Project Elephant in the Ministry of Environment and Forests, Government of India was considered a good compilation to start with. This list of 166 corridors was used as a base to groundtruth the corridors in each elephant range of the country. The elephant areas in the country were divided into five regions, viz. southern India, central India, north-western India, northern West Bengal and north-eastern India, taking the contiguity of elephant habitats as a basis.

In order to verify all the corridors in detail, Field Officers of WTI and the Asian Elephant Research and Conservation Centre (AERCC) had discussions with the officials of the forest departments, forest field staff, knowledgeable members of NGOs and individuals, before personally visiting the short-listed corridors. Details such as GPS locations, parameters of corridor, habitations, status of land use, human artefacts, threats, conservation actions, etc. were entered in a pre-designed format. The explanation of the fact sheet is given separately at the end of this chapter. The identified and verified corridors were then marked on a 1:50,000 toposheet. Senior officers of WTI and AERCC personally visited most of the corridors before verifying the list (Figure 1).

The southern Indian corridors were listed by WTI's regional partner; AERCC, Bangalore. The team also had discussions with scientists and experts in southern India before finalizing the corridor list.

In north-eastern India, a discussion meeting of people knowledgeable on elephant habitats was organised on 1 and 2 August, 2003 (Figure 2). The list of corridors from the region was presented in the meeting and a final list prepared incorporating the suggestions and comments advocated by the people present.

The fact sheet of each corridor thus prepared, was again sent to various experts, researchers and officials of Forest Department of all elephant range states for their comments and suggestions before finalizing the report.



Figure 1: Field verification of a corridor by WTI personnel

The rationale behind the fact sheet

1. **Name of the Corridor:** The corridors have been named based on the names of forests (wherever possible these are the names of the Reserve Forest) being connected. This was done to both standardize the naming process and also to rationalise logically the function of the corridor, i.e. the connection of the forests named. As, in many cases, the corridor was previously referred to by other names, an alternate name listing is also given to facilitate easy retrieval of data.
2. **Ecological Priority:** In order to accord some level of priority to the corridors, the editors have categorized the corridors as being of high, medium and low ecological priority. This is based on the regularity of elephant movement, the population size and the area of habitats being connected and the presence of other routes close-by. Ecological priority can be differently interpreted by different experts and this rating may only be taken as a thumb rule. A detailed rating is given in Appendix I.
3. **Conservation Feasibility:** Completely independent of ecological priority, the corridors were also graded on conservation feasibility. This only took into account factors, such as the land ownership, number of human settlements in it, the fragmentation of the corridor as well as the political and on ground feasibility of securing the corridor. Conservation feasibilities of corridors could be low even if ecological priorities are high. As in the case of ecological priority, these gradations were cross-checked with all authors and the expert panel for the

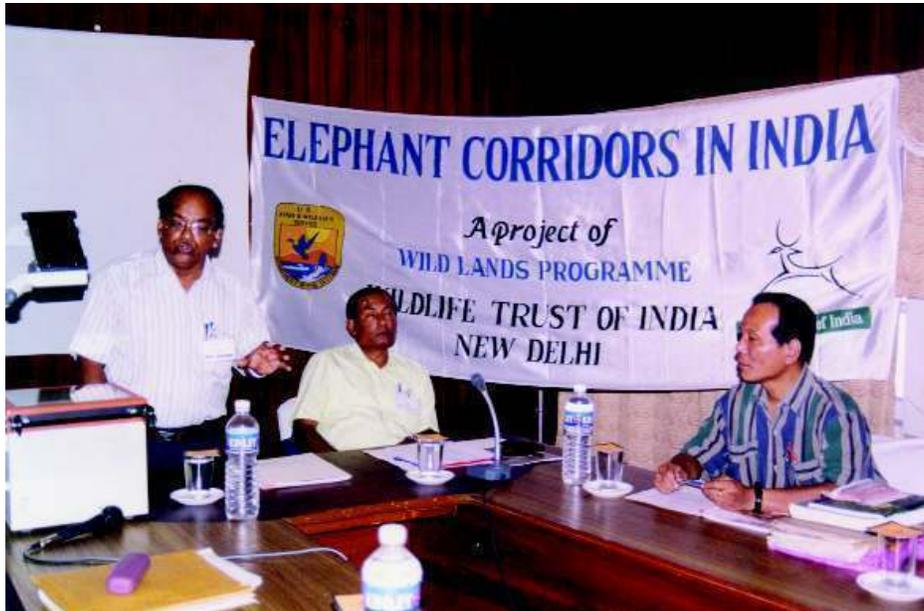


Figure 2: A meeting on elephant corridors in north-east India

region. Similar to ecological priorities, these only reflect WTI-AERCC views and can be interpreted differently by different agencies. A complete ranking is given in Appendix II

4. **State:** The state or states through which the corridor runs.
5. **Forest Division:** The Forest Division in which the corridor is present or the nearest Forest Division to the corridor.
6. **Connectivity:** The two elephant habitats that are being connected by the corridor.
7. **Geographical coordinates:** The geographical position of the corridor. This was recorded with a Geographical Position System (GPS) approximately at two ends of the corridor.
8. **Length and width:** Length is the distance between two habitats in the direction of elephant movement. Width is the distance of separation at the two closest points. Both are measured in kilometers.
9. **Forest type/ Vegetation:** The type of vegetation present within the corridor area using standard vegetation types (Champion and Seth, 1964).
10. **Nearest PA:** Denotes the proximity of any Protected Area (National Park or Sanctuary) to the corridor.

11. **Legal status of the corridor:** Denotes the status of the land in the corridor area, viz. National Park, Wildlife Sanctuary, Reserve Forest, revenue land, community forest, private forest, private land, etc
12. **Major land-use:** Gives the land-use pattern within the corridor area as forest, agricultural land, settlement, tea garden, plantation, etc.
13. **Major inhabitants/settlements:** Gives the name of the major settlements within the corridor area.
14. **Corridor dependent villages:** Gives the name of settlements within the corridor and at the periphery that are dependent on the corridor forest for fuel and other resources.
15. **Human artefacts on the corridor:** Lists the man-made structures present in the corridor area that impede elephant movement.
16. **Frequency of usage of the corridor by elephants:** This has been broadly divided into regular, occasional and rare. Seasonal animal movement that is regular is put as regular and seasonal.
17. **Threats to the corridor:** Lists all the present and expected threats to the corridor.
19. **Conservation plan:** Lists the steps that need to be taken to safe-guard the corridor. This also constitutes the framework of the plan for Phase II of the Elephant Corridor Project for WTI

Arrow marks on the maps are an indication of elephant movement and does not signify the length, breadth and area of the corridor.

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CHAPTER-4

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Elephant Corridors of North-Western India

A.K. Singh,¹ A.J.T. Johnsingh² and A. Christy Williams³

The north-western elephant habitat that once extended from Katerniaghat Wildlife Sanctuary in the east to the Yamuna river in the west is now fragmented at many places. The steep Himalayas and the Shivaliks bound this elephant range to the north and the fertile Terai to the south.

Human habitation and the resulting developmental programmes have led to habitat fragmentation and shrinkage. As a result, the elephant population in this region has been broken up into six sub-populations. From west to east, the populations include those between the Yamuna and the Ganga River, Ganga and Khoh river, Khoh and Haldwani, Haldwani and Sharda river, in and around Dudhwa Tiger Reserve and that of the Katerniaghat Wildlife Sanctuary. The major breaks in this elephant range are along the Ganga River, along the Gola River and between Dudhwa National Park and Katerniaghat Wildlife Sanctuary thus severely hindering elephant movement. In several other places, the habitat connectivity is under severe threat of breaking up.

The growing human population and their encroachment of the elephant habitat has not only fragmented the habitat but has also led to degradation of the available habitat. Dependence on the forest for fuel, timber, livestock grazing and conversion of natural forest into monoculture plantation of tea, eucalypts, etc have severely degraded the habitat and exotics like *Lantana* and *Parthenium* have taken root. The impact of "Gujjar" settlements on the habitat is multifarious (Dabadghao and Shankaranarayan, 1973; Johnsingh *et al.*, 1990; Johnsingh and Joshua, 1994).

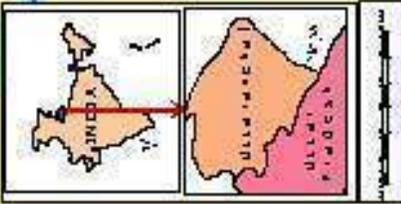
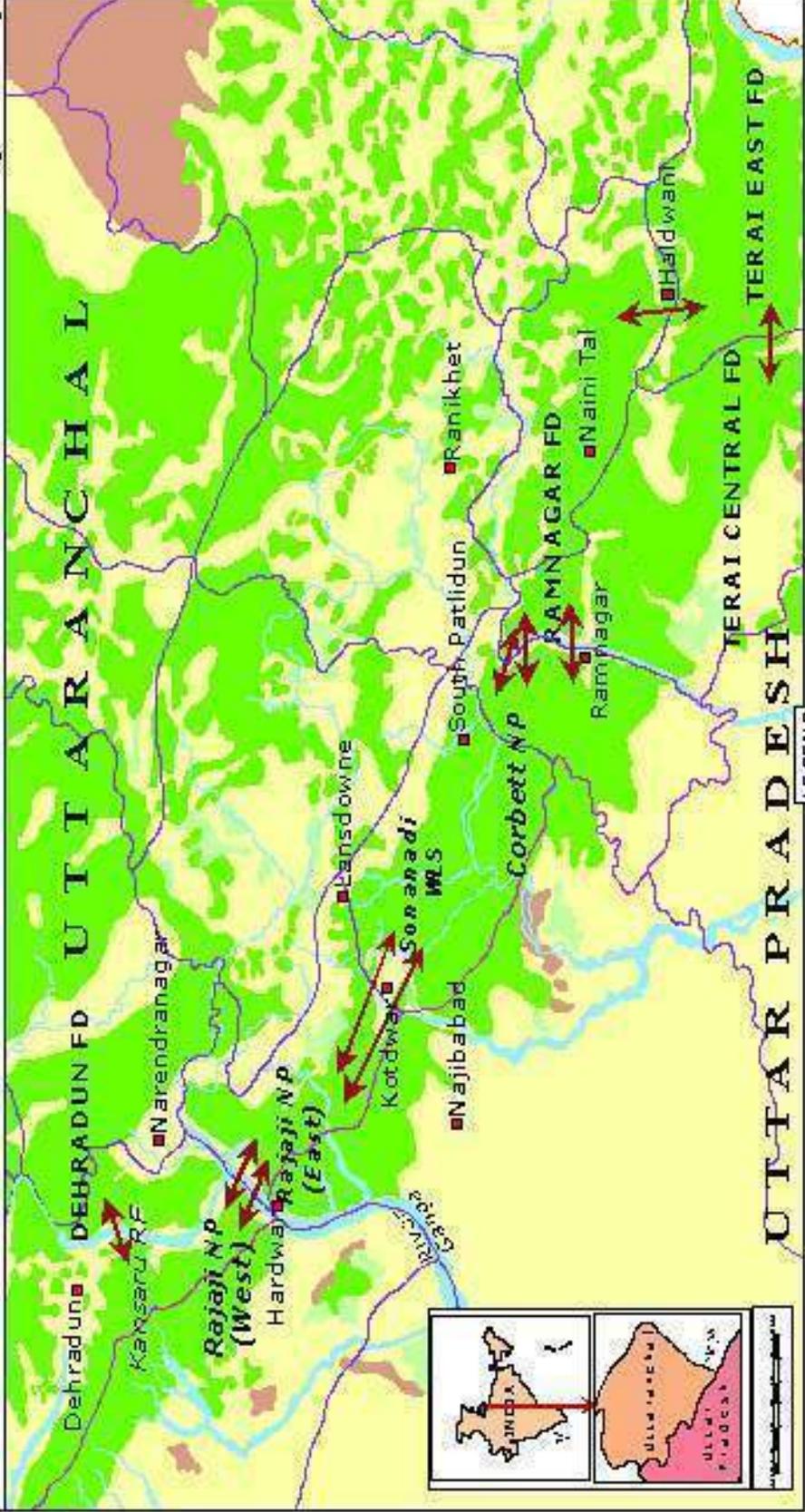
Twelve corridors have been identified in this elephant range.

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²Dean, Wildlife Institute of India. Email: ajtjohnsingh@wii.gov.in

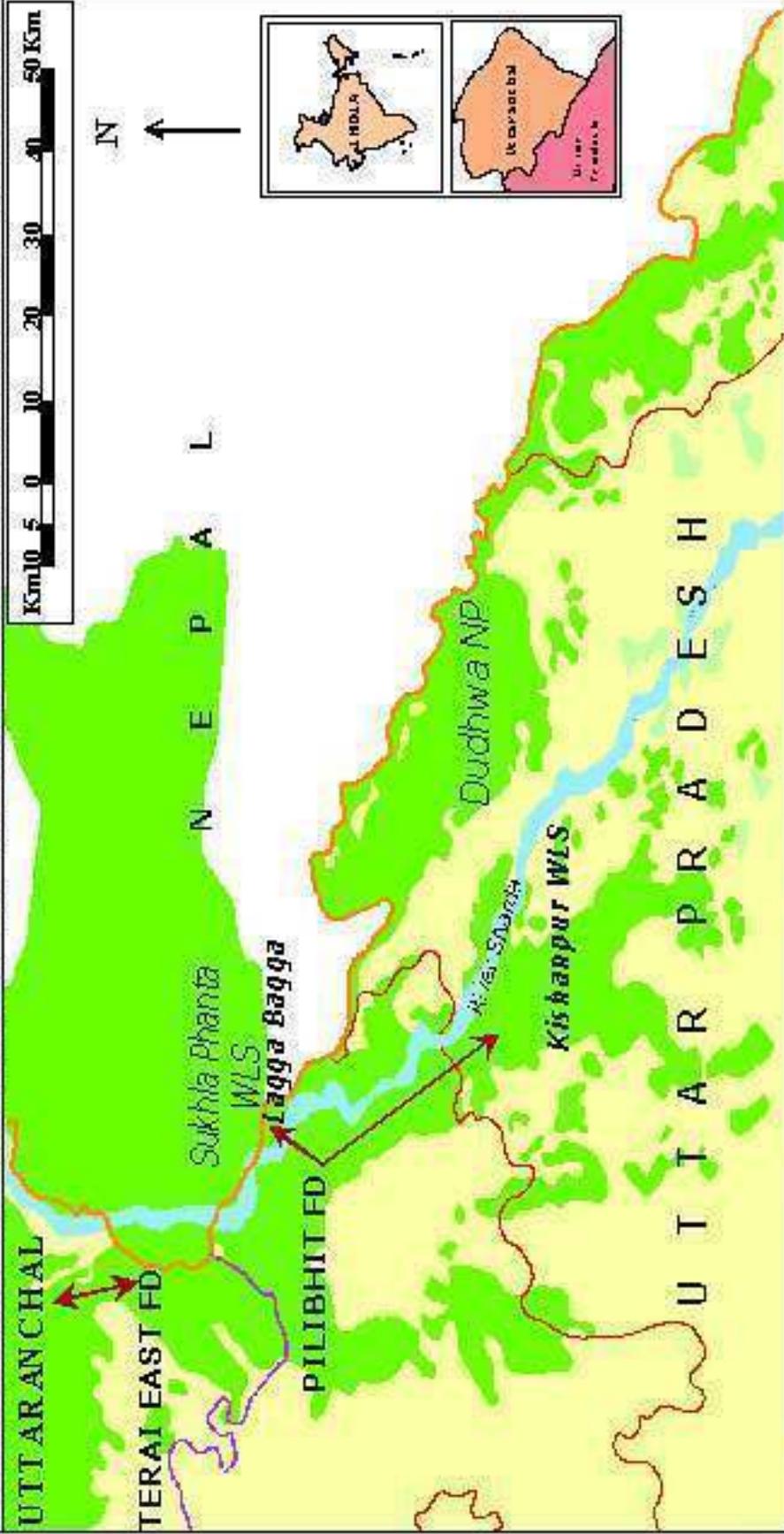
³Programme Coordinator, Asian Rhino and Elephant Action Strategy, WWF-International. Email: acwill69@yahoo.com

ELEPHANT CORRIDORS IN NORTH-WESTERN INDIA (PART I)



LEGEND			
	Reserve Forest		Water bodies
	Scrub & Grassland		Wasteland
	Arable land with Settlements		Important Towns
	Elephant Corridor		Division boundary
	International boundary		

ELEPHANT CORRIDORS IN NORTH-WESTERN INDIA (Part II)



LEGEND	
	Reserve Forest
	Scrub & grassland
	Arable land with settlements
	Water bodies
	Important Towns
	Elephant Corridor
	State Boundary
	Division boundary
	International boundary



1. KANSRAU - BARKOTE



State : Uttarakhand
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor provides connectivity for elephant movement between the Kansrau Range of Rajaji National Park and the Barkote and Rishikesh Ranges of Dehradun Forest Division. The corridor is under severe biotic pressure from the surrounding villages and heavy traffic on the Dehradun-Haridwar National Highway.

Forest Division : Rajaji National Park and Dehradun Forest Division

Connectivity : Kansrau Range of Rajaji National Park with Barkote Range of Dehradun Forest Division.

Geographical Coordinates:

Latitude : 30°05'41"–30°06'33" N
Longitude : 78°10'45"–78°11'10" E

Length: 2–2.5 km

Width: 2 km

Forest type/Vegetation: *Acacia catechu* and *Eucalyptus* plantation

Nearest PA: Rajaji National Park

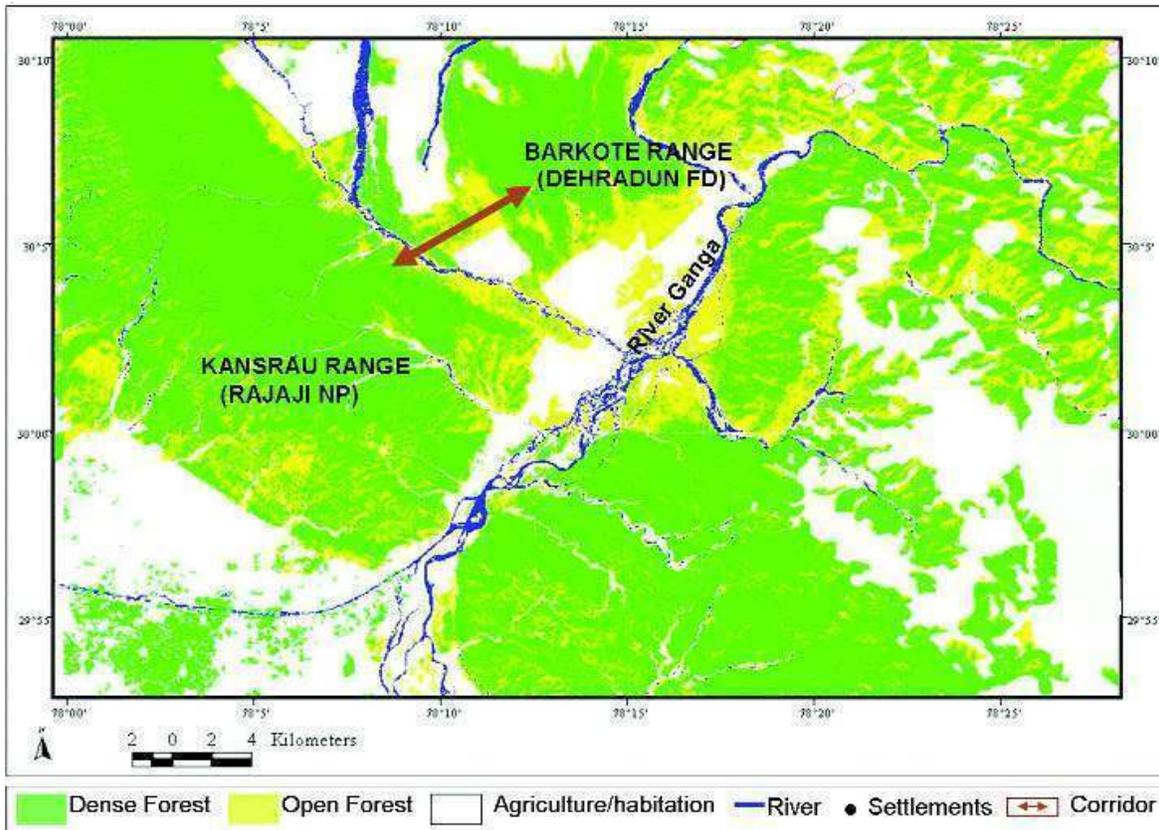
Legal status of the corridor: Reserve Forest

Major land-use: Forest

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Lal Thappar (40 families), Chhidarwala (250 families) Sergarh (70–75 families) and Chandi (45 families)

Human artefacts on the corridor: Haridwar-Dehradun Highway



Frequency of usage of the corridor by elephants: Occasional; used by bulls and groups of 10–12 elephants.

Threats to the corridor:

1. Illicit felling and firewood collection
2. Grazing
3. Heavy road traffic from March to June especially during a local pilgrimage

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Regulation of night traffic on the Haridwar - Dehradun highway.
3. Reducing biotic pressure and improving forest cover
4. Eco-development programmes in Lal Thappar and Chhidarwala villages to reduce biotic pressure.



2. CHILLA - MOTICHUR



State : Uttarakhand
Ecological Priority : High
Conservation Feasibility : Medium

This corridor extends across the River Ganges and connects the western part of Rajaji National Park (and thereby the Dehradun Forest Division and Shivalik Forest Division) to the eastern part of the Park and maintains the Rajaji-Corbett elephant population as a single entity.

Forest Division : Rajaji National Park

Connectivity : Motichur Range to Chilla and Gohri Ranges of Rajaji National Park

Geographical Coordinates:

Latitude : 30°00'00"–30°01'19" N
Longitude : 78°11'46"–78°13'04" E

Length: 3.5 km **Width:** 1 km

Forest type/Vegetation: Tropical dry deciduous sal forest and teak plantation

Nearest PA: Rajaji National Park

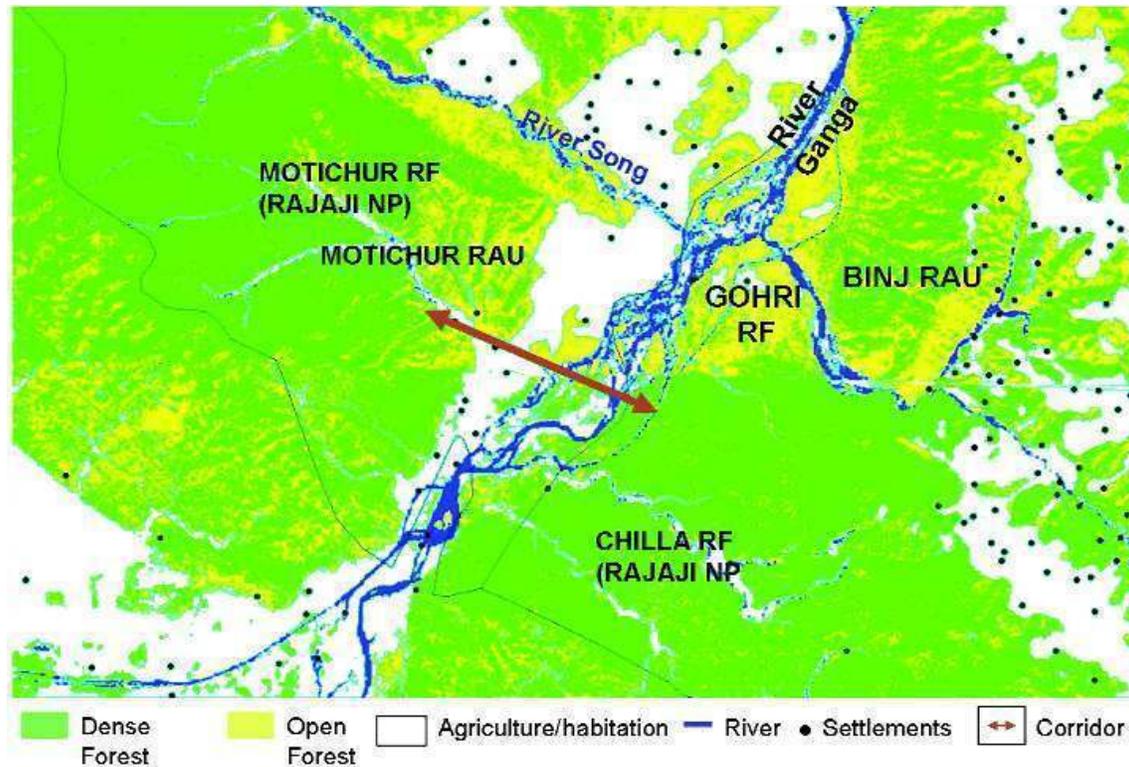
Legal status of the corridor: National Park, Reserve Forest and revenue land

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Khand Gaon-III with 18 houses and 32 families

Corridor dependent villages: Khand Gaon I, Khand Gaon II, Khand Gaon III, Raiwala, Prateet Nagar and Haripur Kalan

Human artefacts on the corridor: Army ammunition dump, Haridwar-Dehradun Highway, Delhi-Dehradun railway line and Chilla power channel



Frequency of usage of the corridor by elephants: Regular; only few bulls use this corridor along the Motichur *rau* and through the army camp and Khand Gaon III, mostly at night

Threats to the corridor:

1. Road and railway traffic
2. The settlements of the Tehri dam evacuees
3. Raiwala army camp and ammunition dump
4. Chilla power channel
5. Cattle grazing

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Rehabilitation of Khand Gaon III village to Lalpani Block no. II of Rishikesh Range.
3. Relocation of Raiwala army camp outside the corridor area
4. Construction of a flyover of 1.5–2 km length between Raiwala and Haridwar near Motichur.
5. Regulation of road and rail traffic, especially at night

Remarks: The land for rehabilitation of Khand Gaon -III has been identified and villagers are willing to move out. WTI is assisting the Uttaranchal Forest Department to secure this corridor.



3. MOTICHUR - GOHRI



Alternate Name: Binj-Rau

State : Uttaranchal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects the Motichur and Gohri Ranges of the Rajaji National Park across the River Ganga. Due to the tremendous pressure from villages as well as roads and other developmental activities, elephants have almost abandoned this corridor.

Forest Division : Rajaji National Park

Connectivity : Motichur and Gohri Ranges of Rajaji National Park.

Geographical Coordinates:

Latitude : 30°01'30"–30°02'20" N
Longitude : 78°12'60"–78°14'40" E

Length: 4 km

Width: 1 km

Forest type/Vegetation: Tropical dry deciduous sal forest and teak plantation

Nearest PA: Rajaji National Park

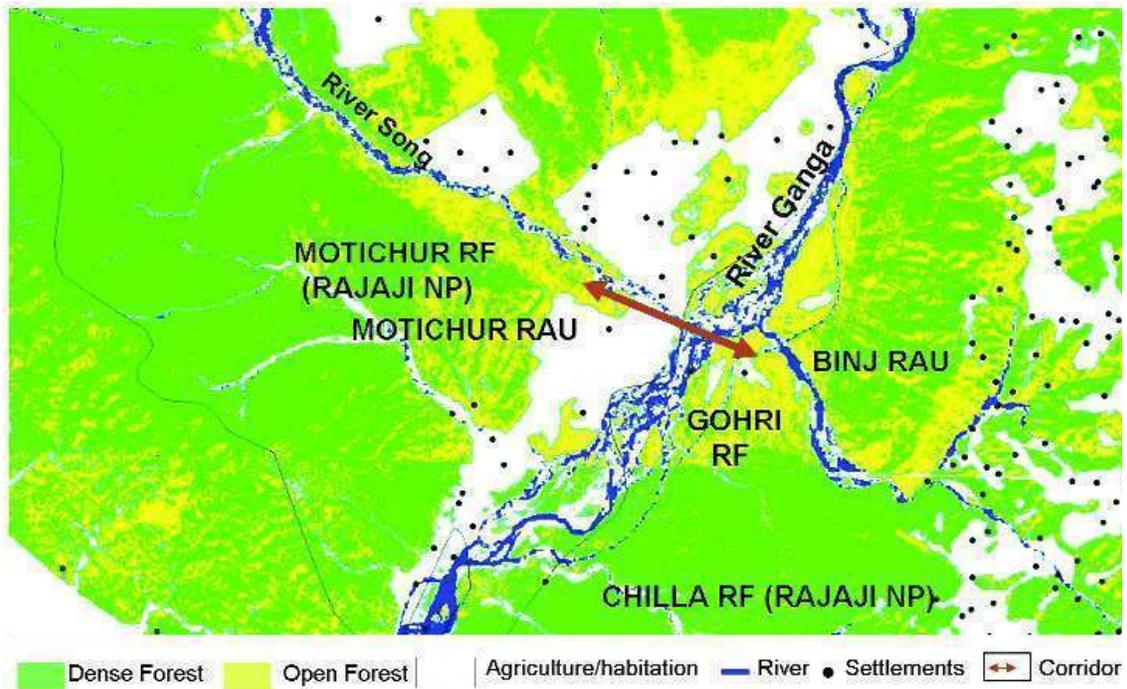
Legal status of the corridor: National Park and revenue land

Major land-use: Forest, settlements and agriculture

Major habitation/settlements in corridor: Gohri Maphi, Tehri Farm, Ganga Bhogpur with a total population of about 500 families and '*gujjar*' settlements

Corridor dependent villages: Gohri Maphi, Tehri Farm, Ganga Bhogpur and '*gujjar*' settlements

Human artefacts on the corridor: Settlement of Tehri evacuees, IDPL factory, Haridwar-Dehradun Road, Rishikesh-Haridwar road and Chilla power channel



Frequency of usage of the corridor by elephants: Rare; used by bull elephants

Threats to the corridor:

1. Road and railway traffic
2. Settlement of Tehri dam evacuees
3. IDPL factory
4. Chilla power channel
5. Cattle grazing
6. 'Gujjar' settlements

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Seek alternatives for Ganga Bhogpur village and 'gujjar' settlements
3. Regulation of road and rail traffic
4. Improvement of forest cover in corridor



4. RAWSAN - SONANADI (VIA LANSDOWNE FD)



Alternate name: Rajaji–Corbett

State : Uttaranchal
Ecological Priority : High
Conservation Feasibility : Medium

An earlier corridor that existed, south of the hilly tract between Khoh River (west of Corbett Tiger Reserve) and the eastern end of Rajaji National Park (Rawasan River) is now degraded due to cultivation and settlements. The elephants now move across the hilly terrain in the eastern part of the previous corridor.

Forest Division : Lansdowne Forest Division

Connectivity : Rajaji National Park and Corbett Tiger Reserve

Geographical Coordinates:

Latitude : 29°37'21"–29°52'49" N
Longitude : 78°20'01"–78°36'18" E

Length: 10 km

Width: 4–5 km

Forest type/Vegetation: Tropical dry deciduous sal forest

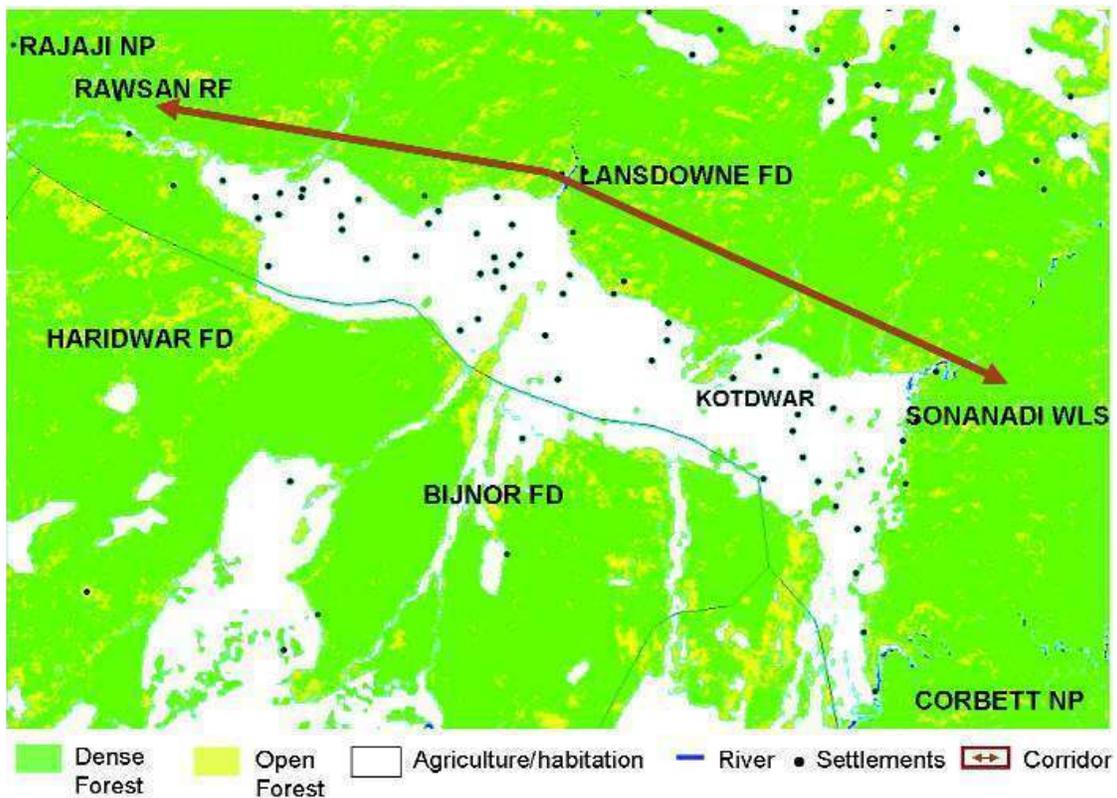
Nearest PA: Rajaji National Park and Corbett Tiger Reserve

Legal status of the corridor: Reserve forest and revenue land

Major land-use: Forest and Settlement

Major habitation/settlements in corridor: 77 families of Gujjars

Corridor dependent villages: Jorasi malli, Syalni, Keshta, Amola, Timliyal, Laldhang, Chamaria, Nayagaon (Haridwar District), Bhubdevpur, Mandevpur, Kishandevpur, Shrirampur, Jaidevpur, Dalipur, Ramdayalpur, Lokmanipur, Udairampur, Teliwara, Bhimsinghpur, Kothala, Mawakot, Satichaur, Dhruvpur, Lalpur, Shivpur, Kotdwar Gewai, Grastanganj, Ratanpur, Khumhichaur, Bishanpur, Nathupur, Lalpani, Amsour, Jamargaddi, Ramripulinda, Aldawa. Apart from this, large population of Kotdwar township.



Human artefacts on the corridor: Kotdwar-Pauri Road

Frequency of usage of the corridor: Regular; Both by bulls and groups (5 - 11 elephants)

Threats to the corridor:

1. Settlements and industrial area at the periphery of the corridor and the resultant biotic pressure.
2. Expansion of settlements (including gujjar) in corridor area.
3. Heavy traffic on Kotdwar-Pauri road.
4. Encroachments in the Malan river near Karalghati, Laldhang and Kotdwar.
5. Unplanned electric fences in Laldhang and Kotdwar Range.

Conservation Plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Seek alternatives for 77 gujjar families from the corridor area.
3. Regulation of traffic on Kotdwar-Pauri road
4. Demarcation of forest boundary on the southern side of the corridor.
5. Re-alignment of electric fences in Laldhang and Kotdwar Range.
6. Securing 10 ha. of land in Bini Jamargaddi village near the corridor



5. RAWSAN - SONANADI (VIA BIJNOR FD)



Alternate name: Rajaji–Corbett

State : Uttaranchal and Uttar Pradesh
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor that extends between Khoh river (Sonanadi RF west of Corbett TR) and the eastern end of Rajaji National Park (Rawasan RF) passing through Bijnor Forest Division is extremely degraded due to cultivation and migration of people from hill areas. However, solitary bulls and small groups of elephants still use this corridor.

Forest Division : Mainly Bijnor Forest Division, U.P. and part of Lansdowne Forest Division

Connectivity : Rajaji National Park and Corbett Tiger Reserve

Geographical Coordinates

Latitude : 29°46'08"–29°46'42" N
Longitude : 78°28'38"–78°33'49" E

Length: 40-45 km **Width:** 5-7 km

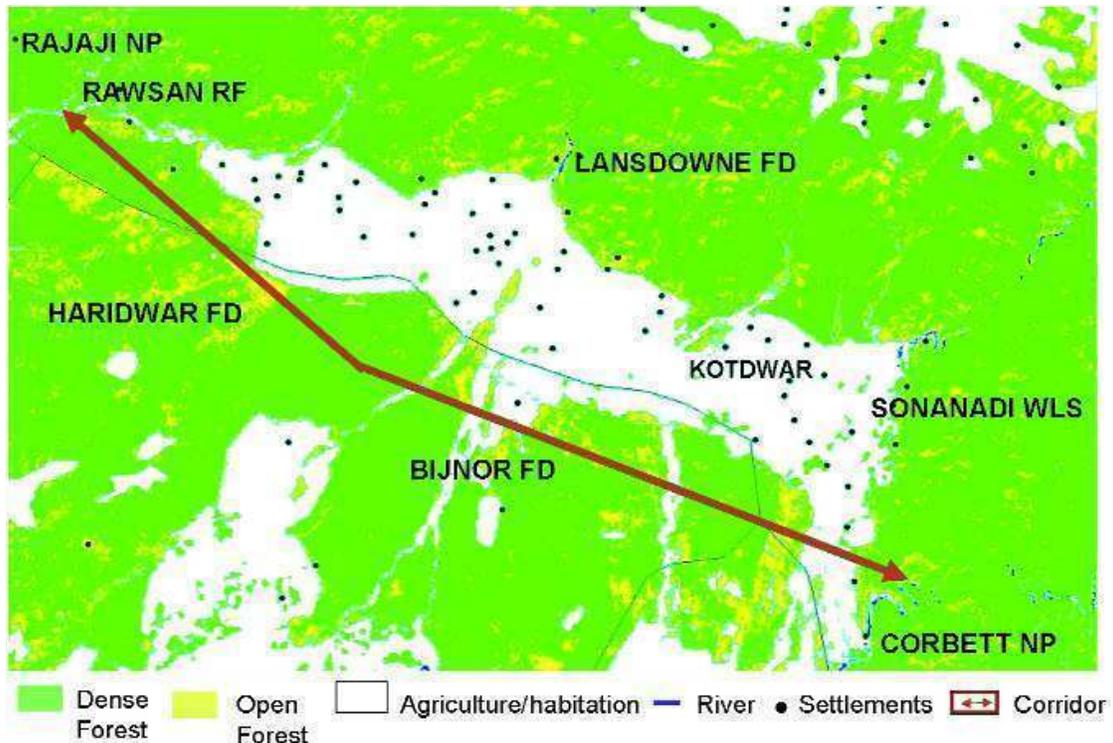
Forest Type/ Vegetation: Tropical dry deciduous forest

Nearest PA: Rajaji National Park and Corbett Tiger Reserve

Legal status of corridor: Reserve Forest

Major land-use: Forest and Settlements

Major habitation/settlements in corridor: 20-25 Gujjar families and 15 Gothia families.



Corridor dependent villages: Sitawali, Gulalwali, Maduwala, Sahanpur, Chaturwala, Motadhak, Rajpur kot, Chaurkhata, Haldukhata, Sankarpur, Ramjiwala etc.

Human artefacts on the corridor: Najibabad-Kotdwar Road, Kotdwar-Laldhang Road, Kotdwar-Kalagarh Road and Najibabad-Kotdwar Railway line

Frequency of usage of the corridor: Regular: both bulls and groups

Threats to the corridor:

1. Settlements at the periphery of the corridor and the related biotic pressure
2. 'Gujjar' settlements
3. Heavy traffic on road and railway track.
4. Proposed conversion of Kotdwar-Laldhang and Kotdwar-Kalagarh Road into highways.

Conservation Plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Seek alternative for gujjar and gothia families from corridor area.
3. Regulation of traffic on Najibabad-Kotdwar road, Kotdwar-Laldhang Road and Kotdwar-Kalagarh Road. Kotdwar-Laldhang and Kotdwar-Kalagarh Road should not be converted into highways.
4. Protection of the corridor forest to check illegal extraction of timber.



6. SOUTH PATLIDUN - CHILKIYA



Alternate Name: Kosi River (Mohan-Kumaria)

State : Uttaranchal
Ecological priority : High
Conservation feasibility : Medium

This is the first of three corridors that connect Corbett Tiger Reserve with Ramnagar Forest Division and elephants frequently use all three. Elephant movement takes place most often during the season when wheat and paddy are planted. A factory of the Indian Medical Pharmaceutical Co. Ltd. (IMPCL) is a major hurdle to elephant movement

Forest Division : Corbett National Park and Ramnagar Forest Division

Connectivity : Corbett Tiger Reserve with Ramnagar Forest Division.

Geographical Coordinates:

Latitude : 29°32'33"–29°33'27" N
Longitude : 79°06'45"–79°09'59" E

Length: 3 km

Width: 5 km

Forest type/Vegetation: Tropical dry deciduous sal forest and plantation

Nearest PA: Corbett Tiger Reserve

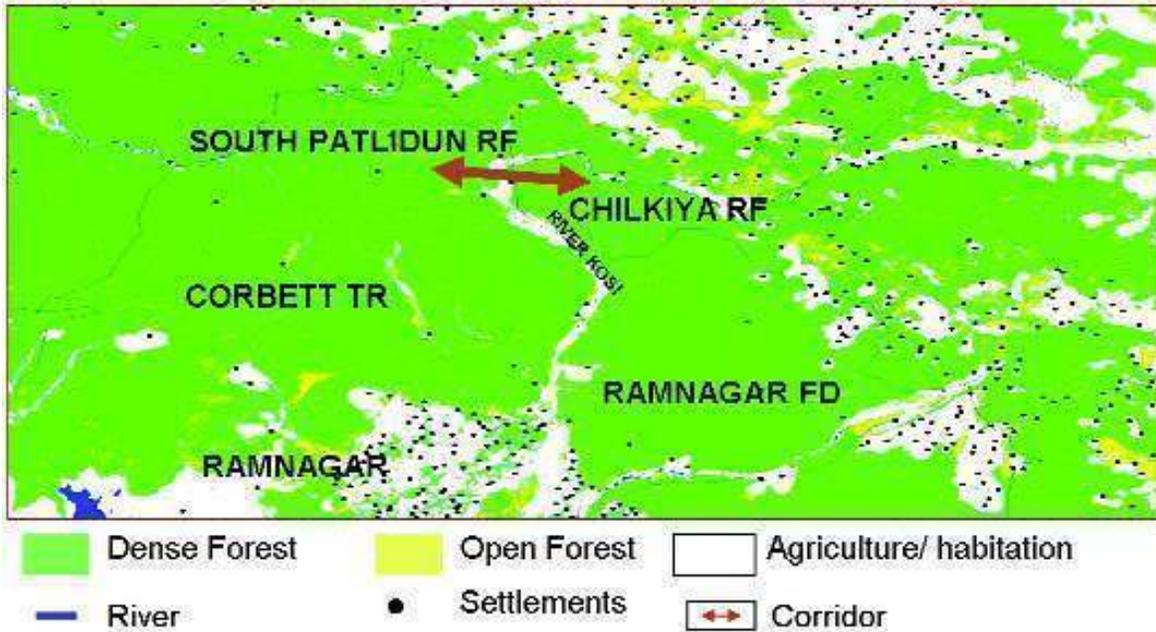
Legal status of the corridor: National Park and Reserve Forest

Major land-use: Forest and settlement

Major habitation/settlements in corridor: Kumkhet

Corridor dependent villages: Kumaria (18 families), Kumkhet (80 families), Chokam (80-85 families) and Mohan (25 families)

Human artefacts on the corridor: Ramnagar-Ranikhet road



Frequency of usage of the corridor by elephants: Regular; mainly used by bulls or small herds

Threats to the corridor:

1. Indian Medical Pharmaceutical Company and Garjia chemical factories
2. Traffic on the Ramnagar-Ranikhet road
3. Extraction of fire wood

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of road traffic at night
3. Relocation of the IMPCL factory and chemical factory at Garjia



7. CHILKIYA - KOTA



Alternate Name: Kosi River (Dhangari-Sunderkhal)

State : Uttarakhand
Ecological Priority : Medium
Conservation Feasibility : High

This is the second corridor that connects the Corbett Tiger Reserve and Ramnagar Forest Division. Elephants cross the road at Dhangari gate of Corbett Tiger Reserve and also through Sunderkhal village. This village stretches over four kilometres along the main road on forestland. Solitary bulls mostly use the corridor.

Forest Division : Corbett Tiger Reserve and Ramnagar Forest Division

Connectivity : Corbett Tiger Reserve with Ramnagar Forest Division

Geographical Coordinates:

Latitude : 29°31'55"–29°30'49" N
Longitude : 79°06'38"–79°07'19" E

Length: 0.7 km **Width:** 1.5 km

Forest type/Vegetation: Tropical dry deciduous sal forest

Nearest PA: Corbett Tiger Reserve

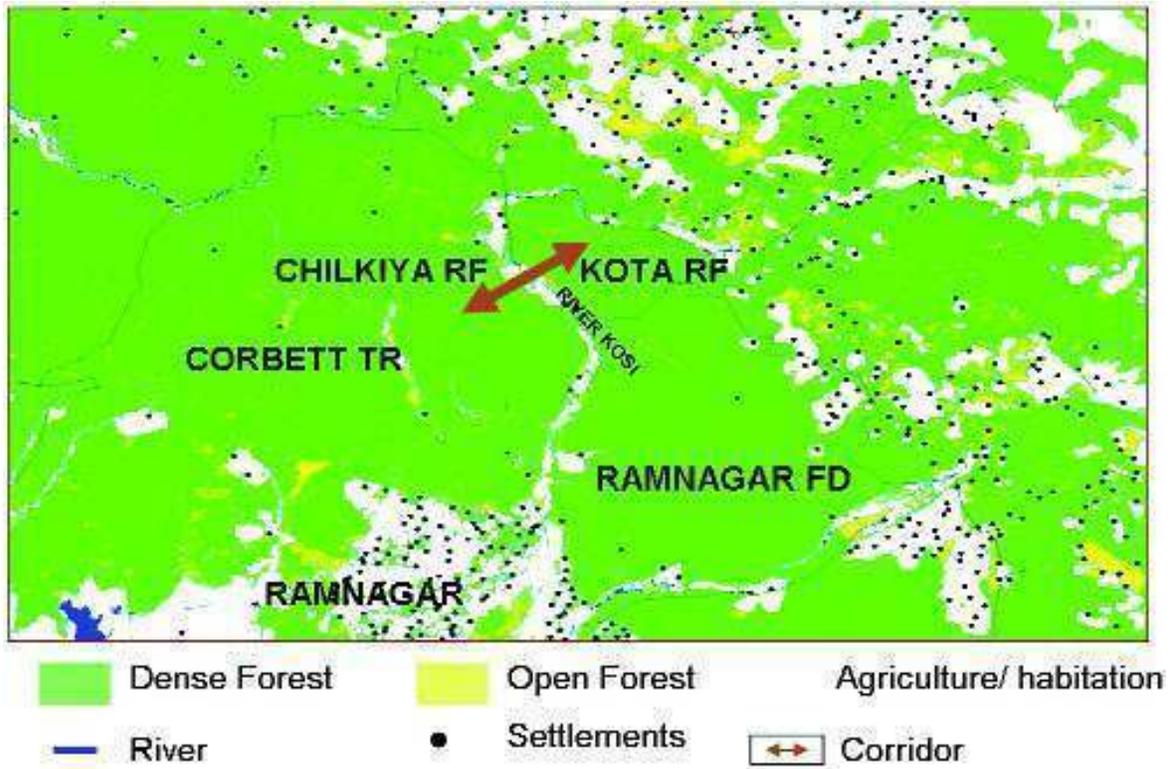
Legal status of the corridor: Reserve Forest and National Park

Major land-use: Forest and settlements

Major habitation/settlements in corridor: Sunderkhal with a total of about 300 families and a population of 1500

Corridor dependent villages: Sunderkhal and Garjia

Human artefacts on the corridor: Ramnagar- Ranikhet road



Frequency of usage of the corridor by elephants: Occasional; mostly used by bulls or herds of two to three elephants

Threats to the corridor:

1. Encroachment
2. Grazing
3. Firewood collection

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Improvement of forest cover in corridor
3. Seek alternatives for Sunderkhal village



8. MALANI - KOTA



Alternate Name: Kosi River (Ringora-Bijrani)

State : Uttarakhand
Ecological Priority : High
Conservation Feasibility : Medium

This is the third corridor that connects Corbett Tiger Reserve with Ramnagar Forest Division. This corridor passes through the Ringora village and a private resort called Infinity Resorts. Elephants move between Ringora village and the Bijrani gate of the Corbett Tiger Reserve, mostly in close proximity of the village

Forest Division : Corbett Tiger Reserve and Ramnagar Forest Division

Connectivity : Corbett Tiger Reserve with Ramnagar Forest Division

Geographical Coordinates:

Latitude : 29°26'92"–29°24'69" N
Longitude : 79°07'50"–79°08'33" E

Length: 0.5 km **Width:** 6 km

Forest type/Vegetation: Tropical dry deciduous sal forest and plantation

Nearest PA: Corbett Tiger Reserve

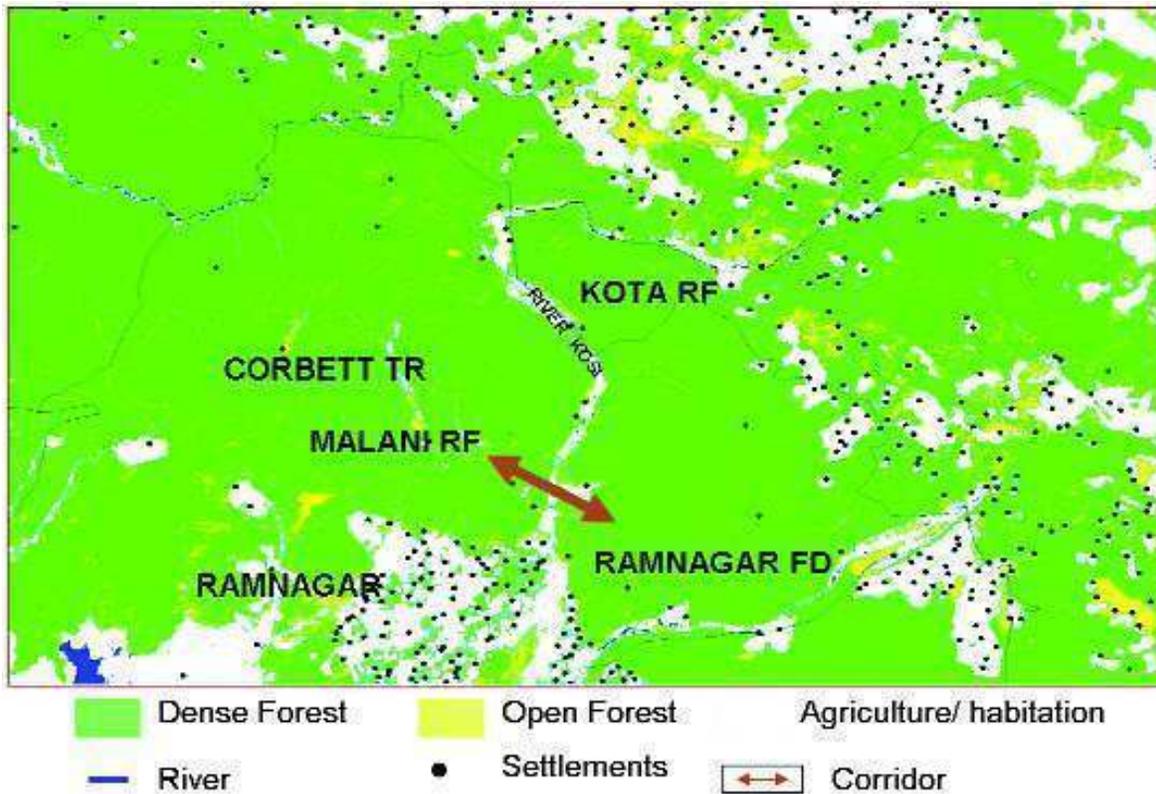
Legal status of the corridor: Reserve Forest

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Ringora (33 families) and Amdanda forest villages

Corridor dependent Villages: Ringora and Amdanda

Human artefacts on the corridor: Bijrani Forest Depot and road (Ramnagar-Ranikhet)



Frequency of usage of the corridor by elephants: Regular, used by herds of 20–30 elephants.

Threats to the corridor:

1. Increasing number of resorts in the vicinity
2. Settlements in the corridor area
3. Grazing

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Seek alternatives for Ringora and Amdanda villages



9. FATHEHPUR - GADGADIA



Alternate Name: Nihal - Bhakhra

State : Uttaranchal
Ecological Priority : Medium
Conservation Feasibility : High

This corridor connects the Fatehpur Reserve Forest of Ramnagar Forest Division with the Gadgadua Protected Forest of Terai Central Forest Division and is surrounded by seven or eight villages that exert heavy biotic pressure on the corridor forests.

Forest Division : Ramnagar and Terai Central

Connectivity : Ramnagar Forest Division with Terai Central Forest Division

Geographical Coordinates:

Latitude : 29°14'15"–29°14'38" N
Longitude : 79°22'59"–79°24'55" E

Length: 0.5 km **Width:** 4 km

Forest type/Vegetation: Plantation

Nearest PA: Corbett Tiger Reserve

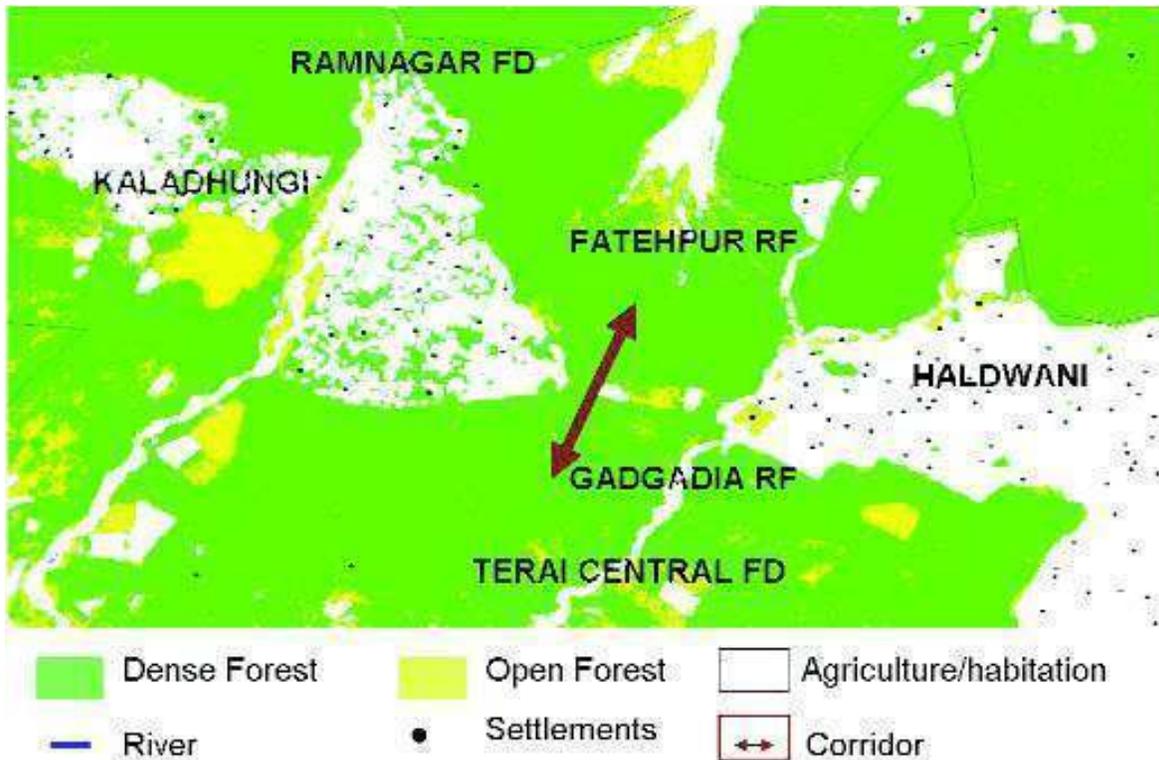
Legal status of the corridor: Reserve Forest

Major land-use: Plantation

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Bidrampur (100 families), Rampur, Kharagpur (20 families), Lachampur (22–25 families), Sakatpur, Serpur and Pratappur (100 families) with a total human population of about 3500–4000

Human artefacts on the corridor: Haldwani-Ramnagar road



Frequency of usage of the corridor by elephants: Occasional; used by solitary bulls or herds of three to four elephants

Threats to the corridor:

1. Grazing
2. Extraction of firewood
3. Large scale farming on leased land

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Termination of leasing of forest land for agriculture
3. Improvement of corridor forest cover by eco-development activities in the adjacent villages



10. GOLA RANKHU AND GORAI-TANDA

Alternate Names: Gola River, Lalkuan

State : Uttaranchal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor provides connectivity between the Gola Rankhu and Gorai Reserve Forest of Terai East and the Tanda Protected Forest of Terai Central Forest Division. Several developmental activities in the past, especially in the area between Haldwani and Lal Kuan towns, have broken the connectivity between these forests. Settlements, forest depots, stone mining and heavy traffic on the Lal Kuan - Haldwani Road have resulted in the reduction of use of this corridor by elephants.

Forest Division : Terai East and Terai Central

Connectivity : Terai East with Terai Central Forest Division

Geographical Coordinates:

Latitude : 29°05'10"–29°05'37" N
Longitude : 79°31'02"–79°31'04" E

Length: 5 km

Width: 2.5 km

Forest type/Vegetation: Plantation

Nearest PA: Corbett Tiger Reserve

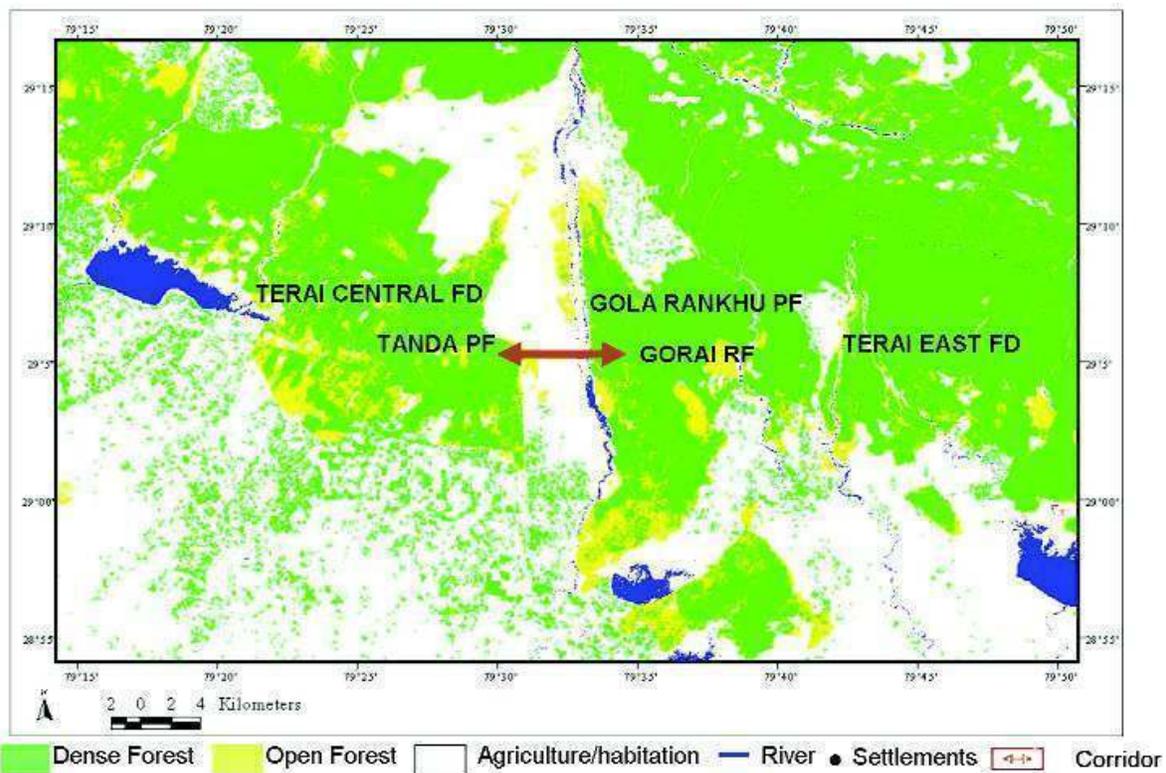
Legal status of the corridor: Reserve Forest

Major land-use: Forest and settlements

Major habitation/settlements in corridor: Lalkuan, Bikashpuri No.1 and 2, Hatagram, Dolia No.1 and 2, Debampur and Tanda with a total population of about 3000–4000 people.

Corridor dependent villages: Lalkuan, Bikashpuri No.1 and 2, Hatagram, Dolia No. 1 and 2, Debampur and Tanda

Human artefacts on the corridor: Lalkuan timber depot (No. 4 and 5), stone crushing unit, Lalkuan- Haldwani road



Frequency of usage of the corridor by elephants: Rare

Threats to the corridor:

1. Expansion of Haldwani township and setting up of Lal Kuan industrial complex
2. Grazing
3. Heavy traffic on Haldwani-Lal Kuan road
4. Boulder mining in the Gola River area

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of night traffic on Lalkuan- Haldwani road
3. Restriction of the stone crushing operations in the corridor area
4. Declaration of the corridor area as ecologically sensitive and the stoppage of boulder mining and sand removal from Gola River, at least for a length of two kilometres from the corridor area
5. Improvement of forest cover in corridor and on either side



11. KILPURA - KHATIMA - SURAI



State : Uttaranchal
Ecological Priority : Medium
Conservation Feasibility : Low

The corridor connects the Kilpura, Khatima and Surai ranges of the Terai East Forest Division. The forests of Khatima Range are a vital link in the chain of connectivity between Haldwani FD, Pilibhit FD and the forests of Nepal. The habitat of the Khatima Range has been fragmented by encroachment and infrastructural development.

Forest Division : Terai East

Connectivity : Kilpura and Surai range of Terai East Forest Division thereby maintaining habitat connectivity between Haldwani Forest Division, Pilibhit Forest Division and the forests of Nepal.

Geographical Coordinates:

Latitude : 28°56'30.5"–28°58'1.6" N
Longitude : 80°03'24.4"–80°01'0.9"E

Length: 7 km

Width: 3–4 km

Forest Type/ Vegetation: Tropical dry deciduous sal forest

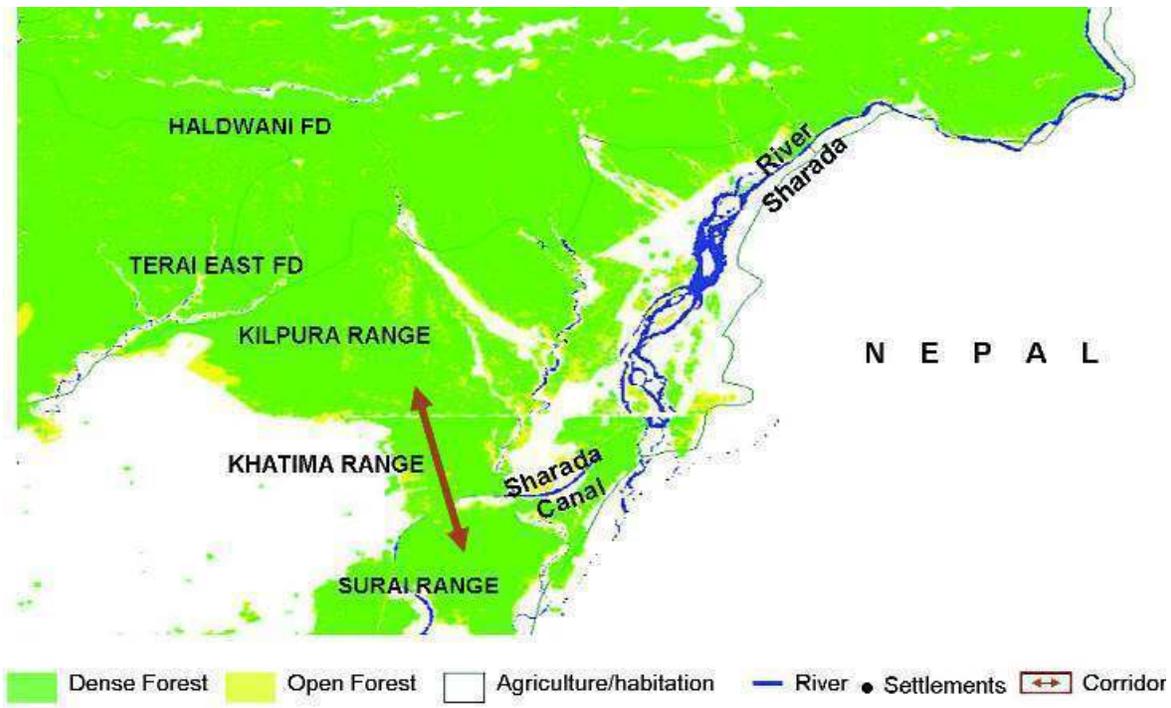
Nearest PA: Nil

Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest, Agriculture and settlement (encroachment)

Major habitation/settlements in corridor: Pachoria, Ghosi Kuan, Amanwa, Burahi, Banbasa, Devipura, Majgain, Panthagoth, Jhamnabari, Rajana, Jungla, and Berigot. Corridor dependent villages: Pachoria, Ghosi Kuan, Amanwa, Burahi, Banbasa, Devipura Majgain, Panthagoth, Jhamnabari, Rajana, Jungla, and Berigot (900–950 families)

Human artefacts on the corridor: Sharda main canal (irrigation) and Tanakpur-Khatima highway



Frequency of usage of the corridor by elephants: Occasional

Threats to the corridor:

1. Encroachment by 800 families in Khatima Range.
2. Five settlements at Panthagoth, Jhamnabari, Rajana, Jungla, and Berigot (Total 50 households).
3. Sharda main canal (irrigation)
4. Tanakpur- Khatima highway.

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Encroachments in the Khatima Range (Pachoria, Ghosi Kuan, Amanwa, Burahi, Banbasa and Devipura Majgain) should be removed
3. Wood cutters should not be allowed to use the Lal Kothi bridge
4. The Nepal Government should undertake eco-development activity for the villagers on the banks of Jhagora River on the Nepal side



12. LAGGA BAGGA - KISHANPUR



State : Uttar Pradesh
Ecological Priority : Medium
Conservation Feasibility : Medium

Elephants move from the Royal Sukhlaphanta NP in Nepal through Lagga Bagga, Gunhan, Tatarganj, Chandpura, Bailha, Faizulganj, Navedia, Dhakka and Maharajganj beat of Bhira Range to Kishanpur Wildlife Sanctuary. In spite of tremendous biotic pressure on the corridor forests between Hazara, Navediya, Haripur and Maharajganj due to a large number of settlements, the corridor still provides passage to elephants.

Forest Division : Pilibhit Forest Division, Kishanpur Wildlife Sanctuary and South Kheri Forest Division

Connectivity : The Nepal population through the South Pilibhit Forest Division to the Kishanpur Wildlife Sanctuary

Geographical Coordinates:

Latitude : 28°27'42" N
Longitude : 80°21'08" E

Length: 25–30 km

Width: 2 km

Forest type/Vegetation: Tropical deciduous sal forest, plantation and grassland

Nearest PA: Kishanpur Wildlife Sanctuary and Royal Sukhlaphanta National Park (Nepal)

Legal status of the corridor: Reserve forest and Revenue land

Major land-use: Forest and agriculture

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Numerous

Human artefacts on the corridor: Sarda canal



Frequency of usage of the corridor by elephants: Occasional and seasonal; used by herds of 10–15 elephants.

Threats to the corridor:

1. Grazing
2. Illegal collection of firewood
3. Encroachment

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Removing encroachments in Lagga Bagga and Belha in Pilibhit
3. Eco-development in adjacent villages to improve forest cover and to reduce dependency of villagers on forest





CHAPTER-5



Elephant Corridors of Central India

Sandeep Kumar Tiwari,¹ A.K. Singh,² R.K. Singh³ and D. Swain⁴

The elephant habitats of central India are spread over an area of 17,000 km² in the states of Jharkhand, Orissa and a part of southern West Bengal. The 2500 odd elephants in the range occupy the most fragmented elephant habitat of the country that has been degraded and fragmented due to mining, shifting cultivation and developmental activities.

Jharkhand has two distinct elephant populations, viz. Palamau and Singhbhum and about 700 elephants. The Palamau population occupies about 1200 km² of the Betla National Park, Palamau Tiger Reserve and adjoining areas. The Singhbhum population occupies about 2570 km² of the available forest area of Dalma Wildlife Sanctuary and the forests of Saranda, Porhat, Kolhan, Saraikala (formerly North Chaibasa) and Dhalbhum Forest Divisions. Mining has been one of the most serious threats to the elephant habitats of this region. Singhbhum is well known for its large reserves of haematite iron ore that constitutes 25% of the total known reserves in India. In Saranda Forest Division alone, there are 12 operational mines with a combined lease area of 81 km² of which 17 km² area has been opened up (Singh and Choudhury, 1999).

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Mining activities in Manoharpur mines and the transport of ores have severely affected the overall habitat and threatened the movement of elephants in these areas. Similarly, the elephant movement between Dalma Wildlife Sanctuary and Saraikala Forest Division has been threatened by the heavy traffic on National Highway-33, the construction of Subarnarekha canal and the Tatanagar-Chandil railway along with various stone crushing units that have come up along the highway. Habitat degradation has also threatened the elephant movement between Dalma Wildlife Sanctuary and Matha Range of Purulia Forest Division (West Bengal). The elephant habitats of Mosabani Range of Dhalbhum Forest division have also been severely affected by increased agricultural activities. However, movement of elephants between Mosabani and Chakulia Range still continues through degraded forestland and agricultural fields and extends to Gidhni Range of Jhargram (West Bengal). Elephants from Mosabani also move to the Sarali and Tungru Reserve Forest of Rairangpur Forest Division, Orissa. The degradation of elephant habitats in Jharkhand has also resulted in migration of elephants to the adjoining areas of Chattisgarh leading to human-elephant conflict. To strengthen the conservation of the Singhbhum elephant habitats, which lack a Protected Area, the Project Elephant, Ministry of Environment and Forest has declared 4529 km² of the elephant habitat as Elephant Reserve-I.

The elephant habitats in Orissa consist of about 11000 km² forests that forms about 24% of the forest cover of the state. The River Mahanadi divides the elephant habitat into two parts. While the elephant habitats north of the river Mahanadi is threatened by severe mining activities, the southern part (about 5030 km²) suffers from shifting cultivation. The elephant habitats of Orissa can broadly be divided into those occupied by four major populations:

Similipal-Kuldiha-Hadgarh and the adjoining population comprises of three Protected Areas, viz. Similipal Tiger Reserve, Hadagarh Wildlife Sanctuary and Kuldiha Wildlife Sanctuary and is in continuity with Noto Reserve Forest, Sukinda Reserve Forest and Badampahar Reserve Forest and supports about 500 elephants. Initially Kuldiha Wildlife Sanctuary, Hadagarh Wildlife Sanctuary and Similipal National Park were part of a larger continuous stretch of forest area but now Kuldiha has been disconnected from Similipal. The elephant movement between Hadagarh and Kuldiha has been severely hindered by chromite mining at Baula Reserve Forest, expansion of settlements and agricultural land, resulting in increased human-elephant conflict. Similarly, elephant movements from Similipal (Orissa) to Jharkhand takes place either via South Chaibasa (Jharkhand) through degraded forests patches of Badampahar Reserve Forest, Budhipat and Basila Reserve Forest or via Mosabani Range (Jharkhand) through even more degraded forest patches of Badampahar, Dhasra, Tungru and Sarali Reserve Forest. Movement between north Similipal and Tapoban (Jhargram, West Bengal) area has also been severely threatened by mining and agricultural activities. The Mayurbhanj Elephant Reserve has been constituted to strengthen the conservation of elephants

in this area.

Satkosia-Baisipalli and the adjacent population of Athamalik and Angul Forest Division is situated in the central part of Orissa and includes two Protected Areas, Satkosia Gorge Wildlife Sanctuary and Baisipalli Wildlife Sanctuary forming part of the Mahanadi State Elephant Reserve (1023 km²). Satkosia-Baisipalli forms a continuous habitat with the River Mahanadi bifurcating them. Sar and Lahiri-Choudhury (2002) has identified five major crossing points used by elephants to cross the Mahanadi. The construction of the Manjhor dam has obstructed the movement of elephants between Taleipathar Reserve Forest and Baruni East and Baruni West Reserve Forest, an important link between Satkosia and Khalasuni. The dam, on completion, will submerge 443 ha. of prime elephant habitat and about eight villages. The construction of the Talcher-Sambalapur railway line, irrigational canals, mining and illegal felling of trees have lead to the fragmentation of elephant habitat in this area and increase of human-elephant conflict.

The South Keonjhar plateau and adjacent areas includes the Deogan, Ghatgaon and Telkoi Ranges of Keonjhar Forest Division and Kamakhyanager East and West Ranges of Dhenkanal Forest division spread over 2600 km² area. Considerable deterioration of elephant habitat has occurred in the Dhenkanal Forest Division due to the construction of Rengali irrigation canal at Samal and other medium sized irrigation canals. This, coupled with encroachment, has lead to fragmentation of the habitat. The elephants, however, still move between Kahnejena Reserve Forest and Anantapur Reserve Forest across the Brahmani River and cross the Rengali canal near Joka village and at a few other points.

Habitat degradation and encroachment in and around Saptasajya Reserve Forest in Dhenkanal Forest Division has severely hindered the elephant movement between north-east Dhenkanal and south-west Dhenkanal. This, along with heavy mining in the neighboring Sukhinda Range of Atagarh Forest Division, has severed the elephant connectivity between Angul and Similipal.

In the Keonjhar Forest Division, 45,146 ha. land has been leased out for mining, although not all of it is being mined presently (Sar and Lahiri Choudhury, 2002). Mining, irrigation canals, encroachment and monoculture plantations have lead to a shrinkage and degradation of elephant habitat and increased conflict.

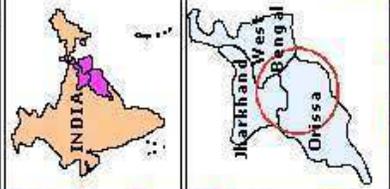
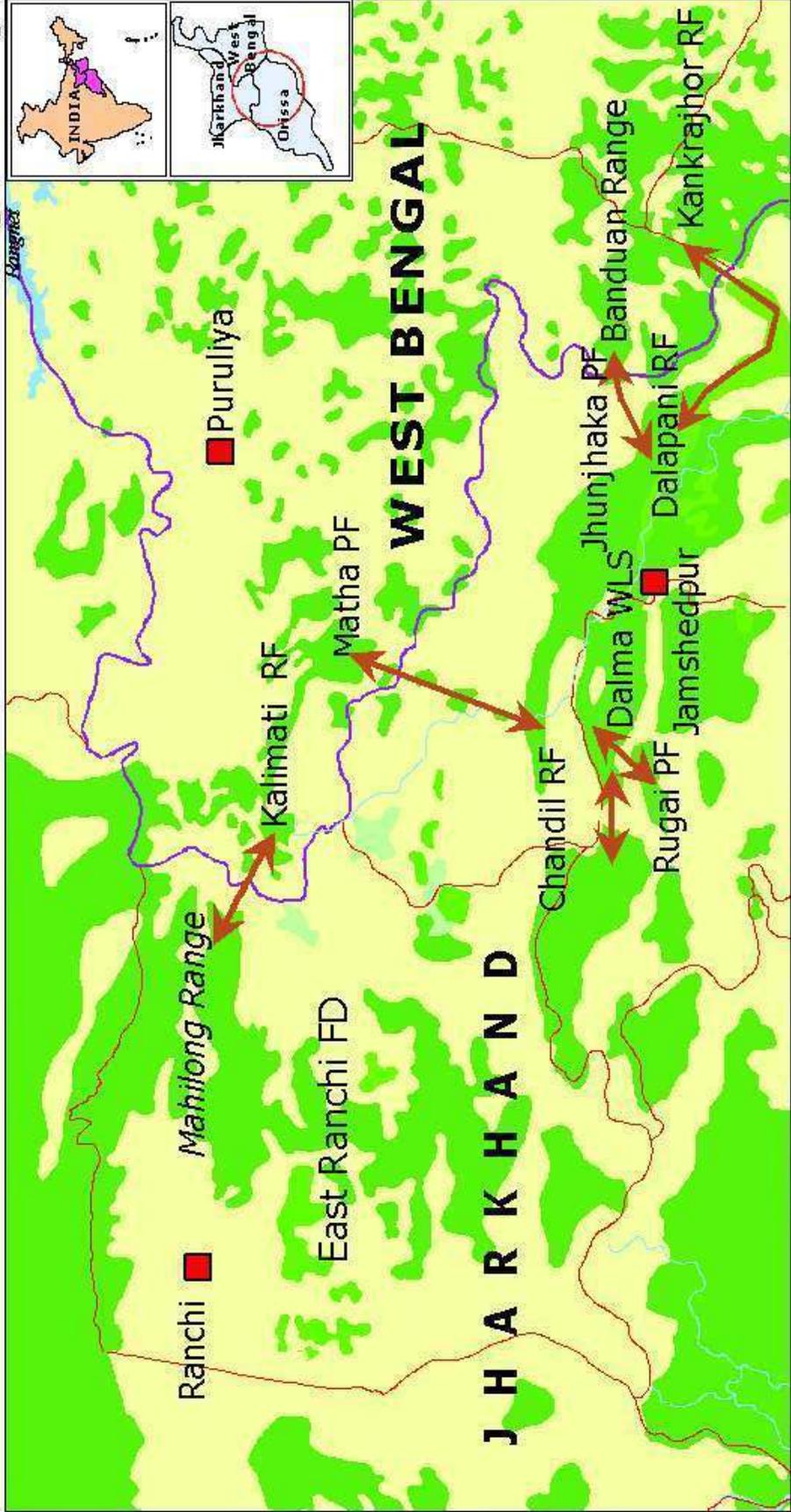
Madanpur-Rampur-Kotgarh and Chandrapur population is to the south of the river Mahanadi and covers the districts of Phulbani, Kalahandi and Ganjam. A major part of this area is under shifting cultivation and Kotgarh is the only protected area in this area. Elephant movement between Kotgarh Wildlife Sanctuary and Kalahandi used to occur in the past but has now been discontinued due to shifting cultivation and encroachment. Elephant movement between Kotgarh Wildlife Sanctuary and Chandrapur Reserve Forest takes place through degraded forest patches. The

population of Lakhari valley Wildlife Sanctuary and Mahendragiri have been isolated from other elephant populations.

Elephant herds move from Dalma Wildlife Sanctuary of Jharkhand to Midnapore East and West Forest Divisions, Bankura North and South divisions, Rupnarayan Planning and Survey division, Panchet soil conservation Division, Puruliya and Kangsabati Soil Conservation Division II as well. The increased movement of about 35 elephants from Dalma results in severe human-elephant conflict in the area.



ELEPHANT CORRIDORS OF CENTRAL INDIA (PART I)

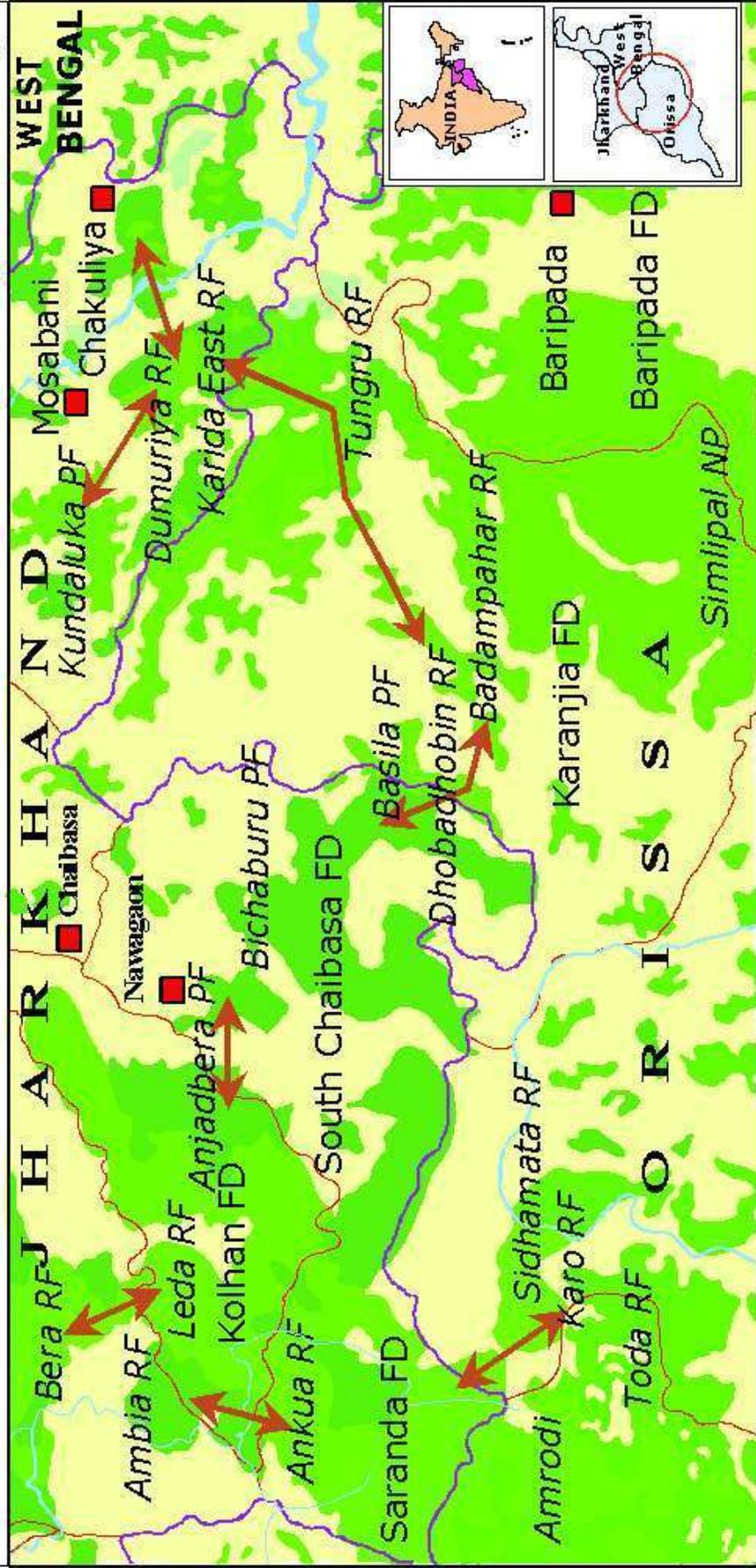


LEGEND

- Reserve Forest
- Protected Forest
- Scrub & grassland
- Arable land with settlements
- Water Bodies
- Unclassified Forest
- Elephant Corridor
- State boundary
- Division boundary



ELEPHANT CORRIDORS OF CENTRAL INDIA (Part II)

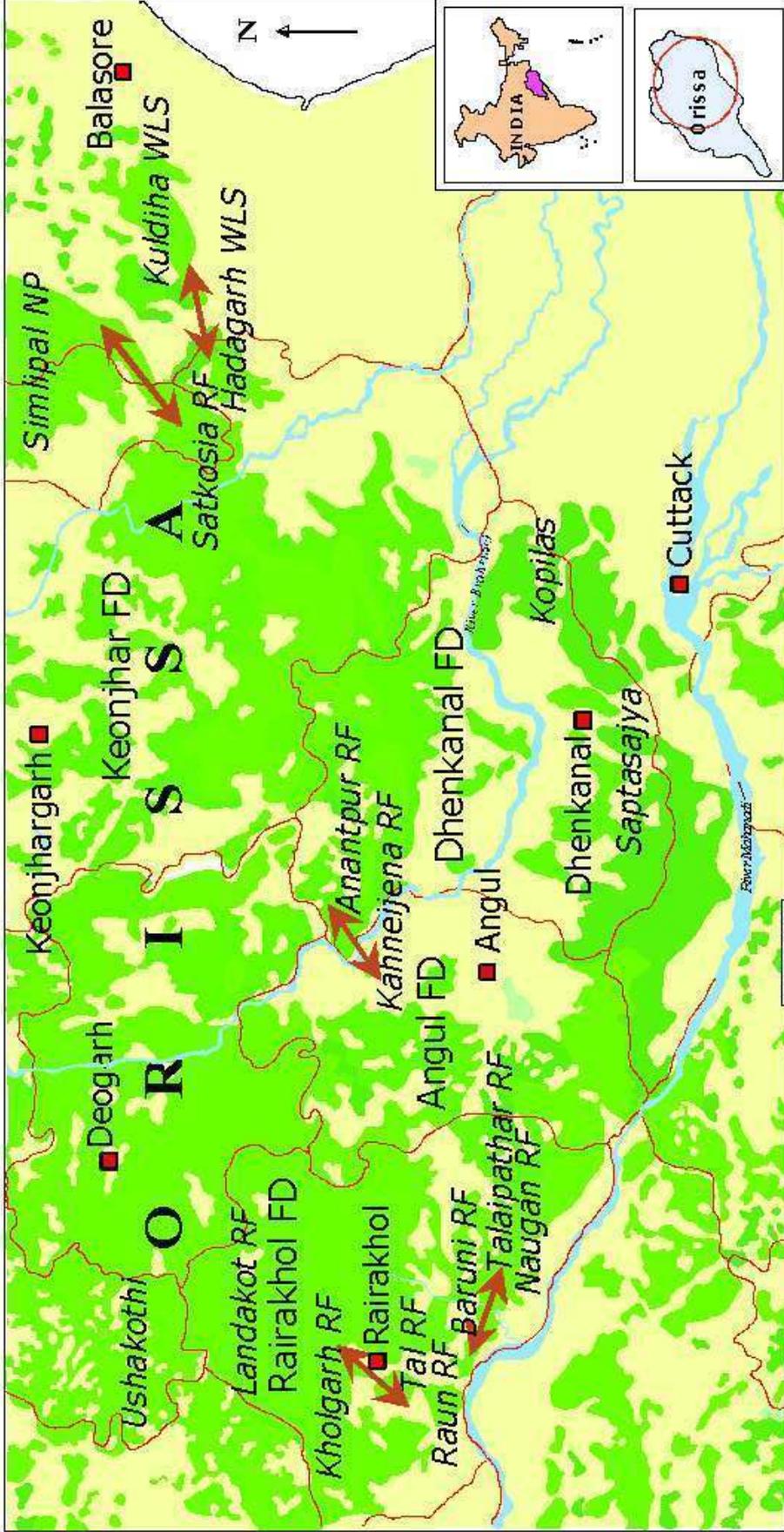


LEGEND

	Reserve Forest		Arable land with settlements		Elephant Corridor
	Protected Forest		Water bodies		State boundary
	Scrub & grassland		Unclassified Forest		Division boundary

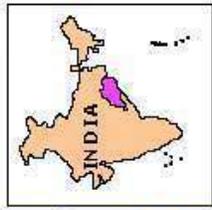


ELEPHANT CORRIDORS OF CENTRAL INDIA (Part III)

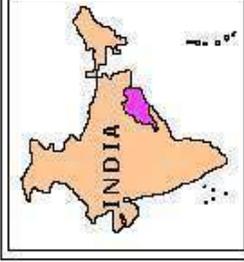
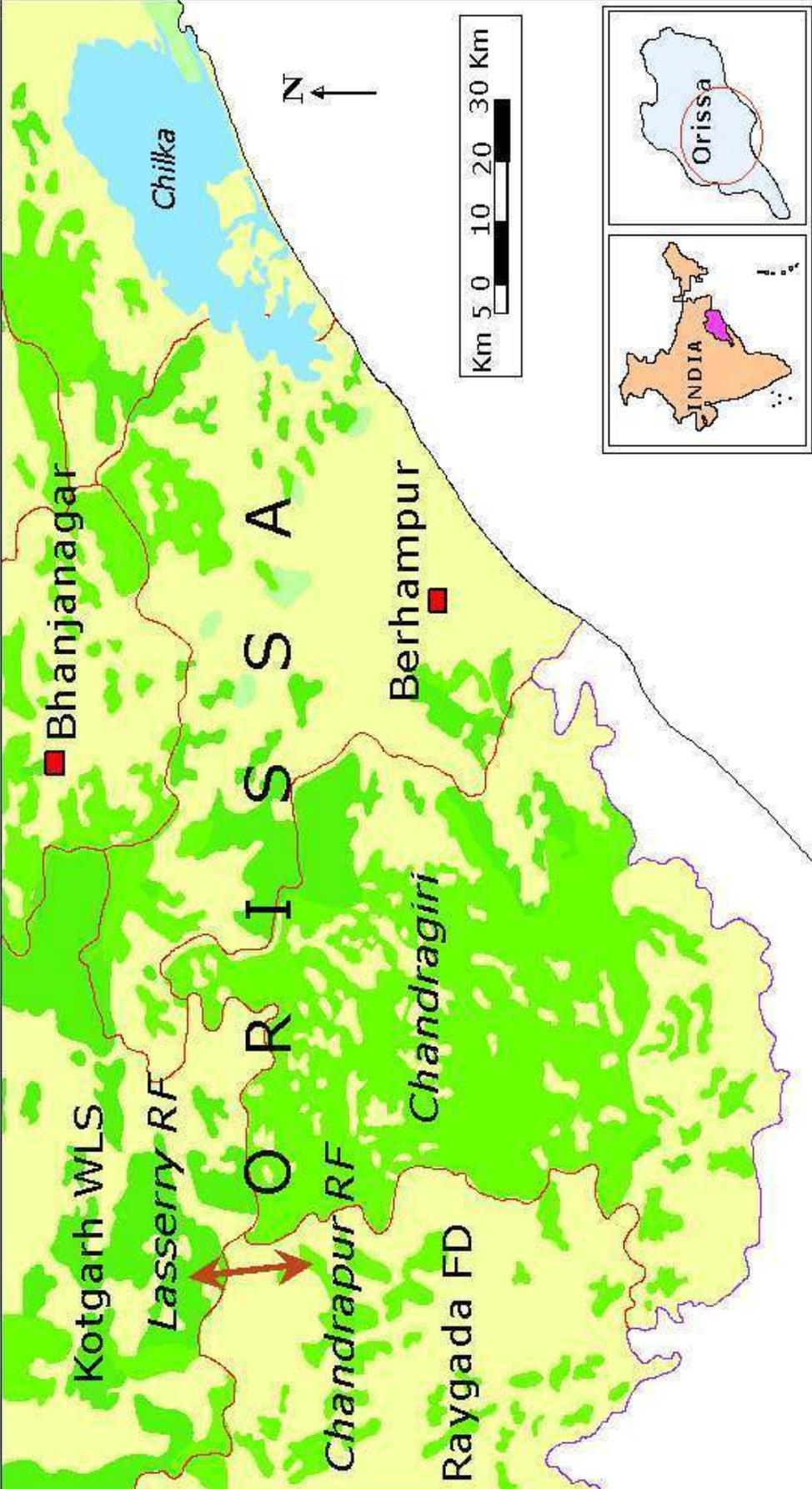


LEGEND

- Reserve Forest
- Protected Forest
- Scrub & grassland
- Arable land with settlements
- Water bodies
- Unclassified Forest
- Division boundary
- Important Towns
- Elephant Corridor

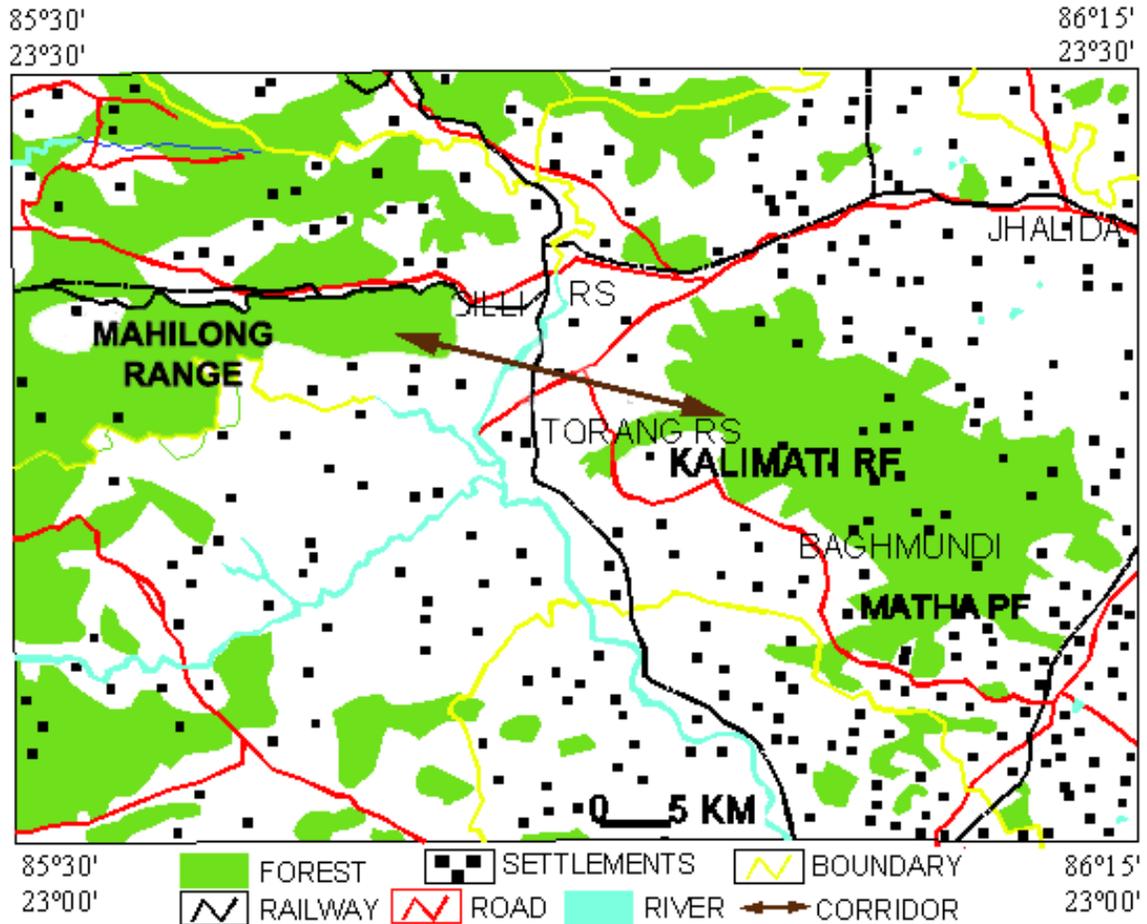


ELEPHANT CORRIDORS OF CENTRAL INDIA (Part IV)



LEGEND

- Reserve Forest
- Protected Forest
- Scrub & grassland
- Arable land with settlements
- Unclassified Forest
- Water bodies
- Important Towns
- Elephant Corridor
- State boundary
- Division boundary



Frequency of usage of the corridor by elephants: Regular and Seasonal; herds of 14–15 elephants use this during August–November and February–March and small herds of two to five elephants use it all year round

Threats to the corridor:

1. Settlements and agriculture
2. Railway line and heavy traffic on road
3. Degradation of adjoining forest
4. Hydroelectric power project of West Bengal at Bagmunda. This is in the general vicinity of the movement route and has an impact on the movement of elephants in the entire Ajodhya hill area

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of traffic on the Jhalda-Bagmundi road at night
3. Setting up of village level Forest Protection Committees to safeguard the forest area



2. CHANDIL - MATHA



Alternate name: Dalma - Matha

State : Jharkhand and West Bengal
Ecological priority : Low
Conservation feasibility : Low

This corridor connects the Chandil Reserve Forest of Saraikala Forest division (Jharkhand) with Matha Protected Forest of Purulia Forest division (West Bengal). In West Bengal, the corridor area is almost intact but in Jharkhand it is degraded and has agricultural land and settlements.

Forest Division : Purulia (West Bengal) and Saraikala (Jharkhand)

Connectivity : Chandil Range of Saraikala Forest Division with Matha Ranges and Balrampur range of Purulia Forest Division

Geographical coordinates:

Latitude 22°59'–23°07' N
Longitude 86°05'–86°06' E

Length: 10 km **Width:** 1–2 km

Forest type/Vegetation: Tropical deciduous sal forest and plantation

Nearest PA: Dalma Wildlife Sanctuary

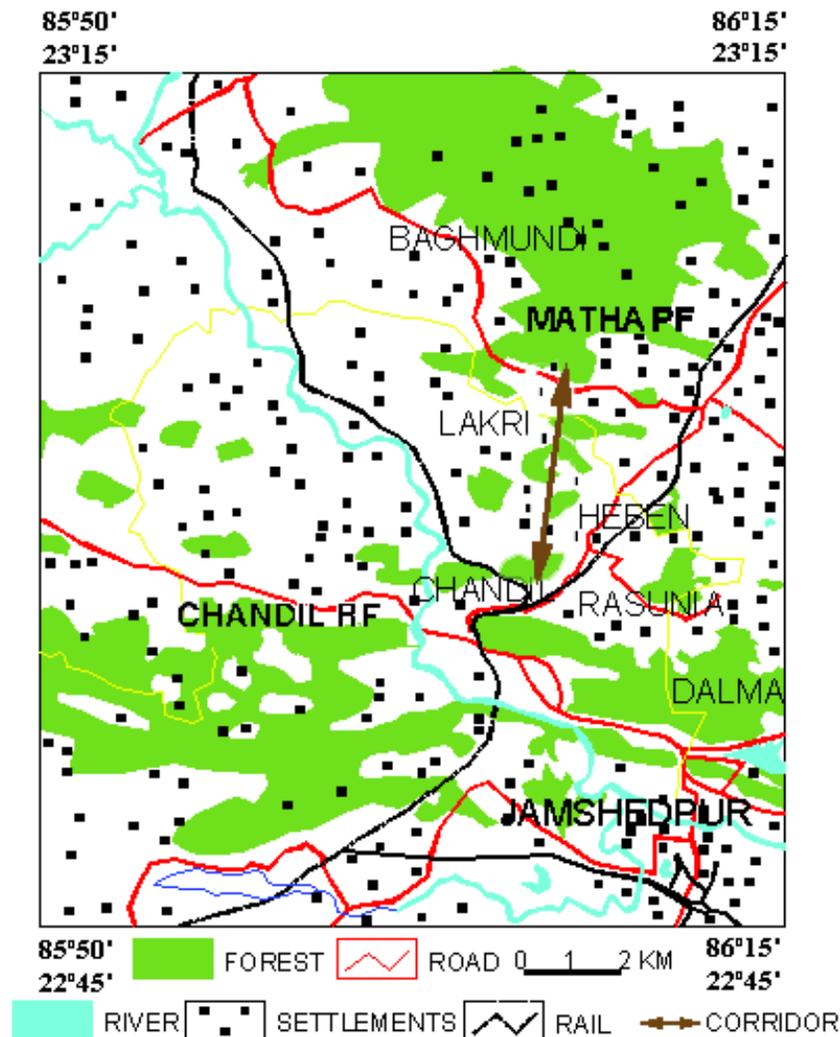
Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Matha, Patkamchaterma, Lakri, Heben, Andadungri and Gunda

Corridor dependent villages: Burudih, Heben, Barochaterma, Malti, Lakri, Andadungri, Ramnagar, Gunda, Patkamchaterma and Rasunia

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Occasional and seasonal; used by small herds of five to six elephants between October and February

Threats to the corridor:

1. Illicit felling and degradation of forest, especially in Jharkhand.
2. Expanding biotic pressure

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Improve and protect the forest cover of the corridor
3. Identify and seek alternatives for villages that are in the direct path of elephant movement
4. Eco-development activities in corridor villages to reduce dependency



3. DALMA - CHANDIL



State : Jharkhand
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor connects the forests of Dalma Wildlife Sanctuary with Chandil Reserve Forest of Saraikala Forest Division. Elephants from Dalma Wildlife Sanctuary move to Chandil Reserve Forest and cross National Highway-33 near Patta village. They cross the Tatanagar-Asansol railway line and the Subarnarekha canal (over the bridge) and pass through settlement and agricultural land to enter the Chandil Reserve Forest during the paddy season (Nov–Feb)

Forest Division : Ranchi Wildlife and Saraikala (formerly North Chaibasa)

Connectivity : Ranchi Wildlife Sanctuary with Chandil Reserve Forest of Saraikala Forest Division

Geographical coordinates:

Latitude 22°59'91" N
Longitude 86°03'63" E

Length: 5 km

Width: 1 km

Forest type/ Vegetation: Tropical dry deciduous sal

Nearest PA: Dalma Wildlife Sanctuary

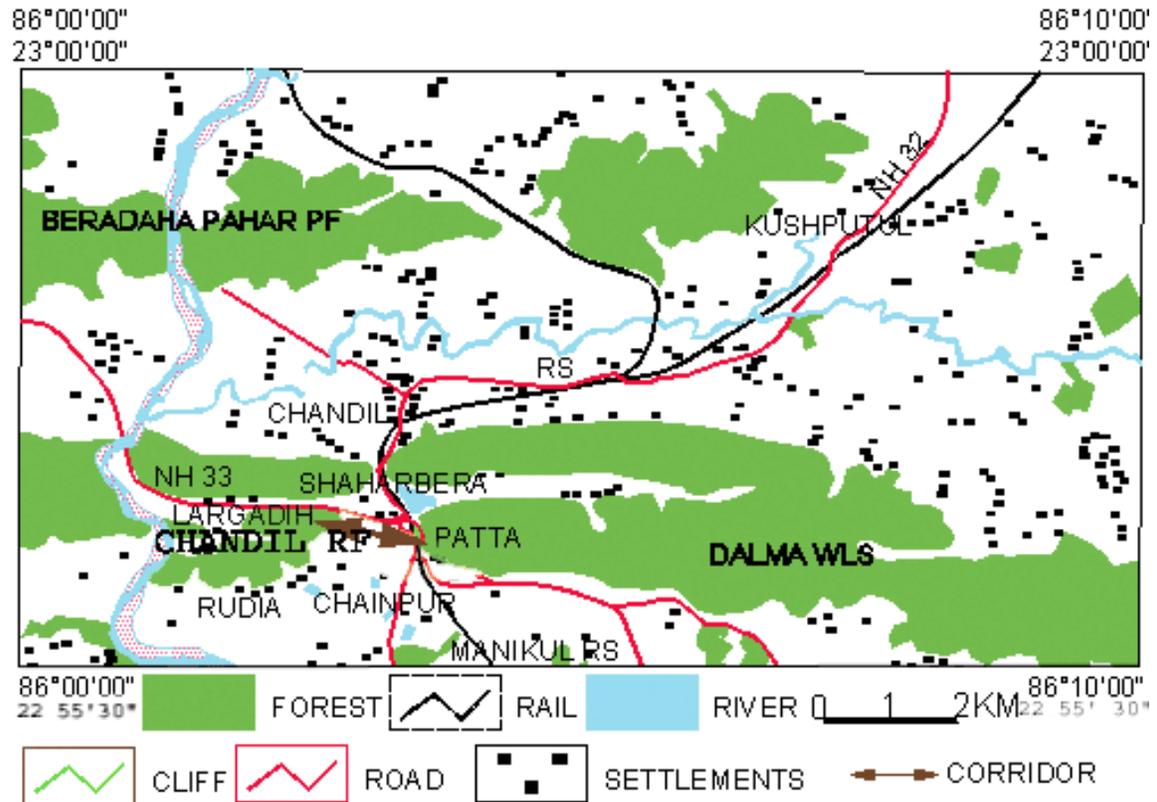
Legal status of the corridor: Reserve Forest, revenue and *patta* land

Major land-use: Forest, agriculture, settlement

Major habitation/settlements in corridor: Patta, Chainpur, Rudia, Nagadi and Balida villages

Corridor dependent villages: Patta, Chainpur, Rudia, Largadih, Shaharbera, Nagadi and Balida

Human artefacts on the corridor: Road (National Highway 33), railway line (Tatanagar-Chandil) and Subarnarekha canal



Frequency of usage of the corridor by elephants: Occasional and seasonal; used by herds of 10–12 elephants and bulls during November–February

Threats to the corridor:

1. Tatanagar-Chandil railway and Tatanagar-Patamda highway
2. Subarnarekha canal
3. Kurli Om Metal Scrap and Bihar Sponge Iron Ltd. Chandil factories
4. Few settlements in the corridor area

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of traffic along National Highway 33 especially during November–February.
3. Improvement of forest cover in the corridor
4. Seek alternatives for Patta village which is adjacent to Dalma Wildlife Sanctuary and in the corridor



4. DALMA - RUGAI



State : Jharkhand
Ecological Priority : Low
Conservation Feasibility : Medium

This corridor connects the forests of Dalma Wildlife Sanctuary with the Rugai Protected Forest (Jorai Pahar). Elephants cross National Highway 33 near Ramgarh village and then pass through agricultural land to enter Jorai Pahar

Forest Division : Ranchi Wildlife and Dhalbhum Forest divisions

Connectivity : Dalma Wildlife Sanctuary with Rugai Protected Forest

Geographical coordinates:

Latitude 22°52'92" N
Longitude 86°09'97" E

Length: 1.5 km

Width: 1 km

Forest type/ Vegetation: Tropical dry deciduous sal forest and agricultural land

Nearest PA: Dalma Wildlife Sanctuary

Legal status of the corridor: Reserve Forest and revenue land

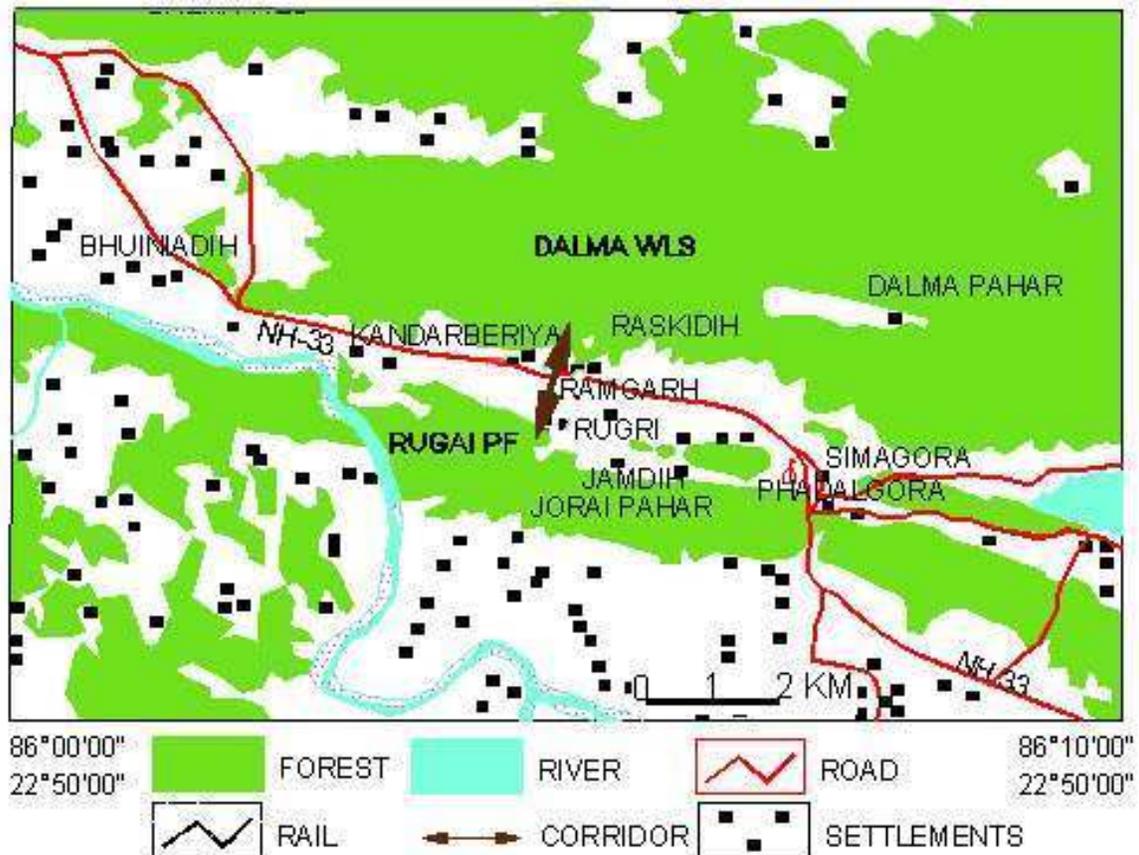
Major land-use: Forest, agriculture, settlement

Major habitation/settlements in corridor: Ramgarh village

Corridor dependent villages: Ramgarh, Asanbani, Jamdih, Rugri, Raskidih and Majhidih

Human artefacts on the corridor: National Highway-33 (Tatanagar-Chandil) and Subarnarekha canal

Frequency of usage of the corridor by elephants: Occasional and seasonal; used by small herds of seven to eight elephants during October–February



Threats to the corridor:

1. Degradation of the forest area
2. Heavy traffic on National Highway-33 (Tatanagar-Chandil)
3. Stone crusher units

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of traffic along National Highway-33 especially during October–February
3. Improvement of forest cover in the corridor
4. Acquisition of agricultural land around Rugri village
5. Removal of stone crushing units



5. JHUNJHAKA- BANDUAN



Alternate name: Dalma - Banduan

State : Jharkhand and West Bengal
Ecological Priority : Medium
Conservation Feasibility : Low

Elephants move from Pagda and Chimti forest blocks of Dalma Wildlife Sanctuary to the Banduan Reserve forest of West Bengal along this corridor. This corridor consists of patches of forest and agricultural land.

Forest Division : Ranchi Wildlife (Jharkhand) and Kangsawati Soil Conservation Division-II (Purulia)

Connectivity : Dalma Wildlife Sanctuary (Chimti and Pagda forest) with Banduan Range of Kangsawati Soil Conservation Division-II

Geographical coordinates:

Latitude 22°50'–22°51' N
Longitude 86°25'–86°27' E

Length: 6–7 km

Width: 2 km

Forest type/ Vegetation: Tropical deciduous sal forest

Nearest PA: Dalma Wildlife Sanctuary

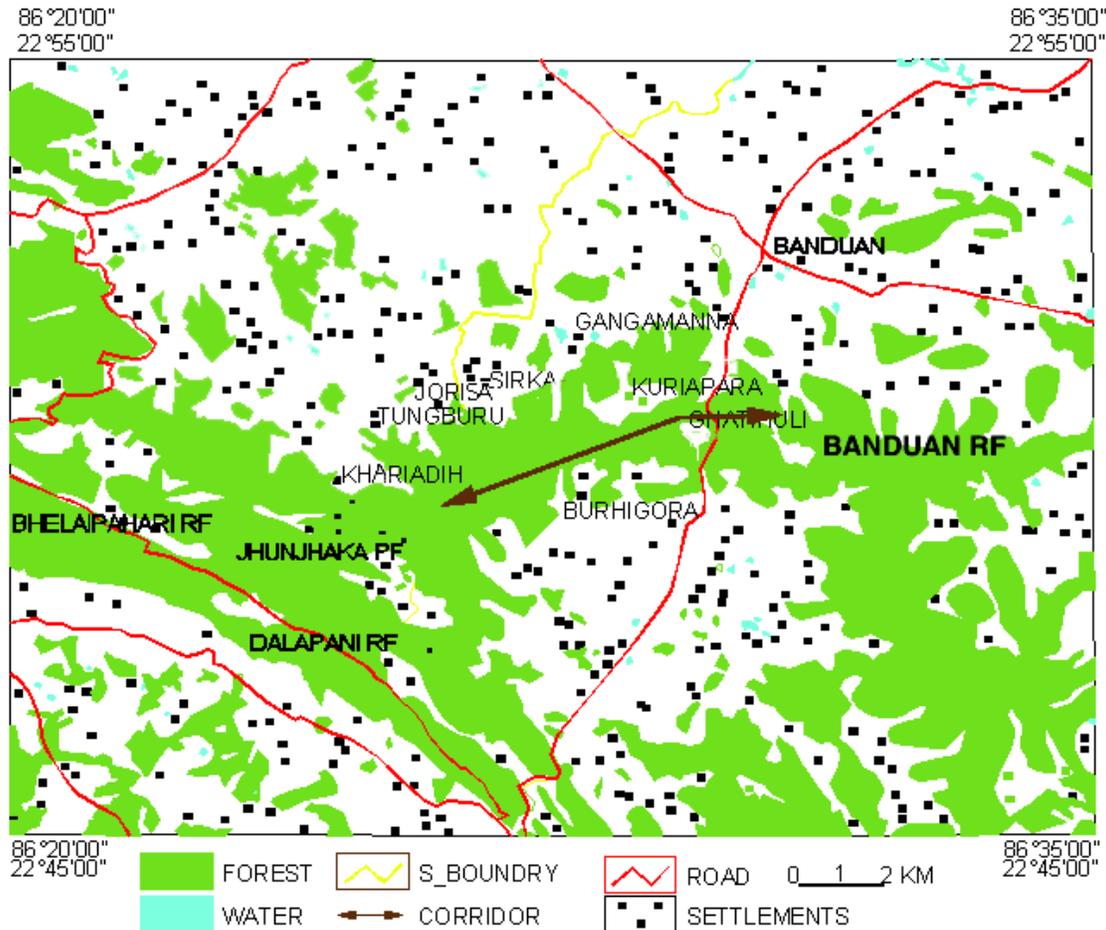
Legal status of the corridor: Reserve forest and revenue land

Major land-use: Forest, agriculture and settlement

Major habitation/settlements in corridor: Jorisa and Sirka

Corridor dependent villages: Jorisa, Sirka, Burighora, Kuriapara and Tungburu

Human artefacts on the corridor: Road



Frequency of usage of the corridor by elephants: Bulls regularly use this corridor and small herds of seven to nine elephants move seasonally during August–October and January–February

Threats to the corridor:

1. Settlements
2. Degradation of forest

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Improvement of forest cover in the corridor

Remark: There is another elephant route through Roladi of Bhanduan to Lochipur of Mango Range of Dalbhum Forest Division. From Lochipur, elephants enter Patamda beat of Dalma Wildlife Sanctuary. Villages in the corridor include Sindurpur, Purna Patamda, Birra, Danga, etc. and the corridor is five to six kilometers long with mostly crop land intermixed with patches of sal-dominated mixed forest.



6. DALAPANI - KANKRAJHOR



Alternate name: Ghatsila - Kankrajhor

State : Jharkhand and West Bengal
Ecological Priority : Medium
Conservation Feasibility : Medium

This is the most frequently used elephant route from Dalma Wildlife Sanctuary to Midnapore district of West Bengal. Every year elephants from Dalma pass through various degraded forest patches and enter the Kankrajhor Reserve Forest from where they move to Bankura and Puruliya. They enter Kankrajhor near Amlasol village.

Forest Division : Dhalbhum and West Midnapore

Connectivity : Dalapani Reserve Forest of Jharkhand with Kankrajhor Reserve forest of West Bengal

Geographical coordinates:

Latitude 22°39'77"–22°41'54" N
Longitude 86°30'13"–86°36'25" E

Length: 22 - 25 km

Width: 1 – 3 km

Forest type/ Vegetation: Tropical deciduous sal forest

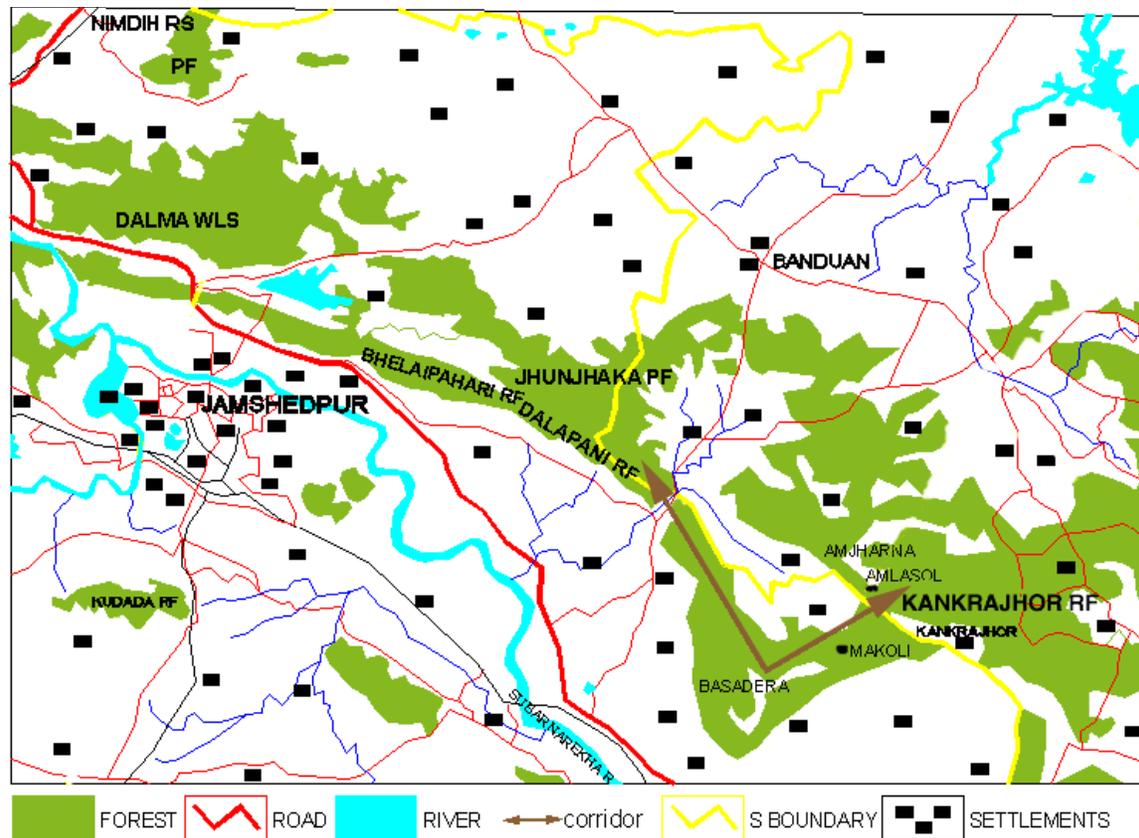
Nearest PA: Dalma Wildlife Sanctuary

Legal status of the corridor: Reserve forest and revenue land

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Amlasol, Makoli, Basadera, Ledasal, Burudi, Lukapani, Pachapani and Tarkadaha

Corridor dependent villages: Amlasol, Makoli, Amjharna, Jhatijharna, Dainmari, Basadera, Ledasal, Burudi, Lukapani, Asanpani, Tarkadaha and Mwghadaha



Human artefacts on the corridor: Road (Banduan - Mahuliya)

Frequency of usage of the corridor by elephants: Regular and seasonal; used by herds of 35–40 elephants in July–September. Bulls use the corridor regularly

Threats to the corridor:

1. Expansion of agricultural land near Amlasol and nearby villages
2. Settlements and the resulting biotic pressure

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Seek alternatives for Amlasol and Makali villages



7. DUMRIYA - NAYAGRAM



Alternate name: Mosabani - Chakuliya

State : Jharkhand
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor helps to maintain connectivity of Dumriya Reserve Forest and Forest block 478 of Mosabani Forest Range with the Nayagram Reserve Forest of Chakuliya Range. From Chakulia, the elephants can easily move through the forests of Kainmahuli, Purnapani, Amlagora, Chandua and Gadarasol into the Gidhni Range of Jhargram (West Bengal).

Forest Division : Dhalbhum

Connectivity : Mosabani Range with Chakuliya Range in Dhalbhum Forest Division

Geographical coordinates:

Latitude 22°25'–22°26' N
Longitude 86°35'–86°38' E

Length: 5–6 km

Width: 1.5 km

Forest type/Vegetation: Tropical deciduous sal forest

Nearest PA: Dalma Wildlife Sanctuary

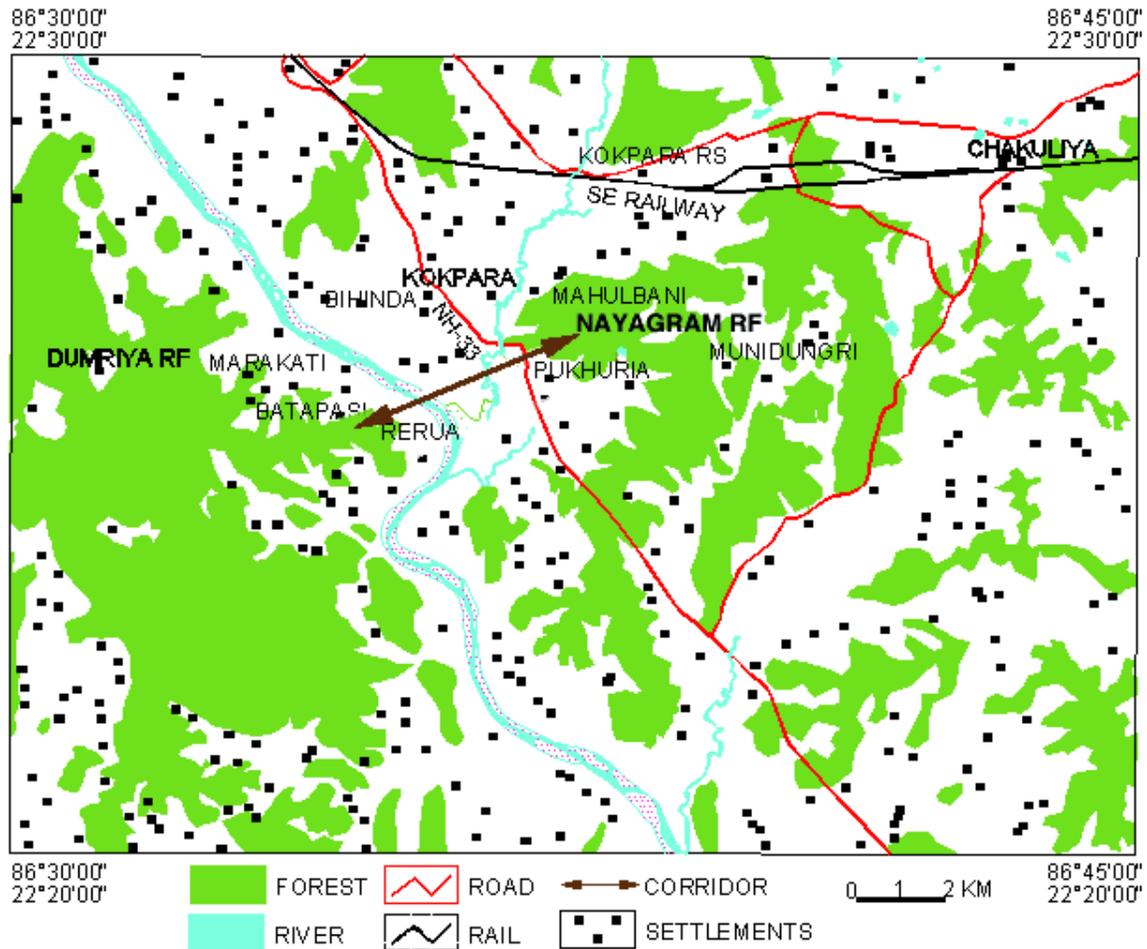
Legal status of the corridor: Reserve forest and Revenue land

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Rerua, Batapasi, Pukhuria, Mahulbari and Munidungri

Corridor dependent villages: Rerua, Batapasi, Pukhuria, Mahulbari, Munidungri, Murathakur, Talabera, Burajbani, Karamdanga and Sagadihi

Human artefacts on the corridor: Road (National Highway-33; Baharagora-Ghatsila)



Frequency of usage of the corridor by elephants: Regular and seasonal; used by small herds of five to nine elephants and bulls during October–January

Threats to the corridor:

1. Heavy traffic on National Highway-33
2. Settlements and agricultural activities
3. Degradation of forest

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of traffic on National Highway-33 at night
3. Improvement of forest cover in the corridor and in Chakulya Range
4. Seek alternatives for a few villages that are situated in the route of elephant movement



8. DUMRIYA- KUNDALUKA AND MURAKANJIYA

Alternate name: Mosabani - Rakhamines

State : Jharkhand
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor falls in the Mosabani Forest Range of Dhalbhum Forest Division. It connects the Dumriya Reserve Forest with Kundaluka Protected Forest and Murakanjiya Reserve Forest. It therefore helps to maintain elephant movement from Sarali Protected Forest and Kanapat Reserve Forest areas of Gorumahisani (Orissa) to Mosabani and Rakhamines areas of Jharkhand.

Forest Division : Dhalbhum

Connectivity : Mosabani Range with Rakhamines Range in Dhalbhum

Geographical coordinates :

Latitude 22°27'–22°29' N
Longitude 86°24'–86°28' E

Length: 7–8 km

Width: 2 km

Forest type/ Vegetation: Tropical deciduous sal forest

Nearest PA: Dalma Wildlife Sanctuary

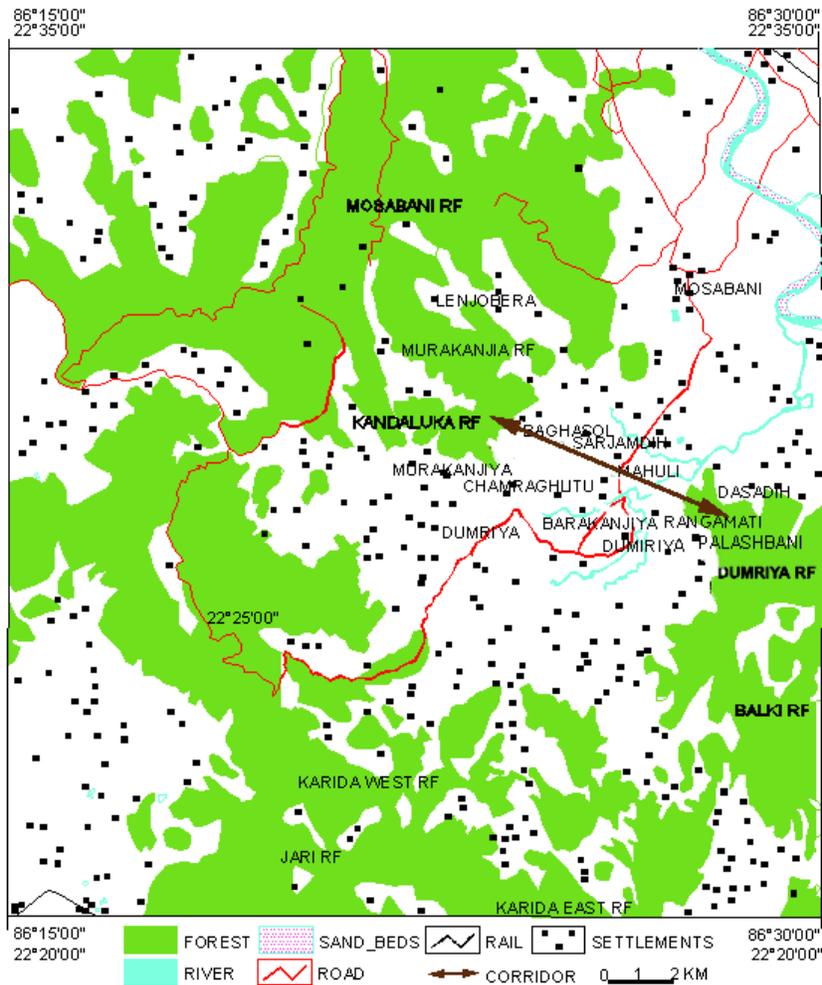
Legal status of the corridor: Reserve Forest, Protected Forest, revenue land and *patta* land

Major land-use: Forest, agriculture and settlement

Major habitation/settlements in corridor: Rangamati, Palasbani, Bara Kanjia, Chota Karanjia, Murakanjia, Chamraghutu, Chetamdahi, Tirildih, Mahuli and Baghasol villages

Corridor dependent villages: Rangamati, Palasbani, Bara Kanjia, Chota Karanjia, Murakanjiya, Chamraghutu, Chetamdahi, Dumuriya, Buatandi, Jahiradih, Tirildih, Mahuli and Baghasol

Human artefacts on the corridor: Road (Ghatsila-Dumuriya-Hata)



Frequency of usage of the corridor by elephants: Regular and seasonal; used by 25–30 elephants between September and February

Threats to the corridor

1. Settlements and the resulting biotic pressures
2. Illicit felling and degradation of the forest
3. Large scale agricultural activities
4. Traffic on Ghatsila-Dumuriya-Hata road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Monitoring the land-use pattern of the corridor area to ensure no further constructions take place
3. Seek alternatives for settlements in the corridor, especially in Palasbani and Murakanjia.
4. Improvement of forest cover by natural regeneration



Frequency of usage of the corridor by elephants: Regular and seasonal; used by herds of 10–12 elephants and bulls during August–February

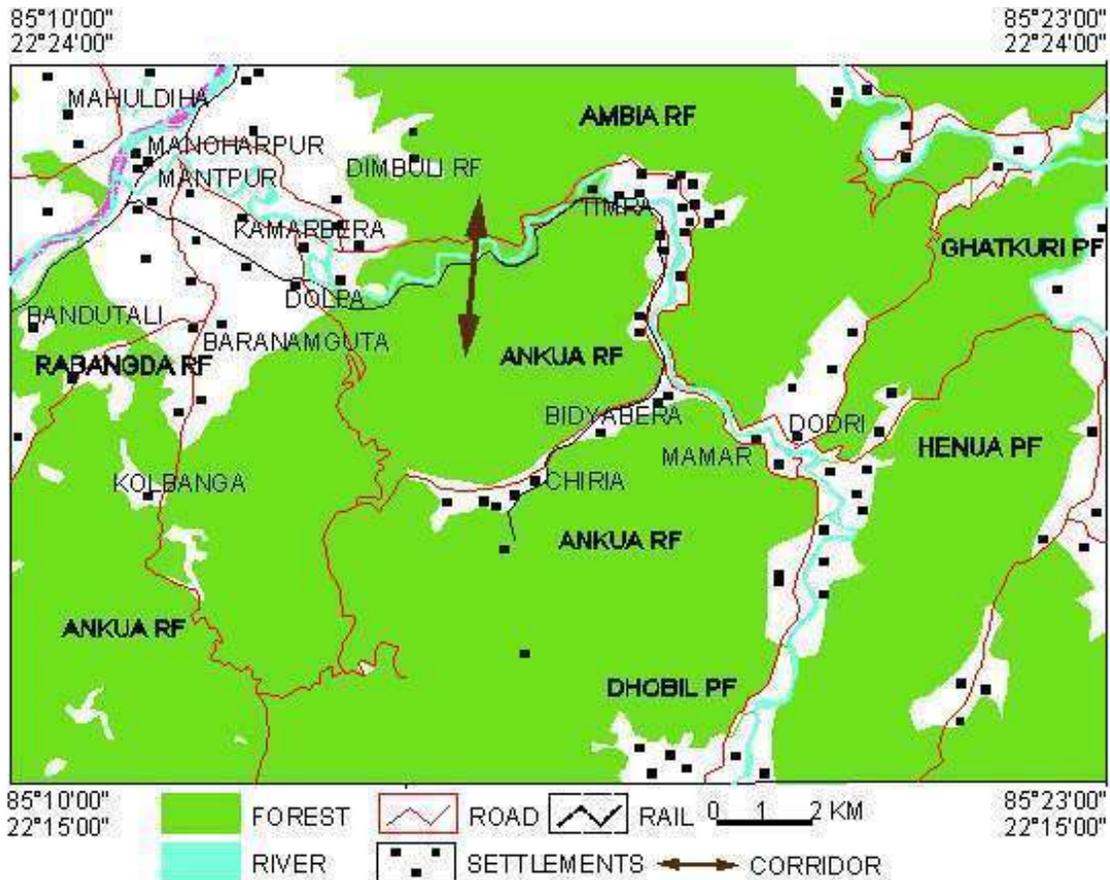
Threats to the corridor

1. Railway line passing through the corridor
2. Anthropogenic pressure from adjacent villages
3. Increase of agriculture in fringe areas

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prevention of expansion of villages (especially, Jamdih and Amjharan) and agricultural land onto corridor.

Remark: Currently, the elephants enter Porahat mostly from Kolhan through Ganmor Reserve Forest causing severe human–elephant conflict. However, due to the presence of the railway track and sharp turns and earthen mounds between Posita and Raidih, accidents are frequent on the rail lines. The Jharkhand Forest Department is planning to block the sides of certain stretches of the rail line near Posita with iron bars (used railway track). This will force the elephants to use the Leda-Bera corridor more frequently. They may also result in the usage of the area near Baraila and Mahadevsal for movement between the two forests.



Frequency of usage of the corridor by elephants: Regular; used by herds of 10–12 elephants and bulls

Threats to the corridor:

1. Iron ore mining adjacent to the corridor area. This area has Asia's largest single point iron-ore deposit.
2. Heavy movement of trucks on the road especially at night.

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of vehicular traffic at night
3. Preparation of a detailed land-use and environmental management plan for sustainable mining and its strict implementation.
4. Looking for new methods of ore transport viz., ropeway/trolley

Remark: A new exit route for ore transportation from Manoharpur Mines will lead to hindrance in elephant movement and can escalate human-elephant conflict in the area. Due to the great potential of the mine, the traffic movement is expected to increase in the future.



11. ANJADBERA- BICHABURU



State : Jharkhand
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor in South Chaibasa Forest Division connects the elephant habitats of Bichaburu Protected Forest with Anjadbera Protected Forest leading to the main elephant habitat of Singhbhum Elephant Reserve.

Forest Division : South Chaibasa

Connectivity : Bichaburu Protected Forest with Anjadbera Protected Forest leading to Kolhan and Saranda Forest areas.

Geographical coordinates:

Latitude 22°20' N
Longitude 85°45' E

Length: 12–13 km **Width:** 2 km

Forest type/ Vegetation: Tropical dry deciduous sal forest

Nearest PA: Nil

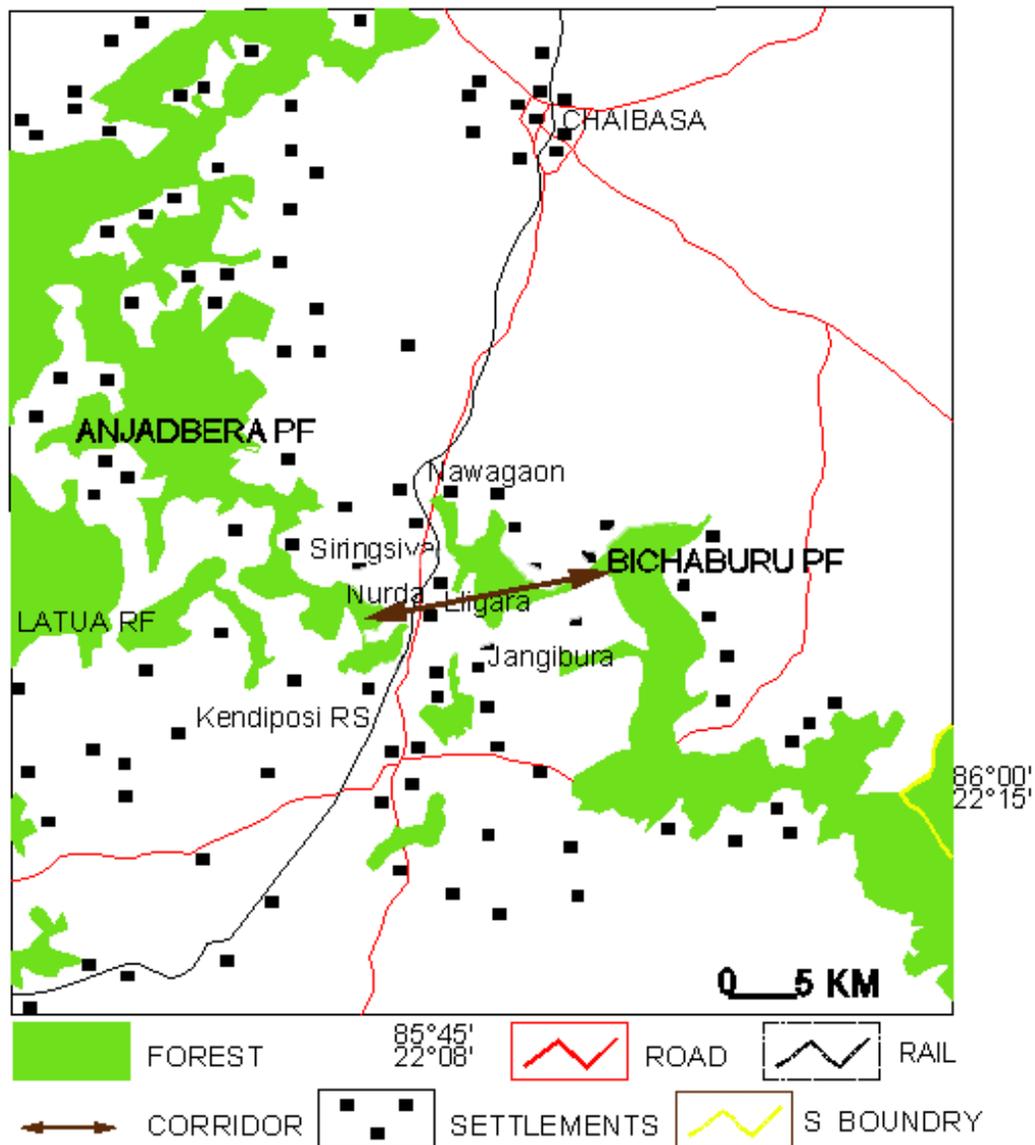
Legal status of the corridor: Protected Forest and revenue land

Major land-use: Forest, settlement and agriculture

Major habitation/settlements in corridor: Nurda and Lligara

Corridor dependent villages: Nurda, Lligara, Siringsiya, Jangiburu and Tengrai

Human artefacts in the corridor: Railway track (Noamuni-Chaibasa) and road (Chaibasa-Champua)



Frequency of usage of the corridor by elephants: Regular and seasonal; used by bulls and herds between October and February

Threats to the corridor:

1. Heavy road and rail traffic
2. Anthropogenic pressure from adjacent villages.
3. Agricultural activities.

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulate road and rail traffic
3. Habitat improvement of the degraded connecting forest



12. KARO - KARAMPADA



State : Orissa and Jharkhand
Ecological Priority : Medium
Conservation Feasibility : High

Karo and Sidhamata Reserve Forest of Keonjhar Division (Orissa) are connected to Karampada Reserve Forest of Saranda Division (Jharkhand) through this corridor. Since the movement of elephants between Tholkobad and Toda Reserve Forest has greatly reduced due to disturbance from settlements, this corridor is important for continuity between the elephant populations of Jharkhand and North Keonjhar and further onwards to the Bonai forests of Orissa.

Forest Division : Keonjhar (Orissa) and Saranda (Jharkhand)

Connectivity : Karo and Sidhamata Reserve Forests of Keonjhar Forest Division with Karampada Reserve Forest of Saranda.

Geographical coordinates:

Latitude 22°03'30" N
Longitude 85°16'30" E

Length: 2.5–3 km

Width: 2–3 km

Forest type/ Vegetation: Tropical deciduous sal dominated forest

Nearest PA: None

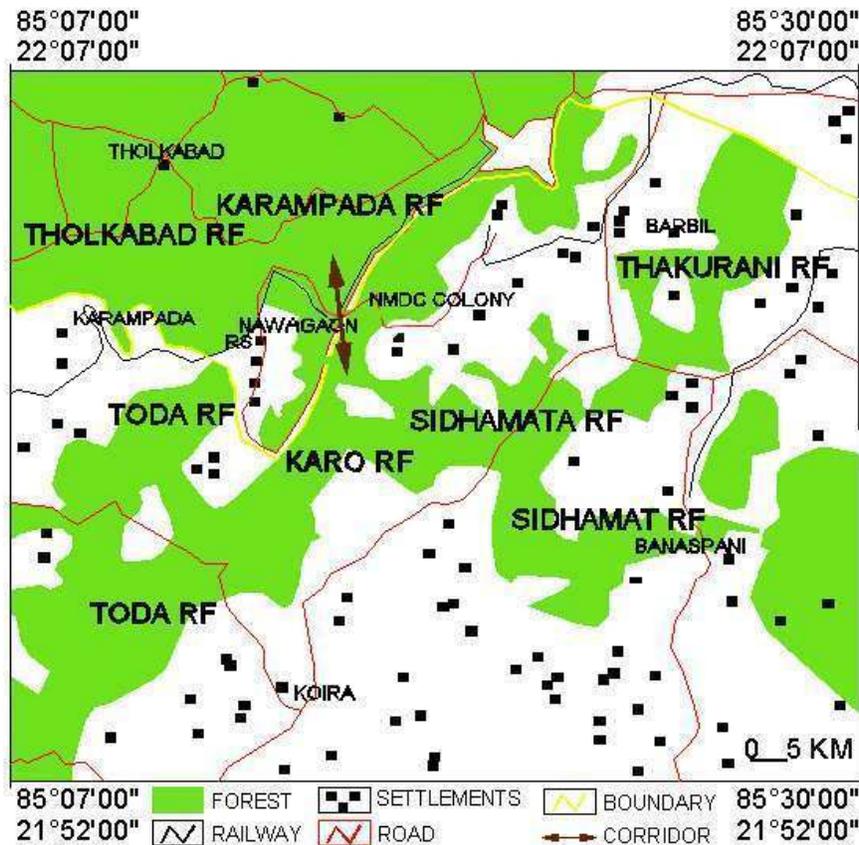
Legal status of the corridor: Reserve Forest

Major land-use: Forest

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Nawagaon, Karampada, Bhangaon, Kiriburu town, Penduliposi and Haramutu

Human artefacts on the corridor: Mines, road (Kiriburu-Jamdih) and railway (Karampada-Kiriburu-Meghahatburu)



Frequency of usage of the corridor by elephants: Regular and seasonal; mostly used by loners and small herds of three to five elephants during October–February

Threats to the corridor:

1. Expansion of SAIL township - NMDC colony and nearby villages
2. Expansion of mining areas
3. Heavy traffic and activities of mining machinery
4. Railway line

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Preparation of a detailed land-use and environmental management plan for sustainable mining and its strict implementation
3. Regulation of vehicular and train traffic at night. Stopping electrification of the railway line
4. Mining companies (user agencies) to compensate for the damage to the surrounding elephant habitat and the corridor forest
5. Eco-development activities in nearby villages (Nawagaon, Haramutu and Penduliposi) to reduce pressure on forest



13. BADAMPAHAR - DHOBADHOBIN



State : Orissa and Jharkhand
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects Badampahar Reserve Forest with Dhobadhobin Reserve Forest and Unduda Protected Forest leading to Haldipokhari Reserve Forest of South Chaibasa. The corridor comprises of Budhipat forest and Basila Reserve Forest (Orissa) and maintains connectivity between Similpal and South Chaibasa.

Forest Division : Karanjia and South Chaibasa

Connectivity : Badampahar Reserve Forest of Orissa with Dhobadhobin Reserve Forest and Undua Protected Forest of Jharkhand leading to the main elephant habitat of South Chaibasa and Kolhan

Geographical coordinates:

Latitude 22°03'–22°05' N
Longitude 85°59'–86°00' E

Length: 4–5 km **Width:** 1.5–2 km

Forest type/ Vegetation: Tropical deciduous forest

Nearest PA: Similipal National Park

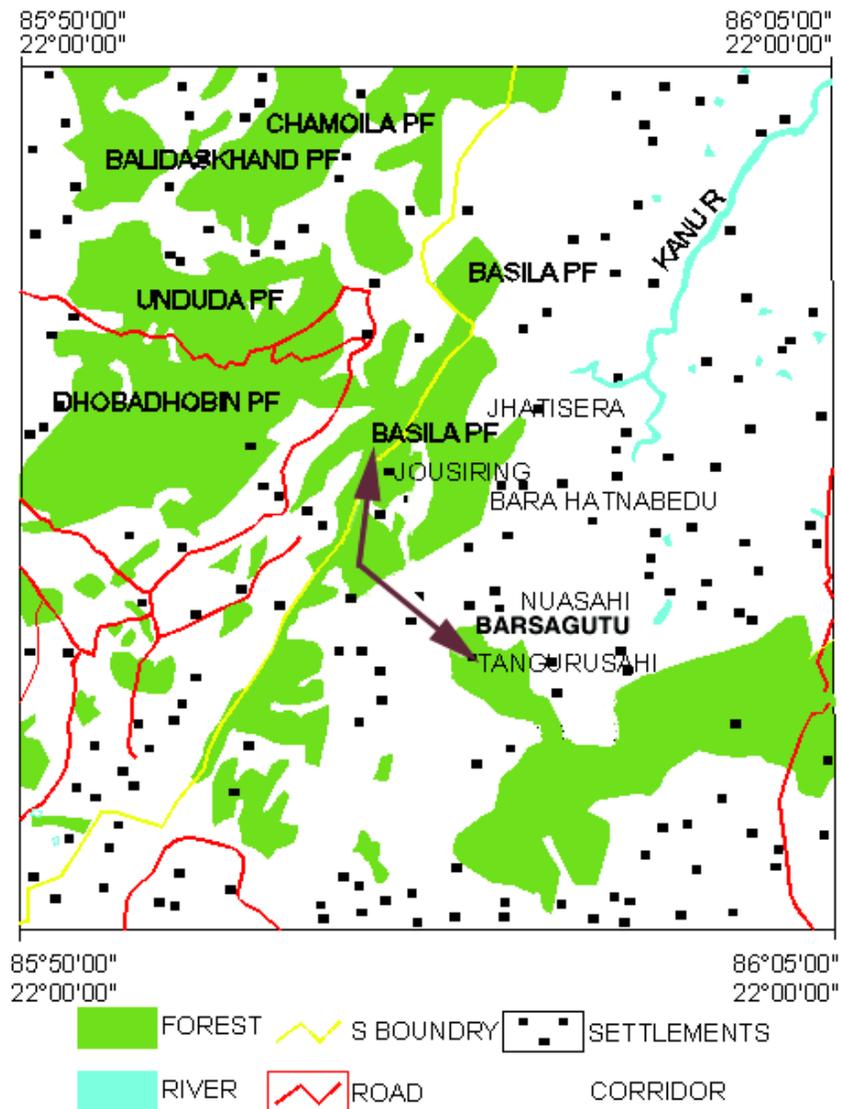
Legal status of the corridor: Reserve forest and revenue land

Major land-use: Forest, settlement and agriculture

Major habitation/settlements in corridor: Tangurusahi, Barsagutu, Jhatisere and Jatsring

Corridor dependent villages: Tangurusahi, Barsagutu, Jhatisere, Jatsring, Barha and Hatnabade

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Regular and seasonal; mostly used by bulls and small herds of six to ten elephants during October–February

Threats to the corridor:

1. Degradation of forest
2. Expansion of settlements and agricultural activities

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Eco-development activities in corridor villages (Tangurusahi, Barsagutu, Jhatisere and Jatsring) to reduce dependency and improvement of forest cover



14. BADAMPAHAR - KARIDA EAST



State : Orissa and Jharkhand
Ecological Priority : Medium
Conservation Feasibility : Low

The corridor connects Badampahar Reserve Forest of Orissa with Karida Reserve Forest of Jharkhand thereby maintaining contiguity between Similipal National Park and Mosabani Range of Dhalbhum Forest Division, Jharkhand. Elephants from Similipal pass through Badampahar Reserve Forest, Dhasra Reserve Forest, Teltangia Village Forest, Dhenkla National Park, Tungru Reserve Forest and Sarali Reserve Forest (Orissa) to enter Karida East Reserve Forest near Satbakra (Jharkhand).

Forest division: Rairangpur and Dhalbhum

Connectivity: Badampahar Reserve Forest (Orissa) with Karida East Reserve Forest (Jharkhand) thereby linking Similipal National Park with Mosabani Range of Dhalbhum Forest Division

Geographical coordinates :

Latitude 22°08'–22°26' N
Longitude 86°14'–86°26' E

Length: 28–30 km

Width: 1–2 km

Forest type/ Vegetation: Tropical deciduous sal forest

Nearest PA: Similipal National Park

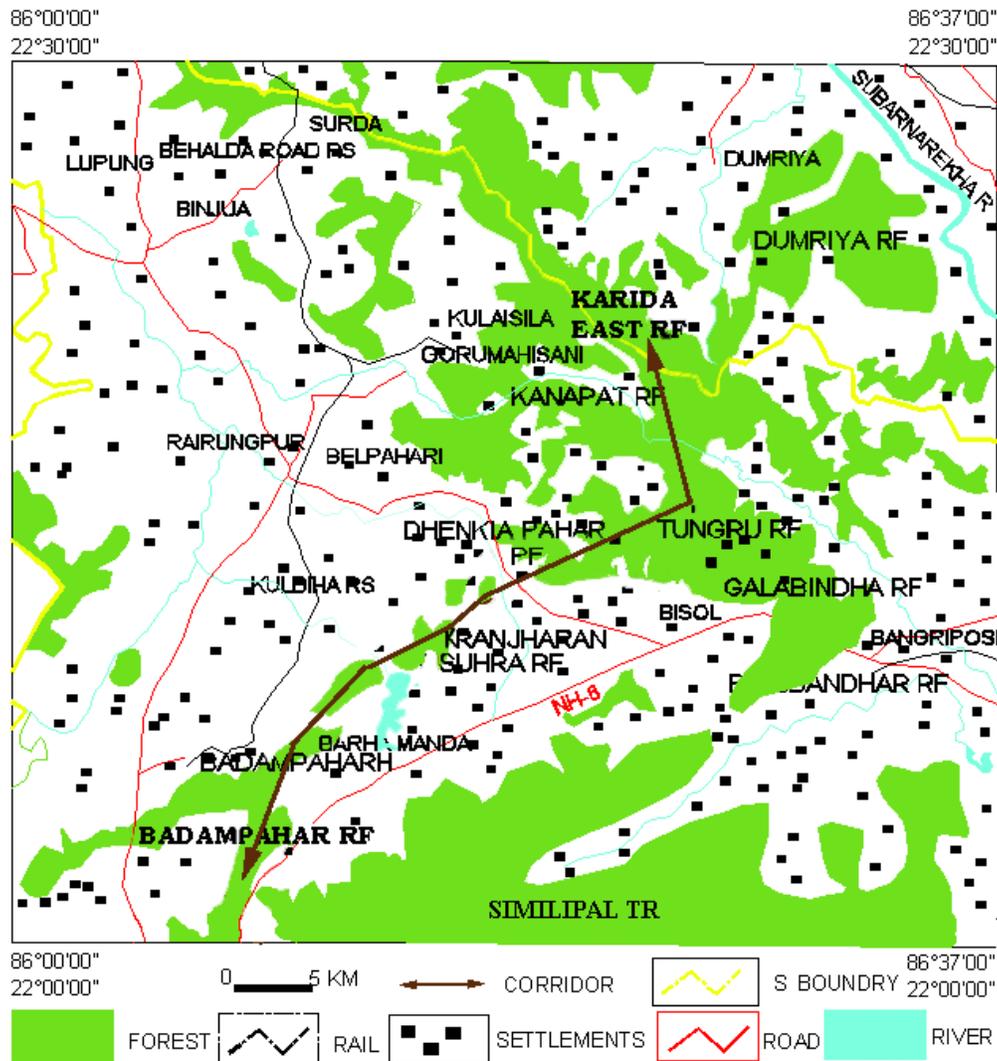
Legal status of the corridor: Reserve Forest, Protected Forest, Village Forest and *patta* land

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Dambada, Kuajhari, Kendua, Tungru, Jhumukapahari, Lado, Dhantangar and Batikocha

Corridor dependent villages: Dambada, Kuajhari, Kendua, Tungru, Jhumukapahari, Lado, Dhantangar, Batikocha, Sulaipat, Khandadera, Jarusahi, Karanjharan, Tulasibani, Dambada, Kurunjai, Bandgan, Jederghutu, Sapaghera, Hatichhad and Satbakra

Human artefacts on the corridor: Road, National Highway-6 (Bisoi-Rairangpur)



Frequency of usage of the corridor by elephants: Regular; used by both bulls and herds

Threats to the corridor:

1. Corridor is much fragmented and has narrow and degraded patch of forest.
2. Settlements and agricultural activities in the area.
3. High traffic on National Highway-6

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Improvement of forest cover in forest patches between Badampahar and Tungru Reserve Forest.
3. Regulation vehicular traffic on National Highway-6 at night.



15. SIMILIPAL - SATKOSIA



Alternate name: Similipal - Hadagarh

State : Orissa
Ecological Priority : High
Conservation Feasibility : Medium

This corridor connects Similipal National Park with Hadagarh Wildlife Sanctuary through Noto and Satkosia Reserve Forest. The corridor is intact at present, but human settlement and anthropogenic pressure is slowly degrading the corridor and can lead to fragmentation of the elephant habitat in both the areas.

Forest Division : Anandapur, Karanjia and Baripada

Connectivity : Similipal National Park with Hadgarh Wildlife Sanctuary

Geographical coordinates :

Latitude 21°20'–21°29' N
Longitude 86°12'– 86°20' E

Length: 15–16 km

Width: 3 km

Forest type/ Vegetation: Tropical deciduous sal forests

Nearest PA: Similipal National Park and Hadagarh Wildlife Sanctuary

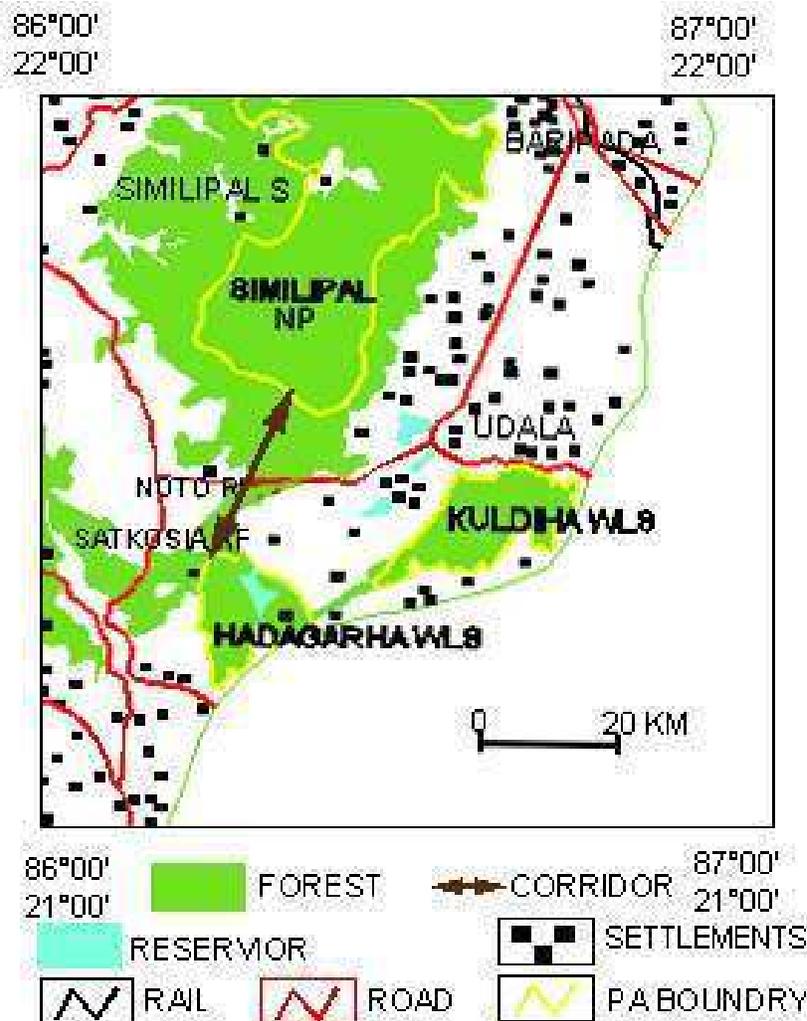
Legal status of the corridor: Reserve forest and revenue land

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Noto, Matkamhatua, Purunapani, Selaipokhri, Khuntapada, Dhanchaturi, Barabanka, Salandi, Bhalunhurka, Dangadiha

Corridor dependent villages: Noto, Matkamhatua, Purunapani, Selaipokhri, Khuntapada, Dhanchaturi, Barabanka, Salandi, Bhalunhurka, Dangadiha, Jamananda, Baghapha, Khudisita, Panoposi, Banamunda, Baghunala, Jadipada, Bhejidiha, Kokunda and Patharpara

Human artefacts on the corridor: Road (Champajhar-Patharpara-Paradiha)



Frequency of usage of the corridor by elephants: Regular; used by herds of 20 –25 elephants and bulls

Threats to the corridor:

1. Expansion of settlements and encroachments in the corridor
2. Degradation of corridor forest, especially in Satkosia and Noto Reserve Forest
3. Conversion of forest land into agricultural land in Satkosia Reserve Forest

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Eviction of encroachments.
3. Improvement forest cover in corridor forest
4. Wildlife Conservation awareness programme among the local people to stop the “*Akhand shikhar*” (mass hunting) in the forest



16. BAULA - KULDIHA



Alternate name: Hadagarh - Kuldiha

State : Orissa
Ecological Priority : High
Conservation Feasibility : Low

The corridor connects Kuldiha Wildlife Sanctuary with Hadagarh Wildlife Sanctuary through small hillocks in Garsahi Reserve Forest, Gaguapahar, Balihudi and Baula hills. The corridor is now confined only to these hills as villages have come up near the foothills.

Forest Division : Anandapur, Baripada and Balasore

Connectivity : Hadagarh Wildlife Sanctuary with Kuldiha Wildlife Sanctuary

Geographical coordinates:

Latitude 21°20'–21°23' N
Longitude 86°16'– 86°25' E

Length: 19–20 km

Width: 2–2.5 km

Forest type/ Vegetation: Tropical deciduous sal forest

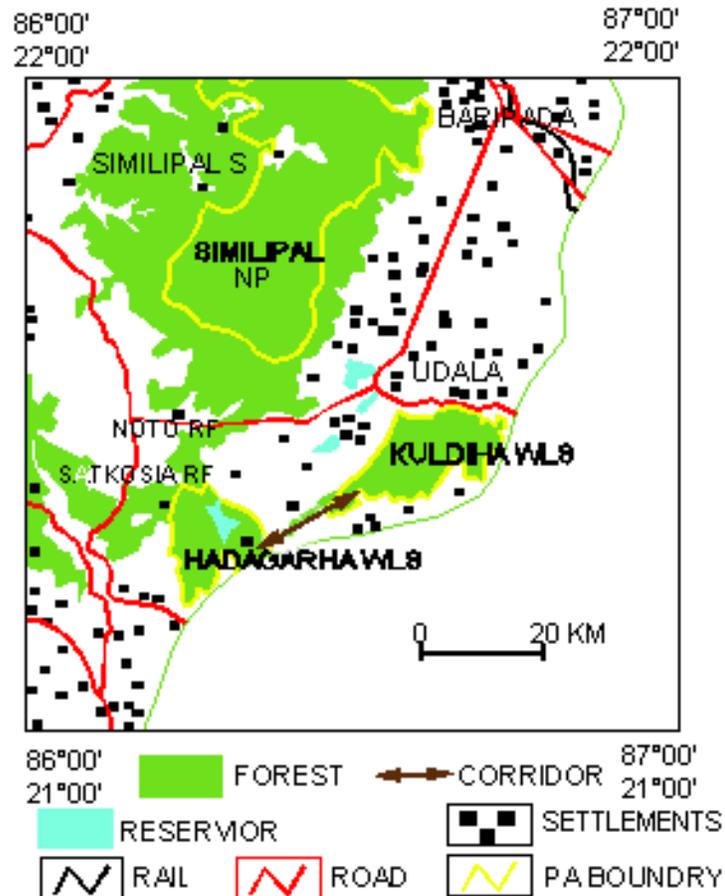
Nearest PA: Hadagarh Wildlife Sanctuary, Kuldiha Wildlife Sanctuary and Similipal National Park

Legal status of the corridor: Protected forest, Reserve forest and revenue land

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Raighati, Telibank, Barabili, Kuturipal, Gagua, Tatasahi, Ambadahi, Kadaligaria, Kantamari, Patana, Malsadalia, Sana Kantamari, Selaimai buru, Bolpai, Sarisapal, Rangamatha, Atasahi and Garsahi
Corridor dependent villages: Raighati, Telibank, Barabili, Kuturipal, Gagua, Ambadahi, Kadaligaria, Kantamari, Patana, Malsadalia, Sana Kantamari, Selaimai buru, Bolpai, Sarisapal, Rangamatha, Atasahi, Garsahi, Bageipur, Sarisapal and Baminipal

Human artefacts on the corridor: Mines



Frequency of usage of the corridor by elephants: Regular; used by small herds of 10–15 elephants

Threats to the corridor:

1. Increase in human settlement because of stone quarries and encroachment.
2. Continuous movement of heavy vehicles and blasting in the stone quarries and in Baula chromite mines.
3. Degradation of corridor forest
4. Expansion of agricultural activities

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Preparation of a detailed land-use and environmental management plan for sustainable mining.
3. Improve forest cover in corridor forest.
4. Eco-development activities in villages in the foothills to reduce dependency on the corridor forest and to improve cover
5. Prevent expansion of agricultural land towards corridor.



17. KAHNEIJENA - ANANTAPUR



State : Orissa
Ecological Priority : Medium
Conservation Feasibility : Low

Elephants from the Satkosia Wildlife Sanctuary, Handapa Reserve Forest and adjoining area of Athamalik Forest Division move through some degraded and discontinuous forest patches of Simulipathar Reserve Forest, Durgapur Reserve Forest, Nisha Protected Forest, Kuio Protected Forest, Kauchiakhhol Reserve Forest, Rakas Reserve Forest and Kahnejena Reserve Forest to Anantapur Reserve Forest of (Khamakhyanagar Range) Dhenkanal Forest Division covering a distance of about 40 km. However, there is a major discontinuity of forest between Kahnejena Reserve Forest and Anantapur Reserve Forest. The elephants cross the Brahmani River near Joka village. Due to a construction of Rengali canal, this movement has been affected, but the elephants are reported crossing the canal near Joka village.

Forest Division : Angul and Dhenkanal

Connectivity : Satkosia Wildlife Sanctuary and forest of Athamalik forest Division with the forests of Dhenkanal and South Keonjhar divisions

Geographical coordinates:

Latitude 21°03'–21°04' N
Longitude 85°09'–85°11' E

Length: 5–6 km

Width: 1km

Forest type/ Vegetation: Tropical deciduous forest

Nearest PA: Satkosia Wildlife Sanctuary

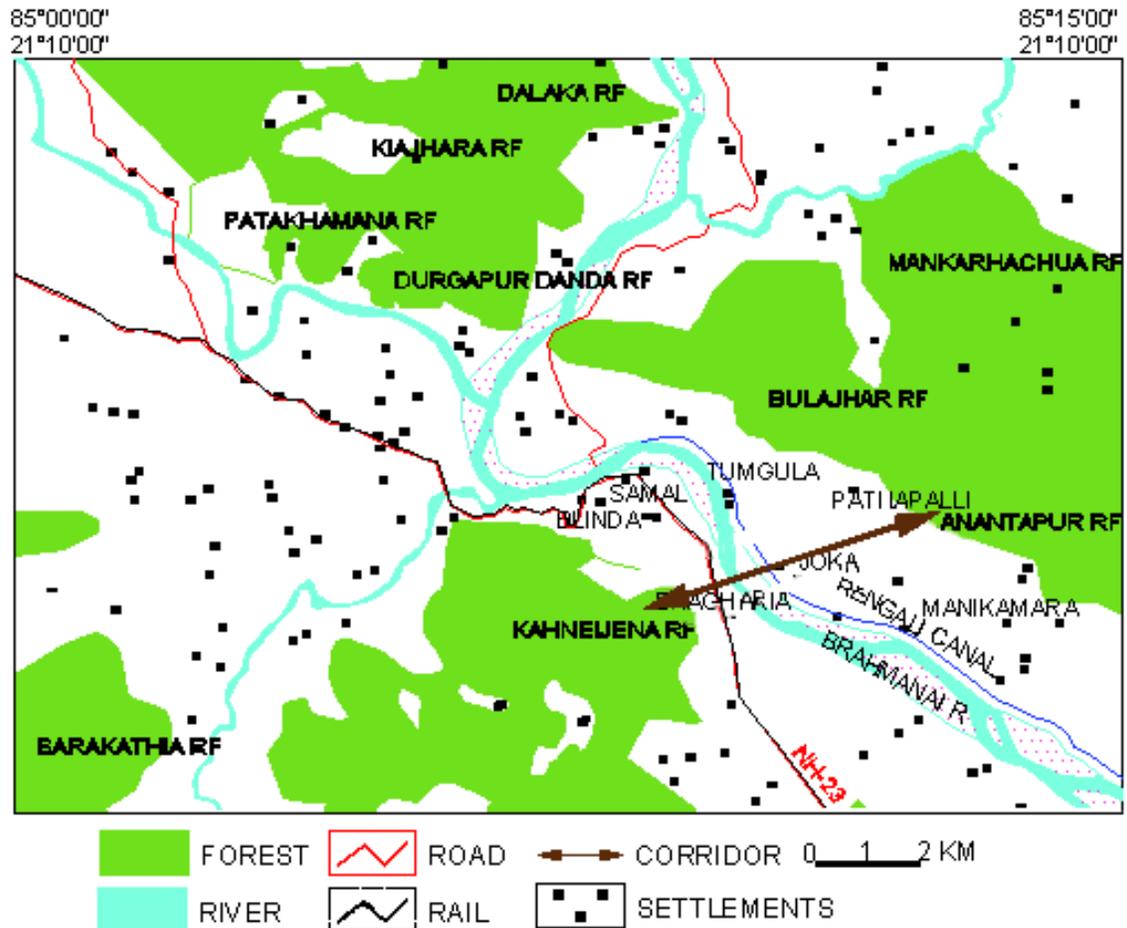
Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest, agriculture and settlement

Major habitation/settlements in corridor: Ekagharia, Joka (150 families), Patuapalli (100 Families)

Corridor dependent villages: Ekagharia, Bikisara, Joka, Tumbgula, Patuapalli and Sarakishorapala

Human artefacts on the corridor: Road (National Highway-23) and Railway line



Frequency of usage of the corridor by elephants: Regular and seasonal; used mostly by bulls and small herds of three to five elephants in October–February

Threats to the corridor:

1. Degradation of connecting forest patches
2. Expansion of settlement and resulting biotic pressure
3. Heavy traffic on National Highway-23.
4. Rengali canal and Railway line

Conservation plan:

1. Declaration, demarcation and legal protection of the corridors under various laws appropriate for the State
2. Preparation of a detailed land-use and environmental management plan for sustainable mining
3. Regulation of night traffic on National Highway-23
4. Improve forest cover in corridor as the area between Kahneijena and Anantapur Reserve Forest is almost barren



18. TAL- KHOLGARH



State	: Orissa
Ecological Priority	: Medium
Conservation Feasibility	: Medium

This corridor connects Tal Reserve Forest with Kholgarh Reserve Forest and Landakot Reserve Forest thereby connecting the elephant population of Satkosia Wildlife Sanctuary with Khalasuni Wildlife Sanctuary through Baruni (East and West) Reserve Forest and Raun Reserve Forest. Heavy traffic on National Highway-42 and construction of a railway line (Sambalpur-Talcher) that passes through the corridor has greatly affected elephant movement. Elephants cross the railway line near Podabarunda.

Forest Division: Rairakhol and Athamalik

Connectivity: Tal Reserve Forest with Landakot Reserve Forest thereby facilitating movement between Satkosia National Park and Khalasuni Wildlife Sanctuary

Geographical coordinates:

Latitude	21°03'– 21°05' N
Longitude	84°16'– 84°18' E

Length: 4 km

Width: 0.5–1 km

Forest type/ Vegetation: Tropical deciduous sal forest

Nearest PA: Khalasuni Wild Life Sanctuary

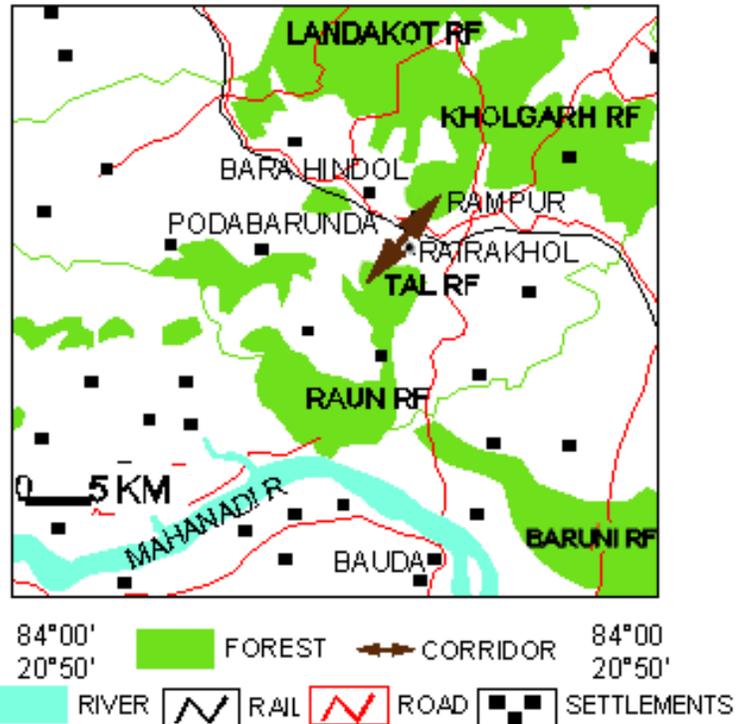
Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest, settlements and agriculture.

Major habitation/settlements in corridor: Barasikia

Corridor dependent villages: Barasikia and Chatuni

Human artefacts on the corridor: Road (National Highway-42) and railway (Rairakhol-Sambalpur)



Frequency of usage of the corridor by elephants: Regular; used by herds of 15–20 elephants.

Threats to the corridor:

1. Heavy traffic on National Highway-42
2. Agriculture and settlement
3. Newly constructed railway line through corridor area
4. Degradation of forest, especially in Tal Reserve Forest

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Improvement of cover in the corridor forest
3. Relocation of Barasikia village outside the corridor area
4. Regulation of night traffic on National Highway-42
5. Reduced frequency of train at night

Remark: The entire forest patch between Satkosia Wildlife Sanctuary and Khalasuni Wildlife Sanctuary is facing severe biotic pressure thereby hindering the elephant movement between two major habitats. However, the main constriction is between Nuagaon Reserve Forest and Baruni Reserve Forest and between Tal Reserve Forest and Kholgarh Reserve Forest. Construction of a railway line, heavy traffic on National Highway-42 and the expansion of Rairakhol township has threatened the elephant movement in this area.



19. NUAGAON - BARUNI



State : Orissa
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects Satkosia Wildlife Sanctuary, Talaipathar and Nuagaon Reserve Forest with East and West Baruni Reserve Forest. The corridor has been threatened by the construction of Manjhor dam near Manabera village thereby reducing elephant movement between Angul and Rairakhol Forest Division through Athamalik Forest division. This will submerge about 442 ha. of forest land and about eight villages. Better irrigation facilities will also lead to increased agricultural activities thereby threatening the corridor and increasing man–elephant conflict.

Forest Division : Athamalik

Connectivity : Satkosia Wildlife Sanctuary, Talaipathar and Nuagaon Reserve Forest with East and West Baruni, Raun and Tal Reserve Forests

Geographical coordinates:

Latitude 20°50' N
Longitude 84°26' E

Length: 1 km

Width: 4 km

Forest type/ Vegetation: Tropical moist deciduous forest

Nearest PA: Satkosia Wildlife Sanctuary

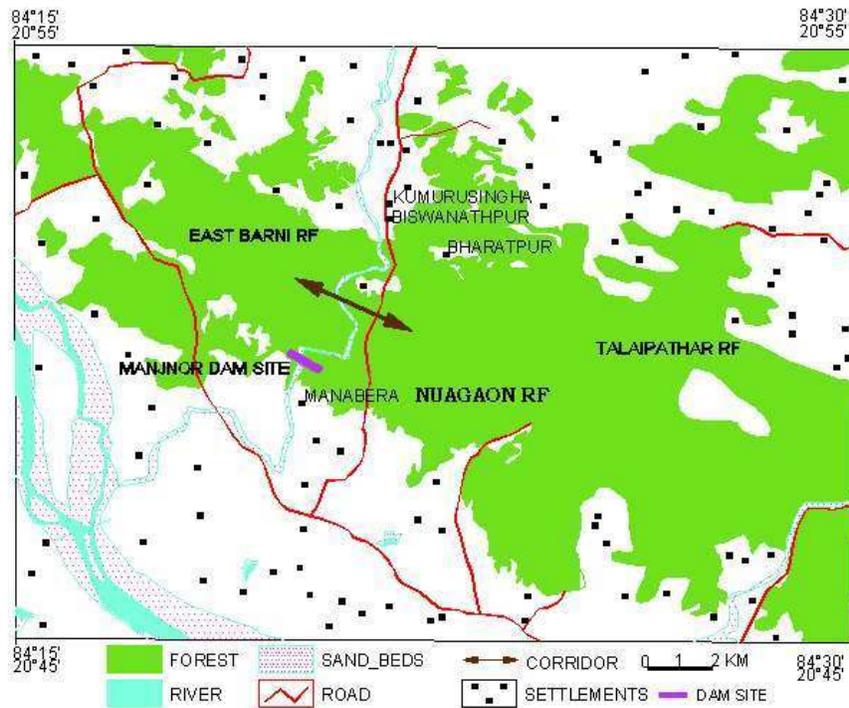
Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest, settlements and reservoir

Major habitation/settlements in corridor: Manabera, Bankual and Barapada

Corridor dependent villages: Manabera (48 houses with 350 people), Bankual (65 houses), Barapada (100–150 houses), Biswanathpur (18 houses with 100 people) and Kumurusingha (25–30 houses).

Human artefacts on the corridor: Manjhor dam submerging 442 ha. of forest land upon completion.



Frequency of usage of the corridor by elephants: Regular and seasonal; used by herds of 8–12 elephants and bulls

Threats to the corridor:

1. Submersion of large forest area for the reservoir of Manjhor dam
2. Settlements

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. No more settlement to be allowed in the area and expansion of agriculture towards forest area to be stopped because the dam is going to facilitate major irrigation facilities that will result in increased agriculture and settlements in nearby areas
3. The area adjacent to the dam may be afforested to facilitate unhindered elephant movement

Remark: The entire forest patch between Satkosia Wildlife sanctuary and Khalasuni Wildlife Sanctuary is facing severe biotic pressure thereby hindering the elephant movement between two major habitats. However, the main constriction is between Nuagaon and Baruni Reserve Forest and between Tal and Kholgarh Reserve Forest. Construction of Manjhor dam has threatened the elephant movement in this area.



20. KOTGARH - CHANDRAPUR



State : Orissa
Ecological Priority : High
Conservation Feasibility : Medium

Kotgarh Wildlife Sanctuary of Balliguda Forest Division is connected with Chandrapur Reserve Forest of Raygada Forest Division through this corridor. Elephants pass through Lassery, Belgarh and Baliguda forest block and some settlements to move from Kotgarh to Chandrapur

Forest Division : Balliguda and Raygada

Connectivity: Kotgarh Wildlife Sanctuary with Chandrapur Reserve Forest

Geographical coordinates:

Latitude 19°35'–19°42' N
Longitude 83°39'–83°45' E

Length: 14–15 km

Width: 2 km

Forest type/ Vegetation: Tropical deciduous sal forest

Nearest PA: Kotgarh Wildlife Sanctuary

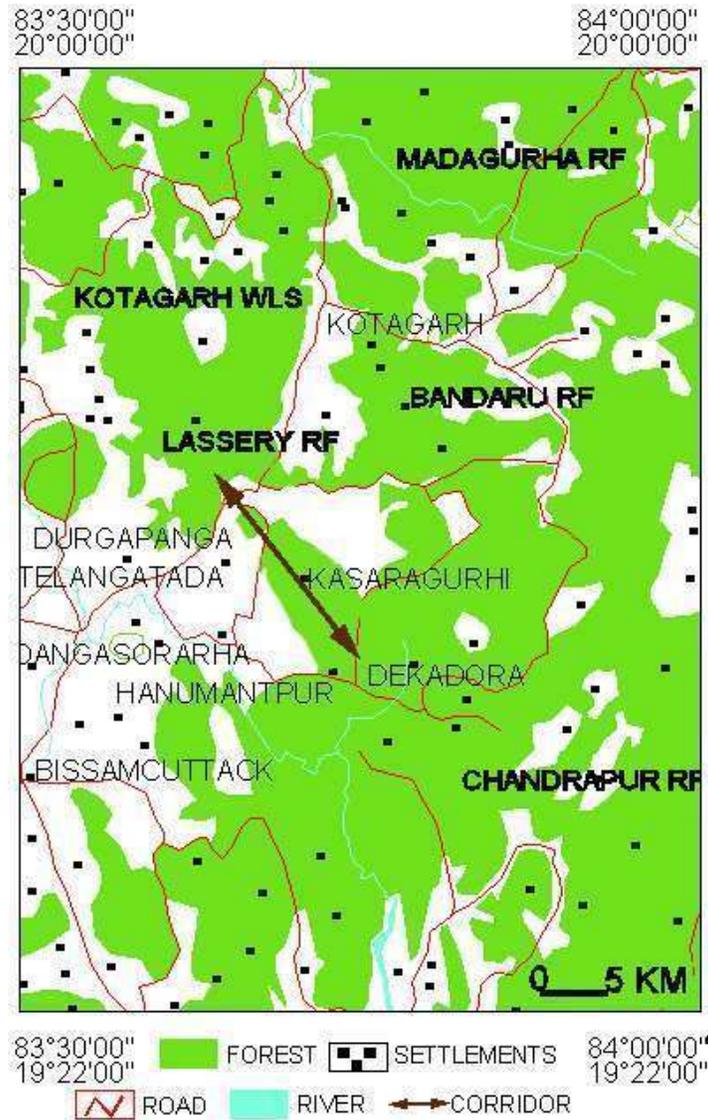
Legal status of the corridor: Reserve forest and revenue land

Major land-use: Forest, agriculture and settlement

Major habitation/settlements in corridor: Durgapanga, Kasaragurhi and Hanumantpur

Corridor dependent villages: Durgapanga, Dangasorarha, Kasaragurhi, Hanumantpur, Telangapada, Dahgasorarha Dekadora and a few other small settlements

Human artefacts on the corridor: Road (Baligurha-Bissam Cuttack)



Frequency of usage of the corridor by elephants: Regular; used mostly by bulls and small herds of five to nine elephants

Threats to the corridor:

1. Degradation and fragmentation of habitat
2. Expansion of settlements and agricultural land

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Improving forest cover in the corridor
3. Seek alternatives for Durgapanga and Hanumantpur village





CHAPTER-6



Elephant Corridors of Northern West Bengal

Sandeep Kumar Tiwari

The elephants of northern West Bengal form the western-most extension of the north-east Indian population of Asian elephants. There are fewer than 300 elephants (Anon, 2003) in this region, spread across the districts of Darjeeling, Jalpaiguri and Cooch Behar, comprising nine forest divisions, viz. Kurseong, Wildlife-I, Baikunthapur, Kalimpong, Wildlife-II, Jalpaiguri, Cooch Behar, Buxa Tiger Reserve (West) and Buxa Tiger Reserve (East). Although this number is only a little above 1% of the total elephant population of India, an extraordinarily high human-elephant conflict, characterizes this region. There are 697 recorded cases of loss of human life in a 15 year period between 1986-87 and 2000-2001, a statistic that translates into an average of more than 47 human lives per year. Northern West Bengal has a forest area of 3051 km² or about 24% of the total geographical area of the state. However, the elephant habitat is confined to about 2200 km² in three distinct geographical zones, viz.

- (a) The terai stretch between the Mechi River and the Teesta River, comprising of the forest areas of the Kurseong Division and the Mahananda Wildlife Sanctuary,
- (b) The western dooars stretch between the Teesta and Torsa rivers comprising Apalchand range of Baikunthapur Division, Jalpaiguri, Kalimpong and Cooch Behar Forest Divisions, Jaldapara Wildlife Sanctuary, Chapramari Wildlife Sanctuary and Gorumara National Park and
- (c) The eastern dooars stretch between Torsa and Sankosh river that adjoins Assam and Bhutan and comprises the forests of Cooch Behar Forest Division and Buxa Tiger Reserve (BTR).

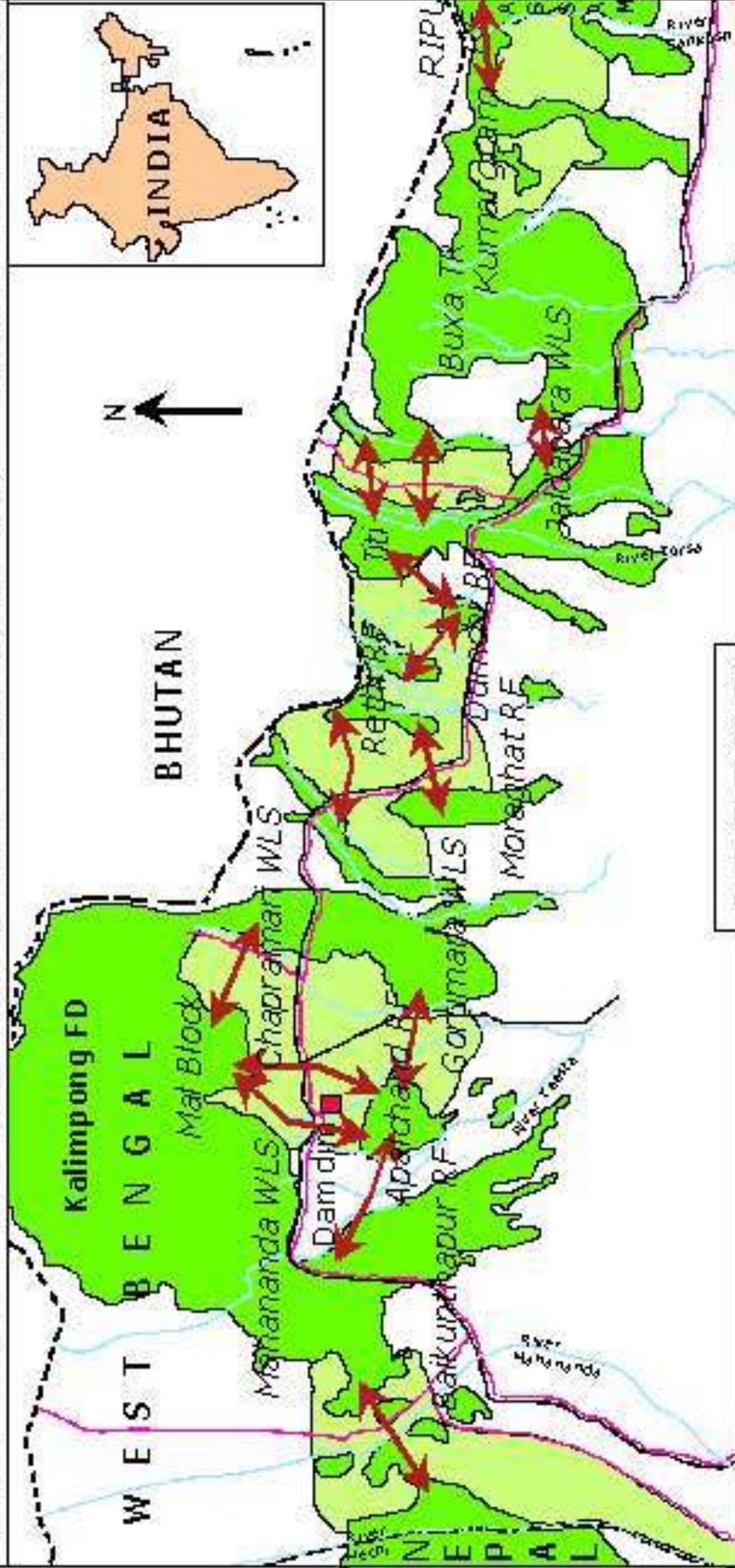
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The three zones are characterized by high rainfall (350-600 cm) and the forest types found in this region include dry deciduous, moist deciduous, semi-evergreen and evergreen forests, with sal (*Shorea robusta*) and its associates dominating.

Both, the terai and the western dooars are patchy (human habitation and tea gardens interspersed with forests) through which regular elephant movement occurs. The main concern about the northern West Bengal elephant population is the increasing trend of human-elephant conflict. Only the elephant population (163 elephants) in Eastern Dooars (Buxa Tiger Reserve) with a good forest can be called a comparatively viable population. The future of over 85 elephants (2001 census) between the Teesta and Torsa rivers is uncertain, mainly due to fragmentation of forest areas in Baikunthapur, Kalimpong, Jalpaiguri and Cooch Behar Forest Division. The elephants are compelled to move through tea gardens, villages and agricultural field resulting in increased conflicts. It is also important to protect the elephant corridor between Mahananda Wildlife Sanctuary and Baikunthapur Forest Division along the Teesta River by removing the illegal human settlements (Nayabasti) along this corridor. There is also need to re-establish the corridor between North Diana forest and Rheti forest which serves as a link path for herds in the Tonda and Titi forests. In the terai, the movement of elephants to Nepal does not take place due to fragmentation of forest in the Panighata Range and also due to firing and other attacks on elephants in Nepal. The Buxa-Ripu (Sankosh) elephant corridor linking Buxa Tiger Reserve to Manas Tiger Reserve (Assam) needs to be secured as elephants move to Manas with great difficulty due to large-scale felling of trees and encroachment in Assam on the eastern side of the Sankosh River. This corridor needs to be strengthened on an urgent basis by acquiring land in Assam to maintain elephant movement between northern West Bengal and Assam.



ELEPHANT CORRIDORS IN NORTHERN WEST BENGAL



LEGEND

- Reserve Forest
- Tea Estate
- Corridor
- Railway
- Water Bodies
- Road
- International Boundary
- Settlements



1. MAHANANDA - KOLBARI



State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor, comprising of patchy forests and tea gardens, connects the Mahananda Wildlife Sanctuary with the Kolbari and Nipania Reserve Forest of Panighata Range on the border of Nepal. Elephants from Mahananda Wildlife Sanctuary pass through Lamagumbha Reserve Forest near Sukhiakhola and travel through Lamagumba and Rohini tea gardens to enter the Bamanpokri Reserve Forest. From here they pass through the Garidhura tea garden and Balasone extension forest and after crossing the Balasone River near Hatidhora enters the Tartari Reserve forest. From Tartari they pass through Barachenga, Belgachia, Nipania and Ashapur tea gardens to enter the Kolabari Reserve Forest of Lower Mechi to then occasionally cross over to Nepal. At times they also move to the Tukriajhar forest area via Bengdube, Naxalbari and Uttamchand forests.

Forest Division : Kurseong

Connectivity : Mahananda Wildlife Sanctuary with Kolabari Reserve Forest of Panighata Range

Geographical coordinates:

Latitude 26°46'–26°48' N
Longitude 88°11'–88°19' E

Length: 12–13 km

Width: 1–1.5 km

Forest type/ Vegetation: Tropical moist deciduous forest and sal plantation

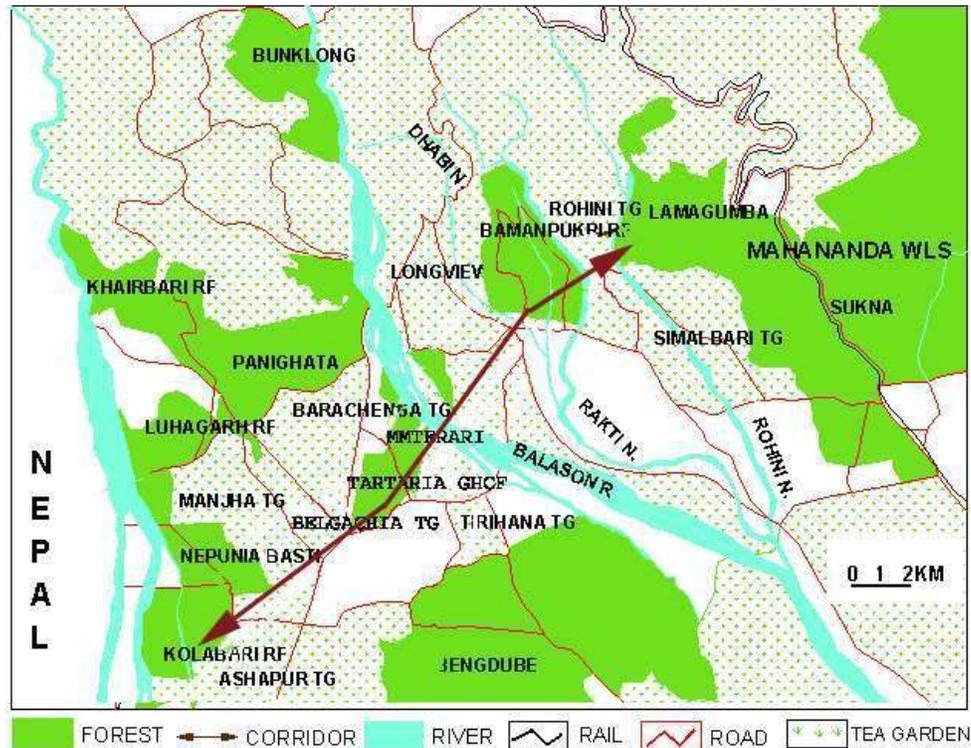
Nearest PA: Mahananda Wildlife Sanctuary

Legal status of the corridor: Reserve forest, Gorkha Hill Council forest land, forests leased to tea gardens and patta land

Major land-use: Forest, tea garden settlement

Major habitation/settlements in corridor: Mahananda-Mechi Terari (225–230 families), Nepunia *basti* in scattered blocks (500–600 families), Oswaldangi (70 families) and the labour colonies of tea gardens.

Corridor dependent villages: Mahananda-Mechi Terari, Nepunia *basti*, Oswaldangi, Tukrabasti (35 families), Chengabasti, Srasath Seema Bal (SSB) army camp and the labor colonies of tea gardens.



Human artefacts on the corridor: SSB camp at Tukrabasti, Army cantonment, road (Siliguri-Pankhabari) and tea gardens

Frequency of usage of the corridor by elephants: Regularly and seasonal, used by both bulls and herds during maize (May to July) and paddy (October to February) seasons

Threats to the corridor:

1. Pressure from Mahananda-Mechi Terari, Nepunia *basti*, Tukrabasti and labor colonies of tea gardens
2. Army cantonment
3. Heavy traffic on the Siliguri-Pankhabari road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Seek alternatives for Mahananda-Mechi Terari village
3. Prevent change in land-use pattern of the tea gardens

Remarks: Severe fragmentation and degradation of forest in Tukriajhar and along the Mechi River has made this habitat unsuitable for the long-term survival of elephants and has increased conflict. Hence, efforts should be made to restrict the movement of elephants beyond the Balason River.



2. APALCHAND - MAHANANDA

Alternate name: Teesta Chaur

State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor facilitates elephant movement from the Apalchand Reserve Forest of Baikunthapur Forest Division and to the Laltong range of Mahananda Wildlife Sanctuary. Elephants from Apalchand Reserve Forest cross the Gish River near Gazaldoba Block 1 and pass through the Sonali tea garden, the Lish River, the Kolagaiti tea garden before crossing the River Teesta and walking on the banks of the river, enter the Laltong Range of Mahananda Wildlife Sanctuary near Laltong village or below Sevoke 10-miles. Sometimes they cross the Teesta just after crossing the Lish River and walk through the chaur to enter Baikunthapur Protected Forest.

Forest Division : Baikunthapur and Mahananda Wildlife Sanctuary

Connectivity : Apalchand Reserve Forest with Mahananda Wildlife Sanctuary

Geographical coordinates :

Latitude 26°47'–26°49' N
Longitude 88°31'–88°35' E

Length: 10–11 km

Width: 3 km

Forest type/ Vegetation: Tropical dry and moist deciduous, grassland and plantations

Nearest PA: Mahananda Wildlife Sanctuary

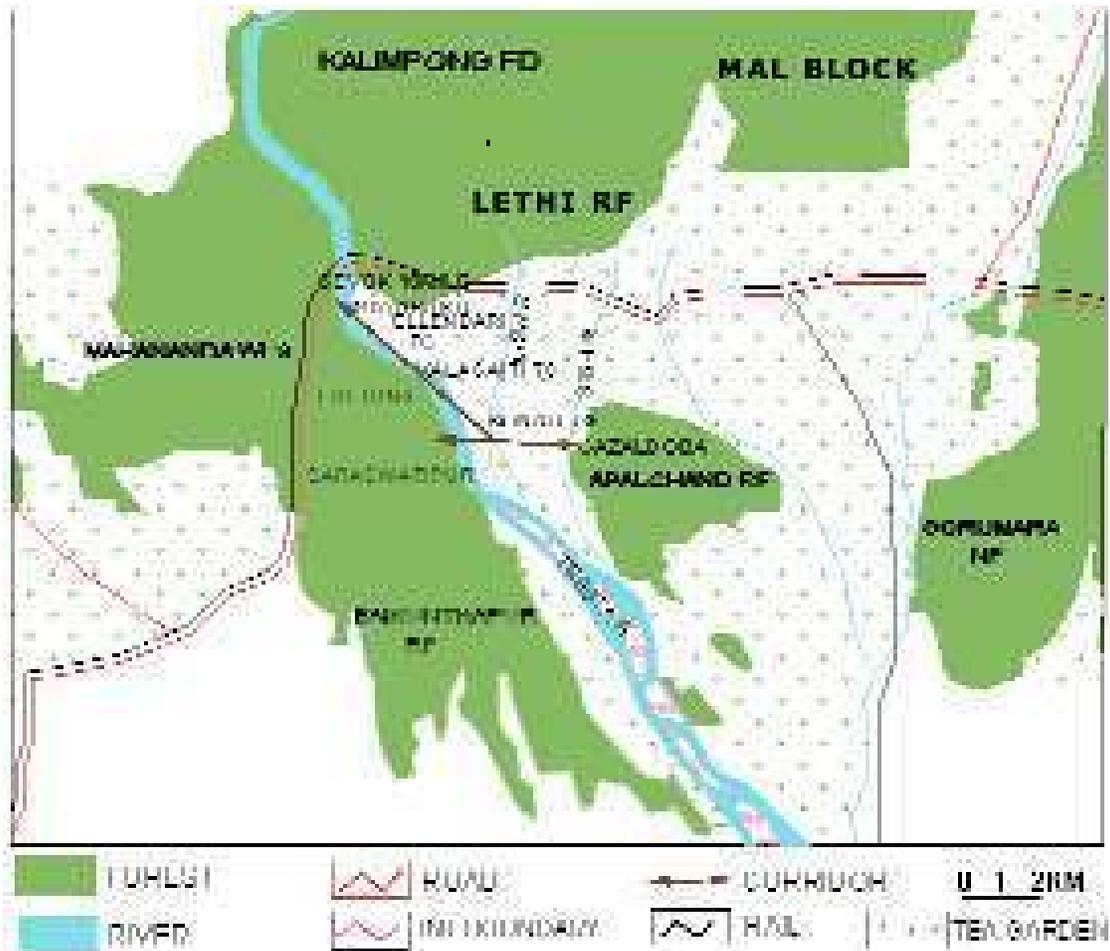
Legal status of the corridor: Reserve forest and forest land leased to tea gardens.

Major land-use : Forest, settlements, tea gardens and agriculture

Major habitation/settlements in corridor: Nayabasti village (200 houses) along the Teesta chaur, labor lines of the tea gardens, Laltong (18 houses) and Shaugaon (200 houses) village

Corridor dependent villages : Nayabasti, labor lines of the tea gardens, Laltong, Shaugaon and Dhumsigara Village

Human artefacts in the corridor area: Army firing range



Frequency of usage of the corridor by elephants: Regular; seasonal (July - November); bulls and large herds of 40–80 elephants.

Threats to the corridor:

1. Army firing range
2. Expansion of settlements along Teesta chaur (Nayabasti).

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Shifting of army firing range
3. Stop further immigration of people in the area, especially along the Teesta Chaur
4. Seek alternatives for Nayabasti

Remark: Sometimes elephants also cross from the Gazaldoba beat of Apalchand to enter the Saraswatipur beat on other bank of the Teesta River, north of Nipunia village near the Saraswatipur beat office.



3. APALCHAND - GORUMARA



Alternate name: Lower Tondu-Apalchand

State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor passes through the Baradighi tea estate and crosses Neora, Kumlai and the Chel River to connect the habitats of Gorumara National Park and Apalchand Reserve Forest. Elephants enter Apalchand Reserve Forest near Nipuchapur village close to Mech *basti*. Increased conflict is reported in this area due to large human habitation, tea gardens (Baradighi and Dam Dim) and agricultural fields.

Forest Division : Baikunthapur and Wildlife II Division

Connectivity : Apalchand Reserve Forest with Gorumara National Park

Geographical coordinates :

Latitude 26°47'04"–26°47'43" N
Longitude 88°41'42"–88°47'52" E

Length: 12–13 km

Width: 1–2 km

Forest type/ Vegetation: Tropical moist deciduous

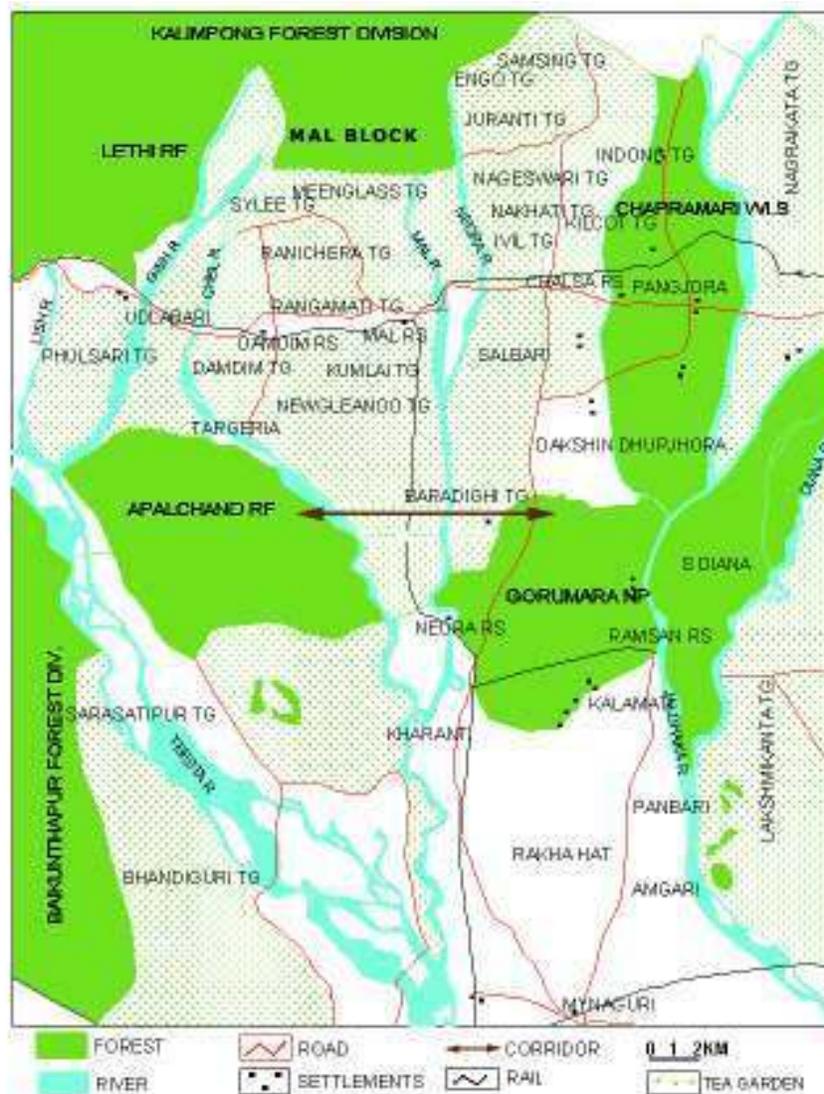
Nearest PA: Gorumara National Park

Legal status of the corridor: Forest land leased to tea gardens and patta land.

Major land-use: Tea gardens (Baradighi and Damdim) and agriculture

Major habitation/settlements in corridor: Nipuchaur village, labor colonies {Gosai of Dam Dim TE and Dhobi (200 houses), Ranichand (200 houses), Prem Nagar (200 houses) and Tilabari (800-850 houses) under Baradighi tea garden} and Kumarpara village, Chawaphili (25 houses), Saraswali-I and Saraswali-II Forest villages

Corridor dependent villages: All the above mentioned villages and Metchbasti (53 families)



Human artefacts on the corridor: Railway line (Mal-Lataguri), villages.

Frequency of usage of the corridor by elephants: Regular and seasonal; used during maize (June–July) and paddy (September–February) seasons

Threats to the corridor:

1. Expansion of human settlement in Nipuchapur and Kumarpara

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Checking the expansion of settlements
3. Dialogue with the tea management to re-organize labor lines outside the corridor



4. APALCHAND - KALIMPONG AT MAL BLOCK (VIA SYLEE)

Alternate name: Apalchand-Bhuttabari

State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor connects the Apalchand Reserve Forest of Baikanthapur Forest Division and Mal block of Kalimpong Forest Division. Elephants from Apalchand pass through the Targhera Range (between Chel Block 1 and Hanskhali Block 4) and after crossing the Chel River pass through Betguri, Batabari, Ranichera and Sylee Tea gardens to enter the Mal block of Kalimpong FD. They cross the Mal-Siliguri highway (National Highway-31) about two kilometers before Damdim

Forest Division : Baikanthapur and Kalimpong

Connectivity : Mal block of Kalimpong Forest Division with Apalchand Reserve Forest of Baikanthapur Forest Division

Geographical coordinates :

Latitude 26°47'–26°56' N
Longitude 88°40'–88°41' E

Length: 20 km

Width: 1–1.5 km

Forest type/Vegetation: Tropical mixed dry to moist deciduous forest and plantations

Nearest PA: Gorumara National Park and Chapramari Wildlife Sanctuary

Legal status of the corridor: Revenue land, forest land leased to tea gardens.

Major land-use: Tea gardens (Damdim, Betguri, Bathguri, Ranichera and Sylee), and settlements

Major habitation/settlements in corridor: Labour colonies of tea gardens {Bathguri (200 houses), Guabari (50 houses), New station (200 houses), Chel (200 houses), Ranichera (100 houses) and Dam Dim labor colony (400+ houses) and Dam Dimpara village

Corridor dependent villages: Labour colonies of tea gardens {Bathguri (200), Guabari (50 houses), New station (200 houses), Chel (200 houses), Ranichera



(100 houses) and Dam Dim labor colony (400+ houses), Dam Dimpara, Khagra and Baltukra village

Human artefacts on the corridor: Dam Dim Army supply camp, Ranichera tea golf club, road (Mal-Siliguri highway) and railway line (Siliguri-Alipurduar).

Frequency of usage of the corridor by elephants: Regular and seasonal; bulls and herds during June-July and October-February

Threats to the corridor:

1. Labour colonies of tea gardens and settlements.
2. Heavy vehicular traffic along the Mal-Siliguri highway
3. Railway line (Alipurduar-Siliguri converted broad gauge railway line)

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of night traffic along Mal-Siliguri highway
3. Seek alternatives for labor colonies
4. Prevent change in land-use pattern in tea gardens



5. APALCHAND-KALIMPONG AT MAL BLOCK (VIA MEENGLASS)

Alternate name: Apalchand Bhuttabari

State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects the Apalchand Reserve Forest of Baikunthapur Forest Division with Mal block of Kalimpong Forest Division. Elephants from the Targhera Range of Apalchand cross the Chel River and pass through Dam Dim, Kumlai, Goodhope, Rangamati, Ranichera and Meenglass Tea gardens and their scattered labor lines to enter Mal block. They cross the Mal-Siliguri highway (National Highway-31) about a kilometer after Dam Dim.

Forest Division : Baikunthapur and Kalimpong

Connectivity : Mal block of Kalimpong division with Apalchand Reserve Forest

Geographical coordinates :

Latitude 26°47'–26°56' N
Longitude 88°40'–88°42' E

Length: 20 km

Width: 0.5–1 km

Forest type/ Vegetation: Tropical dry to moist deciduous forest and tea garden

Nearest PA: Chapramari Wildlife Sanctuary

Legal status of the corridor: Revenue land, forest land leased to tea gardens and National Highway

Major land-use: Tea gardens (Damdim, Kumlai, Good Hope, Rangamati and Meenglass), road (Mal-Siliguri highway) and railway line (Siliguri-Alipurduar)

Major habitation/settlements in corridor: Five tea garden labor colonies {Banludhura (200 houses), Naya Kaman (60 houses), Banshibari (25 houses), Holijangal (45 houses), Chyabasa (200 houses) and Bhuttabari (450 houses)} and Chakla *basti* (250 houses) village

Corridor dependent villages: Tea garden labor colony (Banludhura, Naya Kaman, Banshibari, Holijangal, Chabasa and Bhuttabari) and one village (Chakla *basti*)



Human artefacts on the corridor: Road (Mal-Siliguri highway) and railway line (Alipurduar-Siliguri converted broad gauge railway line)

Frequency of usage of the corridor by elephants: Regular

Threats to the corridor:

1. Encroachment around Sylee *hat* and other settlements. Heavy traffic on National Highway-31
2. Railway line

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of night traffic along the Mal-Siliguri highway
3. Seek alternatives for labor colonies
4. Prevent change of land-use pattern of the tea gardens



6. CHAPRAMARI-KALIMPONG (MAL BLOCK)



Alternate name: Chapramari-Bhuttabari

State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor facilitates elephant movement between Mal block of Kalimpong Forest Division and Chapramari Wildlife Sanctuary of Wildlife Division-II. From Chapramari, the elephants cross Murti River near Sardi line and move between Kilcot and Engo Tea Estate. After crossing the Chalsa-Matiale road, they pass through Juranti and Nagaisree tea gardens and cross the Neora River to enter Bhuttabari near Mal-4 forest village and Nakti tea garden. Sometime they go beyond Nakti tea garden and Sonagachi tea garden to Gurjhanjhora and Meenglass tea gardens to enter the Mal Block.

Forest Division : Wildlife II and Kalimpong

Connectivity : Bhuttabari Reserve Forest with Chapramari Wildlife Sanctuary

Geographical coordinates :

Latitude 26°54'–26°56' N
Longitude 88°46'–88°50' E

Length: 7.5 km

Width: 2 km

Forest type/ Vegetation: Tropical moist deciduous forest and tea gardens

Nearest PA: Chapramari Wildlife Sanctuary

Legal status of the corridor: Reserve Forest, and forest lands leased to tea gardens

Major land-use: Tea gardens, forest and settlement

Major habitation/settlements in corridor: Tea garden labor colonies { Dela (50 houses), Damu (40 houses), Gopal (150), Neora (50), Tila, Gudam, Poka, Koka, Gudu, Daya (40-50 houses), etc.} and Mal-4 (45-50 houses) forest village

Corridor dependent villages: Tea garden labor colonies {Dela (50 houses), Damu (40 houses), Gopal (150), Neora (50), Tila, Gudam, Poka, Koka, Gudu, Daya (40-50 houses), etc.} and Mal-4 (45-50 houses) forest village



Human artefacts on the corridor: Tea processing plant and road (Jalpaiguri-Chalsa-Matiale)

Frequency of usage of the corridor by elephants: Regular (bells and herds)

Threats to the corridor:

1. Expansion of tea gardens and labor colonies
2. Traffic along Jalpaiguri-Chalsa-Matiale road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Checking the expansion of labor colonies
3. Seek alternatives for labor colonies that comes directly in the movement path (Gopal Labor Line, Juranti Manager's bungalow, Damu Labor Line, Neora Labor Line, Dela Labor Line)
4. Regulate vehicular traffic on the Jalpaiguri-Chalsa-Matiale road



7. RETHI - CENTRAL DIANA



State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Low

Elephants move between Central Diana Reserve Forest and Rethi Reserve Forest passing through tea gardens and a few settlements. The elephants cross National Highway-31 and the railway line between Red Bank and Lakhipara tea estates and then pass through Palasbari, Rhyabari, Diana, Kathalguri, Harithalguri and Chunabhati tea gardens and cross the Rethi River to enter the Rethi Reserve Forest.

Forest Division : Jalpaiguri

Connectivity : Rethi Reserve Forest with Central Diana Reserve Forest

Geographical coordinates :

Latitude 26°47'–26°50' N
Longitude 88°58'–89°04' E

Length: 14–15 km

Width: 1.5–2 km

Forest type/ Vegetation: Tropical deciduous sal forest and tea gardens

Nearest PA: Gorumara National Park and Jaldapara Wildlife Sanctuary

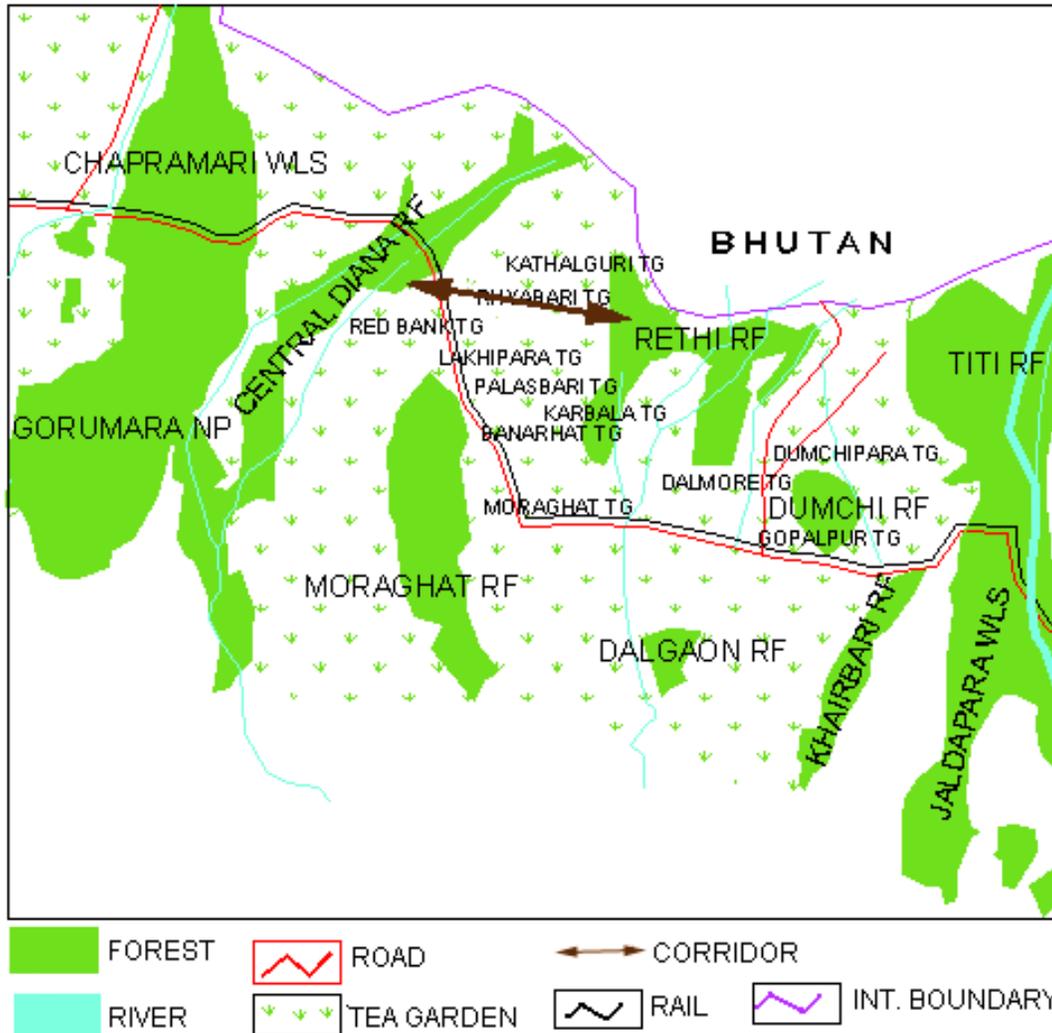
Legal status of the corridor: Reserve forest and forest land leased to tea gardens

Major land-use: Tea garden and forest

Major habitation/settlements in corridor: Prayagpore FPC with about 80 houses, and a few labor colonies of tea gardens

Corridor dependent villages: Prayagpore FPC and labor colonies of tea gardens.

Human artefacts on the corridor: National Highway-31 (Malbazar-Banarhat) and railway line (Chalsa-Madarihat)



Frequency of usage of the corridor by elephants: Regular and seasonal; 20–25 elephants use this corridor during October–February

Threats to the corridor:

1. Heavy traffic on Malbazar-Banarhat road
2. Conversion of railway line from narrow gauge into broad gauge resulting in increase of rail traffic
3. Human activities in the tea gardens
4. Settlements and labor colonies in the corridor area

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prevent the change in land-use of tea gardens and check further expansion of labor colonies



8. RETHI - MORAGHAT



State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor in Jalpaiguri Forest Division connects Rethi Reserve Forest with Moraghat Reserve Forest and passes mainly through tea gardens (Karbala, Banarhat, Gandrapara and Moraghat). Elephants enter Moraghat Reserve Forest through the Gairkata Range near Totapara beat. They cross National Highway-31 near the Kalibari railway crossing.

Forest Division : Jalpaiguri

Connectivity : Rethi Reserve Forest and Moraghat Reserve Forest

Geographical coordinates :

Latitude 26°46'–26°47' N
Longitude 88°59'–89°06' E

Length: 9 km

Width: 1 km

Forest type/ Vegetation: Tropical deciduous forests and tea gardens

Nearest PA: Nil

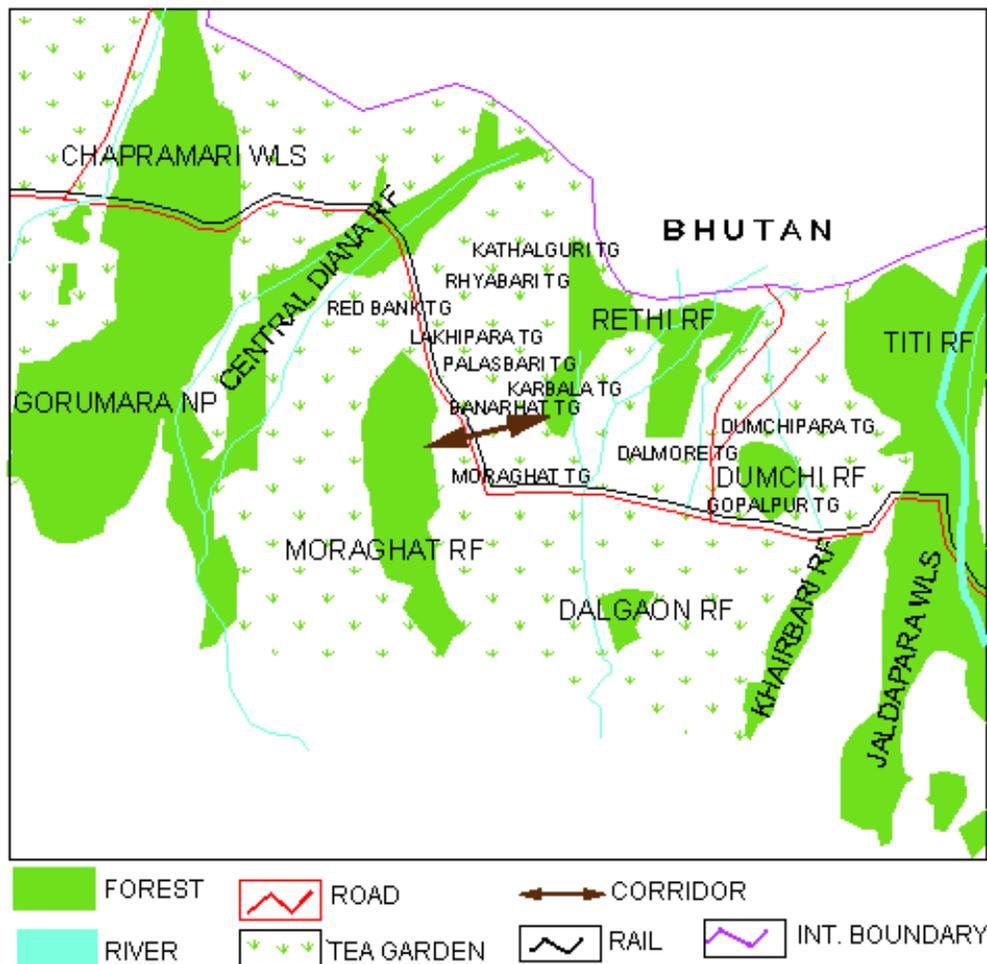
Legal status of the corridor: Reserve forest and forest lands leased to tea gardens

Major land-use: Tea garden, forest and settlement

Major habitation/settlements in corridor: Labour colonies of tea gardens

Corridor dependent villages: Labour colonies of tea gardens.

Human artefacts on the corridor: National Highway-31 (Malbazar-Banarhat-Binaguri) and railway line (Chalsa-Madarihat).



Frequency of usage of the corridor by elephants: Regular. Herds of 50–60 elephants have been seen using the corridor

Threats to the corridor:

1. Degradation of the forest, especially in Moraghat Forest
2. Heavy traffic on Malbazar-Banarhat-Telepara road and Banarhat-Gairkhata road.
3. Conversion of railway line from narrow gauge to broad gauge.
4. Day-time human activities in the tea garden

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Habitat improvement of the Moraghat forest area.
3. Persuading the tea garden management to protect the corridors and leaving a few areas for free movement of elephants.
4. Regulation of traffic on Gairkata-Banarhat road and Malbazar-Banarhat-Telepara road



9. DUMCHI - RETHI



State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor in Cooch Behar and Jalpaiguri forest division passes mainly through tea gardens and elephant movement occurs generally at night. Only solitary bulls or small herds use this corridor.

Forest Division : Cooch Behar and Jalpaiguri

Connectivity : Dumchi Reserve Forest with Rethi Reserve Forest

Geographical coordinates :

Latitude 26°44'–26°50' N
Longitude 88°59'–89°12' E

Length: 9–10 km

Width: 1–2 km

Forest type/ Vegetation: Tropical moist deciduous forest and forest land leased to tea gardens

Nearest PA: Nil

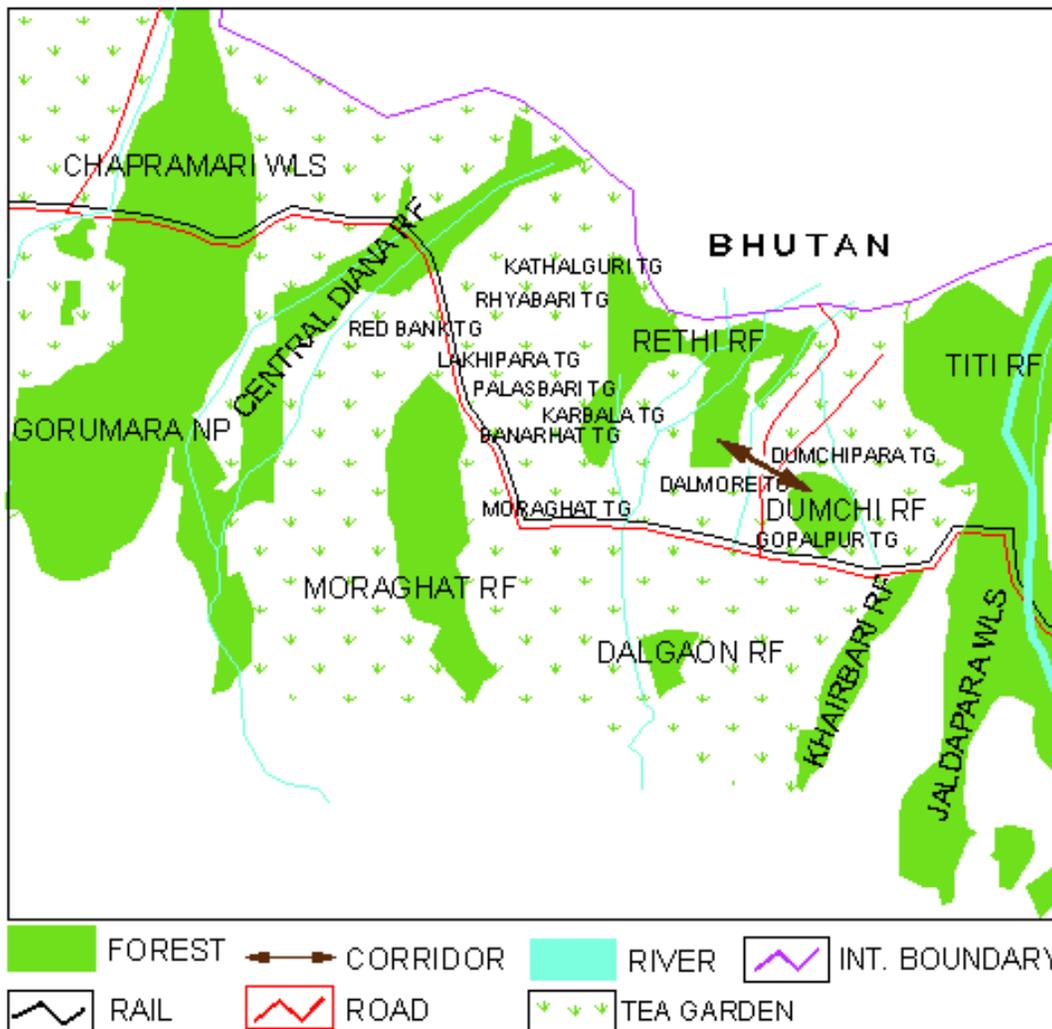
Legal status of the corridor: Reserve Forest and forest land leased to tea gardens

Major land-use: Tea gardens, forest and agriculture

Major habitation/settlements in corridor: Labour colonies of tea gardens (Gopalpur, Ramjhora, Dalmore, Bundapani and Makrapara)

Corridor dependent villages: Few labor colonies of tea gardens

Human artefacts on the corridor: The Birpara-Lankapara road and Birpara-Gomtu Bhutan road



Frequency of usage of the corridor by elephants: Occasional, used mostly by bulls and small herds.

Threats to the corridor:

1. The corridor passes mostly through tea gardens.
2. Agriculture and settlements in and around the corridor

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Persuasion of the Government to acquire some of the tea gardens for movement of elephants
3. Convincing the garden owners of the need to protect a part of the tea gardens for elephant movement
4. Seek alternatives for labor colonies on the corridor land



10. TITI - DUMCHI



State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor passes mainly through tea gardens (Hantapara, Mujnai and Dhumchi) and the Shalbani forest to connect Titi Reserve Forest and Dhumchi Reserve Forest. The expansion of Madarihat township has increased biotic pressure on the corridor and urgent protection is needed

Forest Division : Cooch Behar

Connectivity : Titi Reserve Forest with Dumchi Reserve Forest

Geographical coordinates :

Latitude 26°43'–26°44' N
Longitude 89°12'–89°19' E

Length: 9 km

Width: 1–2 km

Forest type/ Vegetation: Tropical moist deciduous forest

Nearest PA: Jaldapara Wildlife Sanctuary

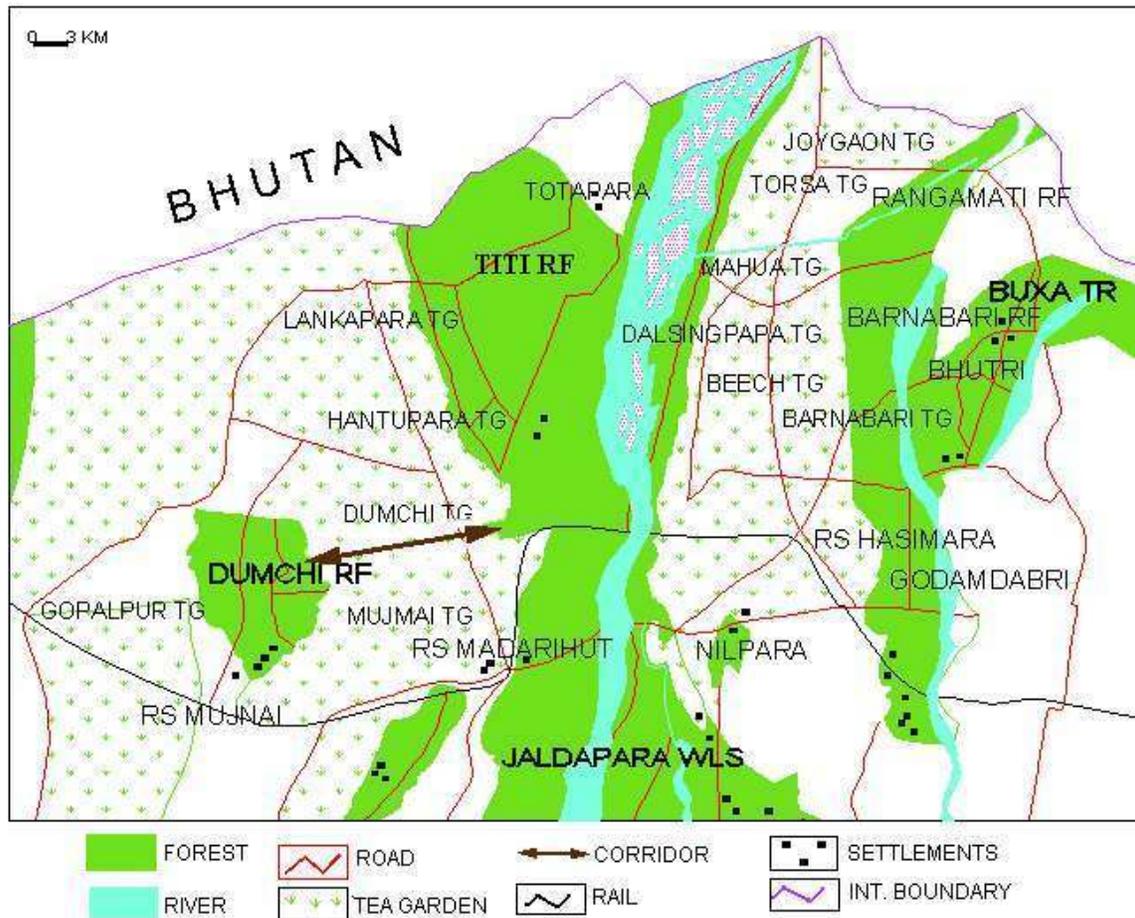
Legal status of the corridor: Reserve Forest and forest lands leased to tea gardens

Major land-use: Tea gardens and forest

Major habitation/settlements in corridor: Labor colonies of tea gardens (Hantapara, Mujnai and Dhumchipara)

Corridor dependent villages: Labor colonies of tea gardens and settlements at the fringe areas

Human artefacts on the corridor: Madarihat-Lankapara road, Madarihat-Totapara road and high tension electric lines



Frequency of usage of the corridor by elephants: Occasional; small herds and bulls

Threats to the corridor:

1. Expansion of Madarihath township
2. Labour colonies of the tea garden
3. Railway line and road traffic
4. Biotic pressure from settlements in and around the corridor area

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Acquisition of a part of Dumchi and Mujnai Tea garden
3. Raising the height of high tension electric lines as it has led to death of elephants in past



11. BUXA - TITI (VIA TORSA)



State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects Rangamati Reserve Forest area of Buxa Tiger Reserve with Titi Reserve Forest. There is a stream (Gabarjithi *jhora*) that passes between Dalsingpara tea garden and Torsa tea garden and crosses the Hasimara-Phuntsoling road finally meeting the Torsa River. Elephant uses this stream to move between Buxa Tiger Reserve and Titi Reserve Forest.

Forest Division : Buxa Tiger Reserve and Cooch Behar

Connectivity : Buxa Tiger Reserve with Titi Reserve Forest

Geographical coordinates:

Latitude 26°48'–26°49' N
Longitude 89°20'–89°23' E

Length: 6 km

Width: 0.5-1 km

Forest type/ Vegetation: Tropical semi-evergreen forest

Nearest PA: Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary

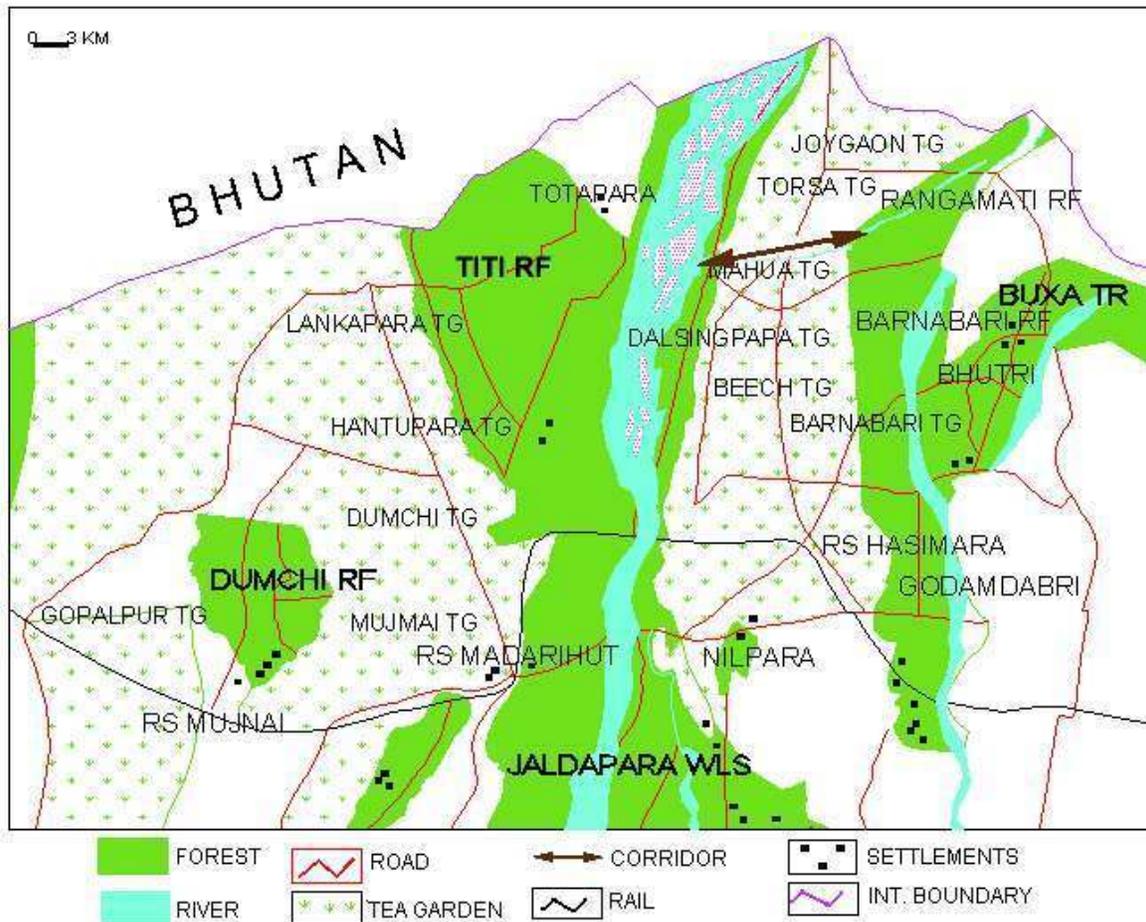
Legal status of the corridor: Reserve forest and forest land leased to tea gardens

Major land-use: Forest, tea garden and settlements

Major habitation/settlements in corridor: Torsa and Mahua tea garden labor colonies

Corridor dependent villages: Few settlements along the river, Mahua labor lines and Gopal Bahadur *basti* (350 houses) and Bailelguri revenue village (near Titi)

Human artefacts on the corridor: Road (Hasimara-Phuntsoling)



Frequency of usage of the corridor by elephants: Occasional

Threats to the corridor:

1. Settlement of Mohua labor colonies and Gopal Bahadur *basti*
2. Heavy traffic along the Hasimara-Phuntsoling road
3. Stone crushing unit on stream bank near the bridge on the Hasimara-Phuntsoling road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Monitoring the land-use pattern in and around corridor area
3. Preventing the expansion of Gopal Bahadur *basti* towards Gabarjithi *jhora*
4. Stopping the stone crushing unit on *jhora* (river) bed



12. BUXA - TITI

(VIA BEECH AND BARNBARI TE)

State	: West Bengal
Ecological Priority	: Medium
Conservation Feasibility	: Medium

This corridor connects Barnbari Reserve Forest of Buxa Tiger Reserve and Titi Reserve Forest situated south of Dalsingpara tea estate by passing through Barnbari tea estate and Beech tea estate. Solitary elephants and small herds generally use the corridor during night as there is heavy traffic along the Hasimara-Phuntsoling road that passes through the corridor with Beech tea garden to its west and Barnbari tea estate to its east

Forest Division : Buxa Tiger Reserve and Cooch Behar

Connectivity : Barnbari Reserve Forest (Buxa Tiger Reserve) with Titi Reserve Forest

Geographical coordinates :

Latitude	26°46' N
Longitude	89°19'– 89°23' E

Length: 5–6 km

Width: 0.5 km

Forest type/ Vegetation: Tropical semi evergreen and riparian forest

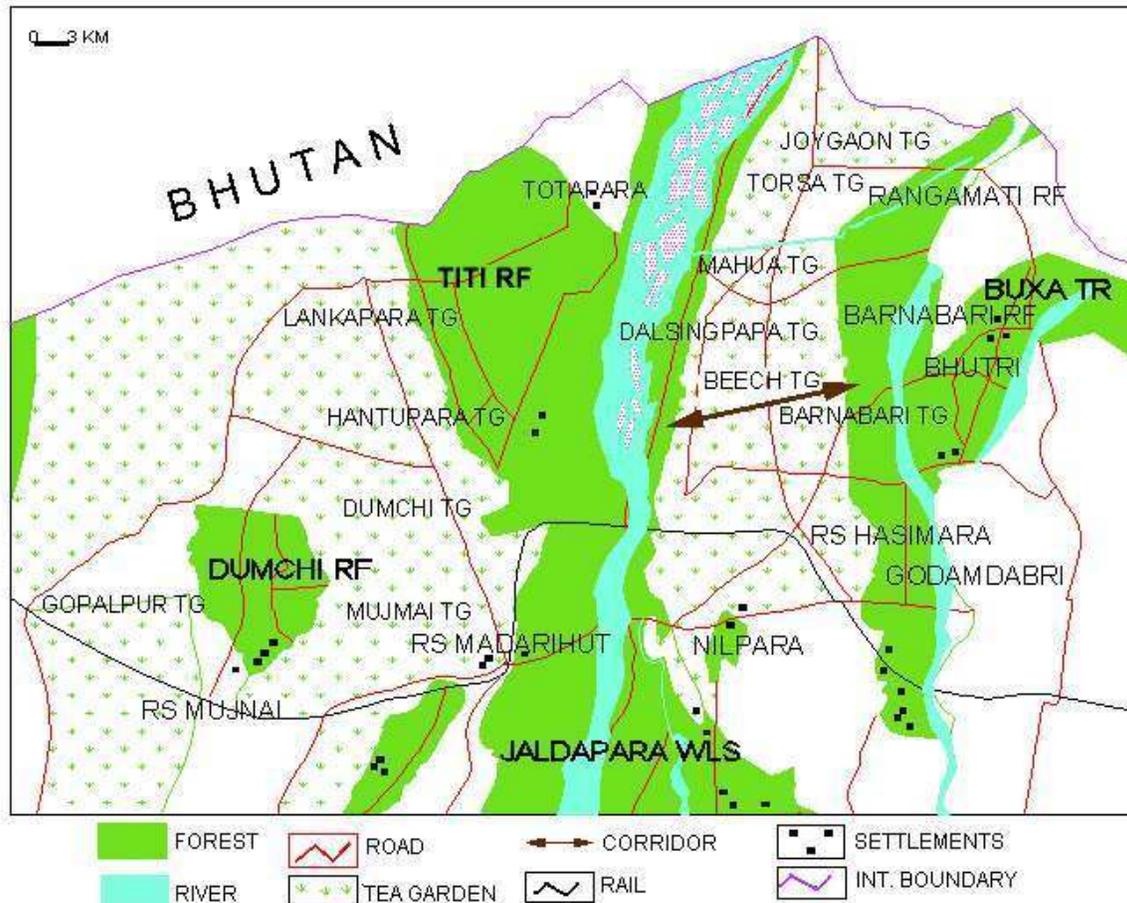
Nearest PA: Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary

Legal status of the corridor: Reserve forest and land leased to tea gardens.

Major land-use: Tea garden and forest

Major habitation/settlements in corridor: Gopal *basti* (350 houses), Labor lines of Beech tea garden and Titi forest village

Corridor dependent villages: Gopal *basti* (350 houses), Labor lines of Beech tea garden and Titi forest village and Bailelguri revenue village



Human artefacts on the corridor: Road (Hasimara-Phuntsoling)

Frequency of usage of the corridor by elephants: Regular and seasonal; used by bulls and small to medium sized herds during maize (June–July) and paddy (September–February) season

Threats to the corridor

1. Tea gardens and human activities during the day
2. Heavy traffic along the Hasimara-Phuntsoling road
3. Expansion of Gopal *basti* and Titi forest village and the resultant biotic pressure.

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of traffic at night on the Hasimara-Phuntsoling road
3. Prevent change in the land-use pattern in and around the corridor area
4. Prevent the expansion of Gopal *basti* village and seek alternatives



13. NIMATI - CHILAPATA



Alternate name: Buxa-Chilapata

State : West Bengal
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor facilitates elephant movement between Nimati Range of Buxa Tiger Reserve and Chilapata Reserve Forest of Cooch Behar Forest Division thereby maintaining elephant movement between Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary

Forest Division : Buxa Tiger Reserve (West) and Cooch Behar

Connectivity : Buxa Tiger Reserve with Chilapata Reserve Forest leading to Jaldapara Wildlife Sanctuary

Geographical coordinates :

Latitude 26°35'–26°36'N
Longitude 89°23'–89°24'E

Length: 6 km **Width:** 1–1.5 km

Forest type/ Vegetation: Tropical moist deciduous forest and tea garden

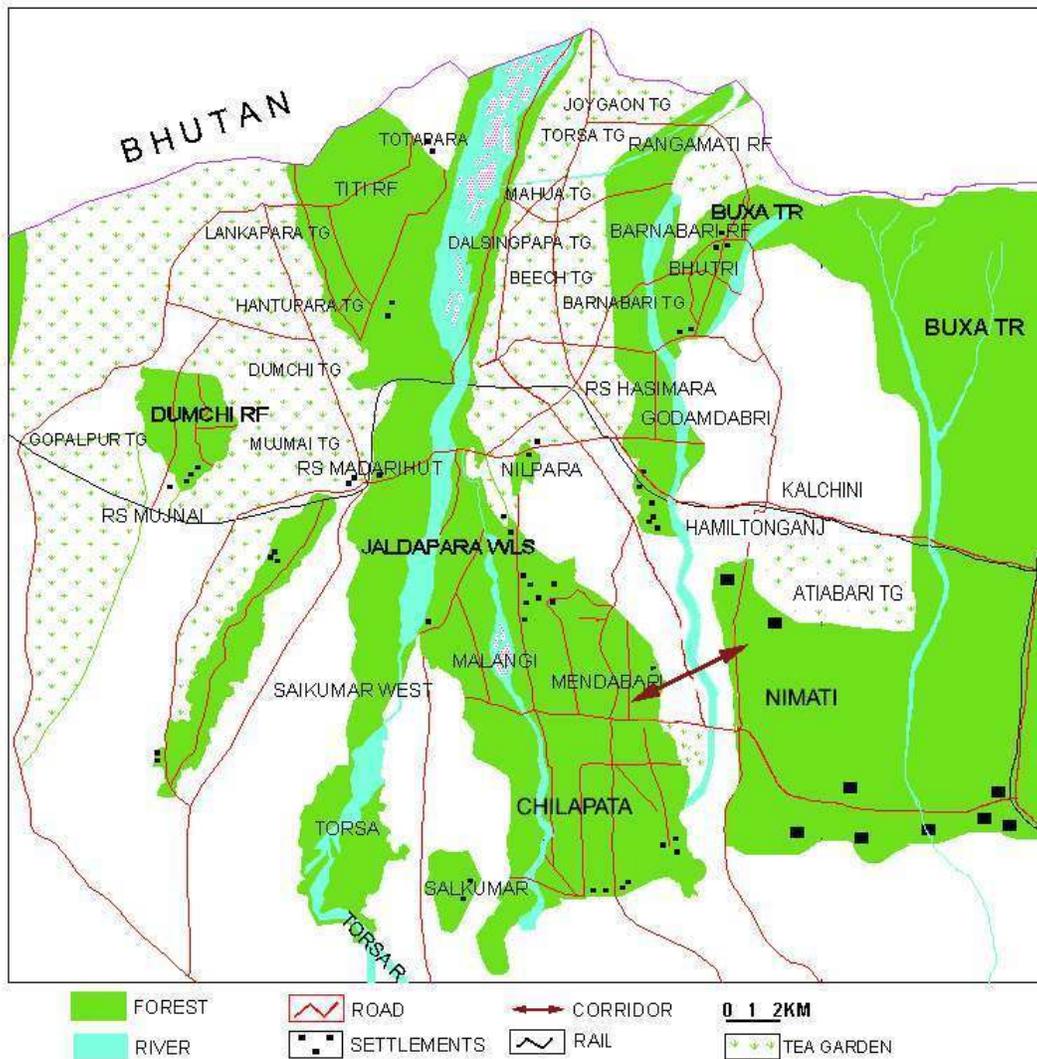
Nearest PA: Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary

Legal status of the corridor: Reserve Forest, revenue land and forest land leased to tea gardens

Major land-use: Forest, agriculture and Tea garden

Major habitation/settlements in corridor: South Mendabari, Bangabasti Forest village, Mendabari Beat office

Corridor dependent villages: South Mendabari, Bangabasti Forest village and Nimati



Human artefacts on the corridor: National Highway-31

Frequency of usage of the corridor by elephants: Occasional

Threats to the corridor:

1. Heavy traffic on National Highway-31
2. Biotic pressure from adjacent villages, Bongobasti and tea gardens

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prevent change of land-use patterns in the tea gardens
3. Regulate vehicular traffic at night



14. BUXA - RIPU AT SANKOSH



Alternative name-Sankosh

State : West Bengal and Assam
Ecological Priority : High
Conservation Feasibility : Medium

This corridor is a contiguous forest that connects Buxa Tiger Reserve of Bengal with the Ripu Reserve Forest of Kochugaon Forest Division, Assam. The Sankosh River passes through Buxa Tiger Reserve and Kochugaon.

Forest Division : Buxa Tiger Reserve (East) (West Bengal) and Kochugaon (Assam)

Connectivity : Buxa Tiger Reserve with Ripu Reserve Forest of Assam

Geographical coordinates :

Latitude 26°41' N
Longitude 89°52' E

Length: 2.5 km

Width: 1–1.5 km

Forest type/ Vegetation: Tropical semi-evergreen, and tropical deciduous forest.

Nearest PA: Buxa Tiger Reserve

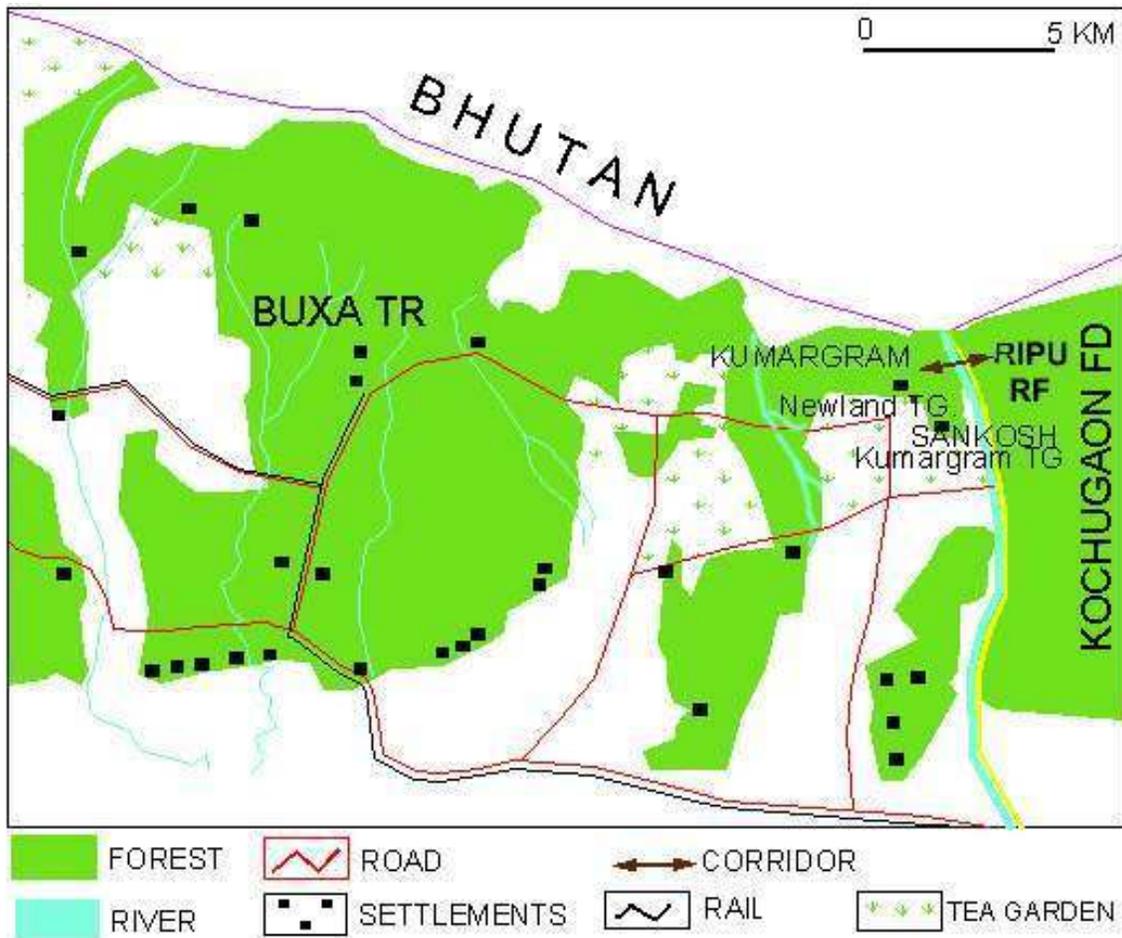
Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest and settlement

Major habitation/settlements in corridor: Kumargram (70–72 families) and Sankosh (98 families) forest village

Corridor dependent villages: Kumargram (70–72 families) and Sankosh (98 families) forest village

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Regular

Threats to the corridor:

1. The biotic pressure from Sankosh and Kumargram villages
2. Degradation of forest in and around the villages

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Habitat improvement in Ripu Reserve Forest of Assam



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CHAPTER-7



Elephant Corridors of North-Eastern India

Sandeep Kumar Tiwari,¹ Sunil Subba Karyong,² Prabal Sarkar,³
Anwaruddin Choudhury⁴ and A. Christy Williams⁵

The elephants of north-eastern India had an almost contiguous distribution with the populations of Bhutan, Bangladesh, Nepal and Myanmar in the past. However, due to degradation and fragmentation of the habitat, the elephants are now confined to certain discrete populations. The elephant is now distributed in four distinct populations and a few scattered populations in the Barak valley (Choudhury, 1999). The major elephant populations are as follows:

(A) North Bank of the Brahmaputra : This population extends from northern West Bengal (this has been dealt with separately in this publication) through the Himalayan foothills and dooars covering southern Bhutan, northern Assam and Arunachal Pradesh along the north bank of the River Brahmaputra. In eastern Assam, the range also covers part of the flood plains of the Brahmaputra and the Lohit River. In 1970, due to clearing of a strip of about 20 km in the Dibang valley of Arunachal Pradesh for cultivation and habitation, the elephant population of the north and south bank (eastern areas) became separated from each other.

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The elephant habitats of the north bank are under severe biotic pressure resulting in degradation and fragmentation. Due to large-scale encroachment and tree felling in Kochugaon Forest Division and other areas of Kokrajhar and Bongaigaon districts, elephant movement between Buxa Tiger Reserve (northern West Bengal) and Manas National Park (Assam) has been severely affected. Between 1991 and 1998, more than 1500 km² of forest area has come under human encroachment in the north bank (Talukdar and Barman, 2003). The Sonitpur district of Assam has been the worst affected and between 1994 and 1999, it lost 86.75 km² (1.7%) of forest area and more recently between 1999 and 2001, it lost 145.44 km² (2.86%) of forest area (Srivastava *et al.*, 2002). Thus 229.64 km² of moist deciduous forest and 2.55 km² of semi-evergreen forest have been lost between 1994 and 2001. The Gohpur Reserve Forest (133 km²) in the Sonitpur district is now totally encroached with no sign of the forest. Similarly other Reserve Forests such as Balipara (100 km² out of 188 km² under encroachment), Charduar, Nauduar, Biswanath, Behali and Singri in this district are under heavy encroachment. This has resulted in severe human-elephant conflict leading to large-scale crop depredation and loss of human and elephant life. The conflict reached its peak in 1998 and 2002, culminating in the mass poisoning of elephants in Sonitpur district and resulting in the death of 22 elephants. In just four years, between 1998 and 2002, 62 elephants died in Sonitpur East and West Division, Rowta Reserve Forest and West Assam Wild Life Division (Nameri Tiger Reserve). Two hundred and thirteen human deaths were also recorded in Sonitpur East and Sonipur West Division between 1991 and 2002. Elephants from Sonai Rupai Wildlife Sanctuary and Charduar Reserve Forest have traditionally been visiting the degraded Singri Hills Reserve Forest through tea gardens and agricultural fields. However, due to degradation and shrinkage of habitat in Sonai Rupai Wildlife Sanctuary, Charduar Reserve Forest and Balipara Reserve Forest, elephants have started visiting Arimura Chapori (adjacent to the Brahmaputra River, near Tezpur) since the past ten years. Elephants from Sonai Rupai Wildlife Sanctuary and Charduar Reserve Forest visit Arimura Chapori either via Gabharu-Dipota-Becheria or via Dhendai and Dhulepachung Tea Estate while from Balipara Reserve Forest to Arimura Chapori they come via Addabari and Harichuri Tea Estate. Elephants take shelter in Arimura Chapori (a small patch of forest) during the day and raid crops at night. Urgent remedial measures need to be taken to improve the habitats of Sonai Rupai Wildlife Sanctuary, Charduar Reserve Forest and Balipara Reserve Forest to restrict the movement of elephants to Arimura Chapori to reduce man-elephant conflict.

Movement of elephants has also been affected between Pakke Tiger Reserve and Papum Reserve Forest in Arunachal Pradesh due to human encroachment and agricultural activities. Elephants mainly use river-beds to move between these two areas. Seijosa nullah and a small plantation area near Longka Nullah serve as a movement path between the two habitats due to the complete clearing of forest in Nauduar Reserve Forest in Assam. The hydro-electric project in Lower Subansiri has also affected the elephant movement in the area.

(B) South Bank of the Brahmaputra : As already mentioned in Chapter one, the elephant population on the southern bank of Brahmaputra can be divided into three distinct populations: that of the eastern, central and western areas.

(1) In spite of fragmentation of the eastern range, the elephants still move through tea gardens and cultivations. This range became separated from the north bank population during the 1970s and from the south bank-central areas in the early 1980s. The separation from the south bank-central areas was due to large scale felling and encroachment in Dayang Reserve Forest, Nambor (South Block) Reserve Forest, Diphu Reserve Forest and Rengma Reserve Forest, totaling about 990 km² of forest area (Choudhury, 1999). The range is spread over Dibang Valley, Lohit, Changlang and Tirap districts in Arunachal Pradesh; Tinsukia, Dibrugarh, Sibsagar, Jorhat and Golaghat districts in Assam and Mon, Tuensang, Mokokchung and Wokha districts of Nagaland.

This range has been fragmented at many places, the most notable being the area along the Dhansiri River (Dayang Reserve Forest, Nambor South Reserve Forest, Rengma Reserve Forest and Diphu Reserve Forest) thereby severely hindering the movement of elephants between this part of Assam and Nagaland. Till the 1980's elephant movement was reported between Rengma Reserve Forest (Assam) and Baghty Valley (Nagaland) between Sungkha and Lishuya village. Similarly elephant movement from Desoi Reserve Forest and Meleng Reserve Forest (Assam) to adjacent elephant habitat in Nagaland has been badly hindered by habitat degradation in Assam and Nagaland.

As a result of large-scale destruction of forest cover in Golaghat district in the last two decades, elephants move to National Highway-37 in search of food from the trucks and buses passing on the highway. This area had dense forest cover till the mid 1980s. At present, about 40% of the northern part of Nambor Reserve Forest has been encroached (Talukdar and Burman, 2003).

Elephants from Digboi and Doom Dooma forest divisions move to forest areas of Changlang district of Arunachal Pradesh near Buridihing. A part of the elephant population of the Changlang district is continuous with that of Myanmar through a corridor in Namdhapa National park. However, all the other probable migration routes through Tirap and Changlang district of Arunachal Pradesh and Mon and Tuensang district of Nagaland are no longer available due to heavy poaching by the Konyak and the Wancho Nagas and clearance for jhum (Choudhury, 1999). Movement between Upper Dihing East and West block and Doom Dooma takes place mainly through tea gardens and agricultural land. Movement of elephants between Lakhpathar Reserve Forest (Digboi FD) and Takawani Reserve Forest (Doom Dooma FD) used to occur through Langkasi and Anandbari tea gardens. But due to encroachment and the expansion of settlements on both sides of the Tinsukia-Digboi highway (NH37) in the last one-decade, elephants are only using the corridor area for crop raiding and the connectivity is totally broken.

(2) The central range is one of the most important habitats for the elephant in north-eastern India and extends from Kaziranga National Park across the Karbi plateau, parts of the central Brahmaputra plains and the basin of the Diyung River to the foot of the Meghalaya plateau in Assam and Meghalaya. This population has become separated from the south bank-western population due to expansion of Guwahati city (capital of Assam), clearing of forest, 'jhum' cultivation and settlements along the National Highway 40 (Shillong-Guwahati) in the Rhi-Bhoi district of Meghalaya.

The elephants from the eastern Karbi plateau move down regularly to the plains of Kaziranga National Park at the beginning of winter, ascending once again at the advent of the floods (Choudhury, 1999). Movement between these two forests takes place mainly through tea gardens and cultivated lands. Heavy traffic on National Highway 37 passing through the corridor is one of the major barriers for animal movement, especially during the rains. There is occasional movement between this population and the south bank-western area population through Nongkhyllem Reserve Forest and the degraded habitat of Rhi-Bhoi district (through Nongwah Mawphar village area established in 1999).

(3) The habitat in the western range supports a significant population of elephants in parts of Assam and Meghalaya. It extends from near Guwahati through the foothills of the Meghalaya plateau (Garo and Khasi Hills) including the districts of Kamrup and Goalpara in Assam and Rhi-Bhoi, West Khasi Hills, East Garo Hills, West Garo Hills and South Garo Hills of Meghalaya. They also occasionally move to forests of Bangladesh from the forest areas of Baghmara in Meghalaya. The majority of the habitat is tropical moist deciduous and tropical semi evergreen forests. Tropical wet evergreen forest occurs along the narrow river valleys. The terrain is mainly hilly in this region and movement of elephants was mostly unhindered till very recently. This area also includes the Garo Hill Elephant Reserve spread over 3500 km² and supports approximately 1700 elephants. However, developmental activities and clearing of forest for 'jhumming' (slash and burn cultivation) has resulted in degradation and fragmentation of habitat. The problem has been compounded due to the fact that most of the forest area is under community or local control. Only 410 km² area is under the control of Forest department and the rest is private forest. Due to large deposits of coal and limestone in Garo Hills, many of the elephant areas are in danger. Coal and limestone mining in Darengiri area has led to fragmentation of the habitat and hindered the movement of elephants between Angratoli Reserve Forest and Emangre Reserve Forest. A big cement and limestone mining operation was planned near Siju Wildlife Sanctuary, which could have threatened the movement of elephants between Balphakram National park and Nokrek National Park. This was prevented by the Supreme Court of India in response to a Public Interest Litigation (PIL) filed by a conservation organization. Human settlements, the new North-Eastern Hill University campus, fishery ponds, the 2nd police battalion camp, heavy traffic on the Guwahati-Tura road and agricultural activities has threatened the elephant movement between West Garo Hills and Nokrek National Park.

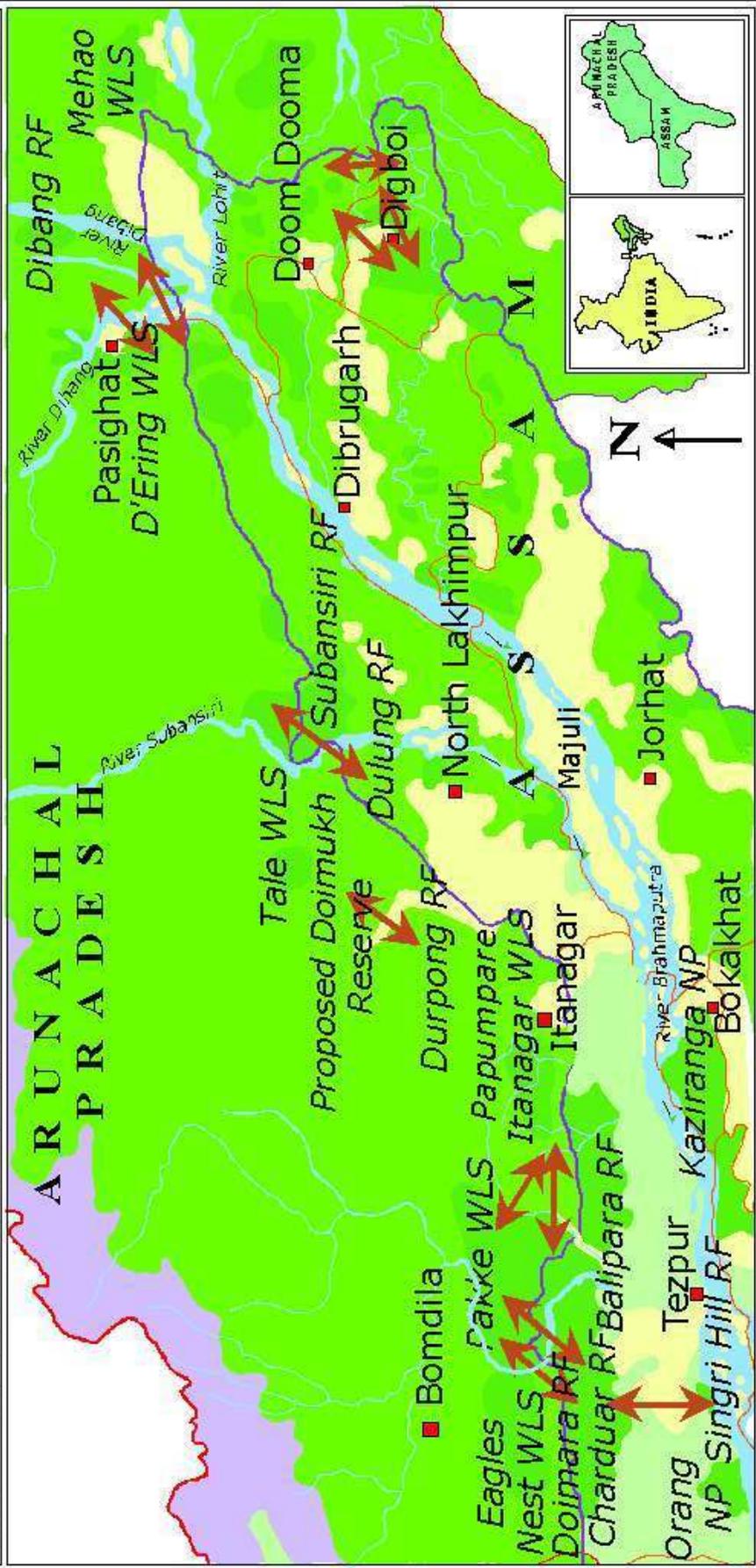
Apart from the above four major populations, there are a few isolated habitats that support a sizeable elephant population as mentioned in Chapter one.

The forest cover of north-eastern India is disappearing at a very alarming rate due to a host of factors that include logging, expansion of human population and that of agricultural land, settlements, encroachment, developmental activities, viz. construction of road, rail and hydroelectric projects, mining and massive bamboo extraction and oil exploration in prime elephant habitats. More than 1000 km² of forest are being destroyed annually (Choudhury,1999).

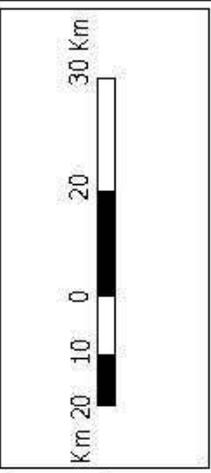
The ultimate cause of habitat shrinkage is the rapid growth of human population. As a very high percentage of these live in rural areas (85%) with farming as the main occupation, the large-scale destruction of forest and wetland seems inevitable.



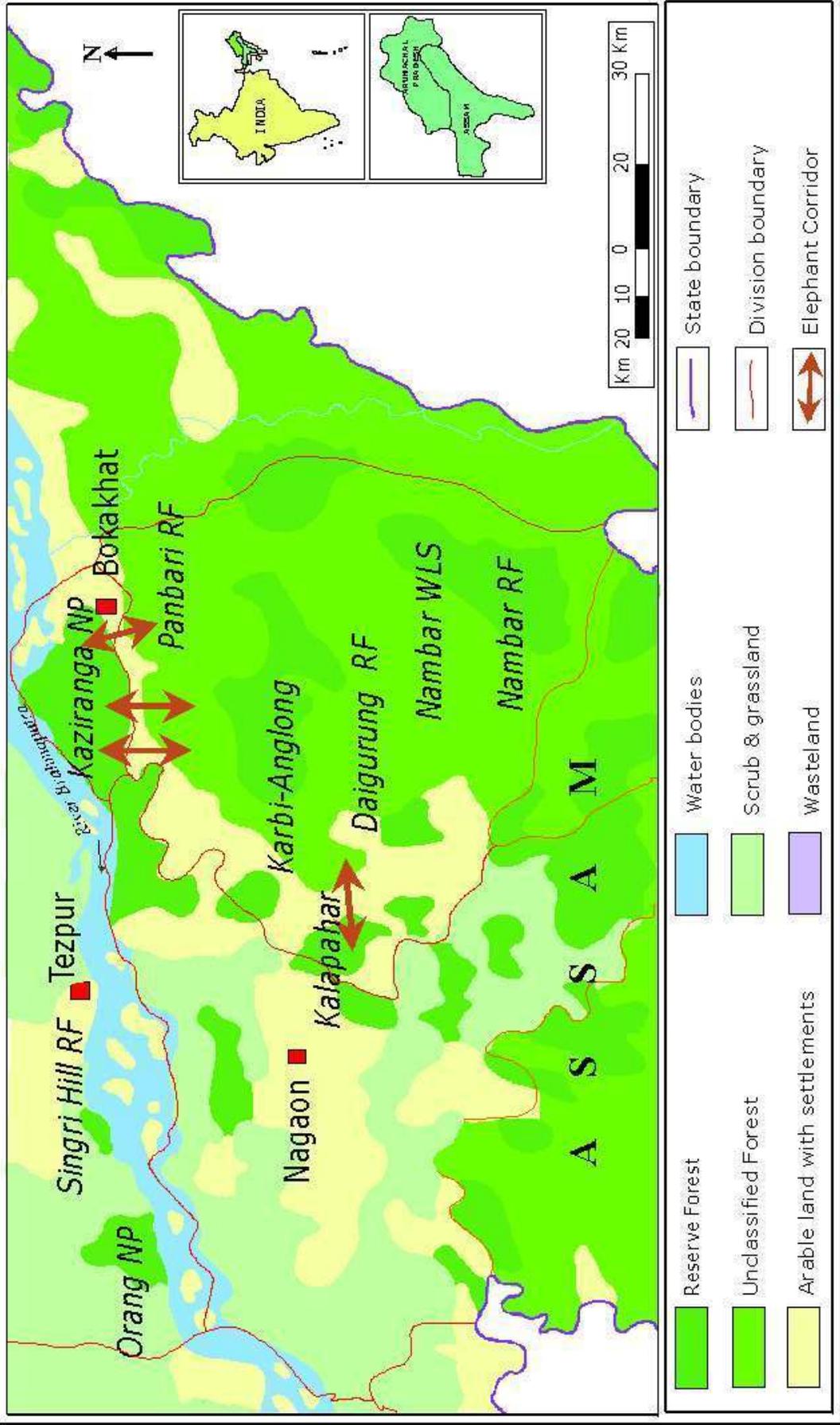
ELEPHANT CORRIDORS IN UPPER ASSAM AND ARUNACHAL PRADESH



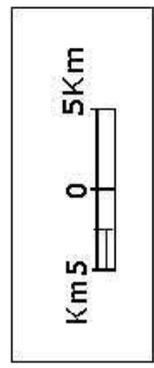
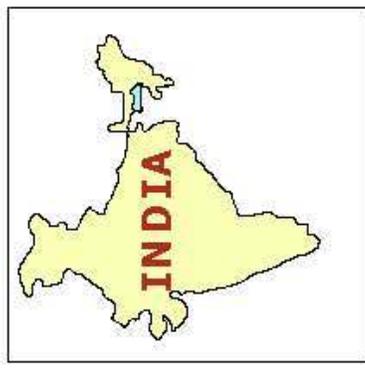
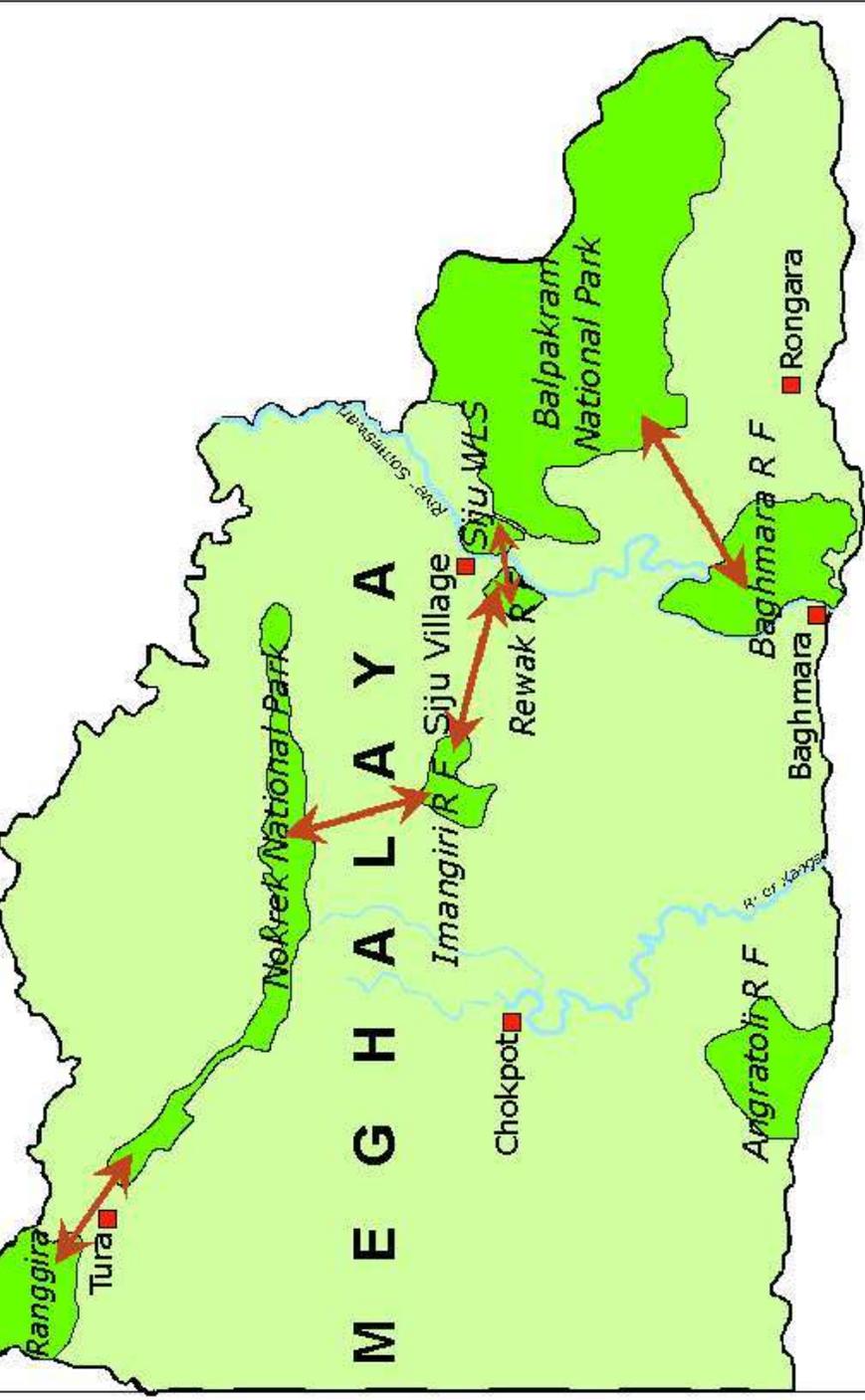
	Reserve Forest		State boundary
	Unclassified Forest		Division boundary
	Arable land with settlements		Water bodies
			Scrub & grassland
			Wasteland
			Elephant Corridor



ELEPHANT CORRIDORS IN CENTRAL ASSAM



ELEPHANT CORRIDORS IN MEGHALAYA



LEGEND

-  Community Forest
-  Reserve Forest / Protected Area
-  Villages
-  River
-  Corridor



1. PAKKE - DOIMARA AT TIPI



Alternate name: Tipi

State : Arunachal Pradesh
Ecological Priority : High
Conservation Feasibility : Medium

This is a vital link between Pakke Wildlife Sanctuary and Doimara Reserve Forest. The elephants cross the River Kameng and Bhalukpong-Bomdila road near Tipi village. Sessa Orchid Research Centre, Tipi Range Office and Tipi village along with settlements are a major hindrance to elephant movement.

Forest Division : Khellong

Connectivity : Pakke Wildlife Sanctuary with Doimara Reserve forest

Geographical coordinates :

Latitude 27°01'54"–27°02'12" N
Longitude 92°36'21"–92°36' 34" E

Length: 1 km

Width: 0.6 km

Forest type/ Vegetation: Tropical evergreen and semi-evergreen forests

Nearest PA: Pakke Wildlife Sanctuary (Arunachal Pradesh) and Nameri National Park (Assam)

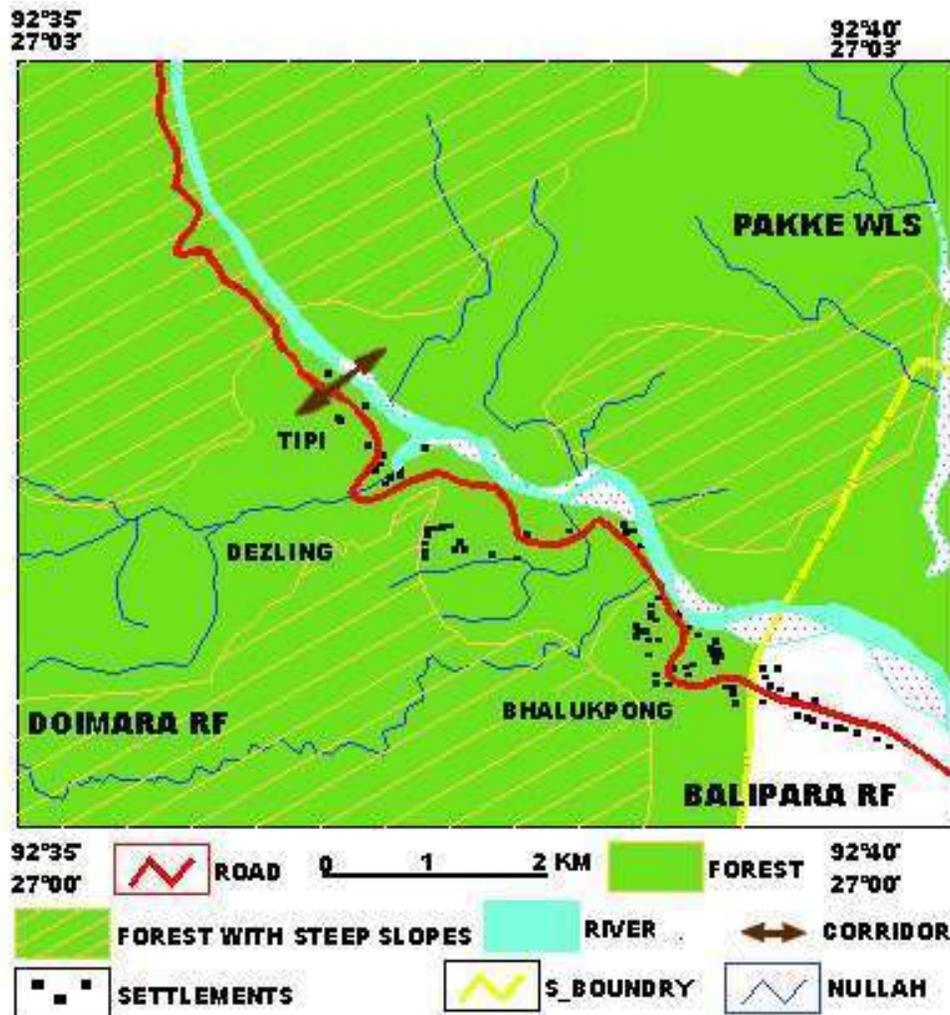
Legal status of the corridor: Reserve Forest

Major land-use: Forest, settlement, including Orchid Research Centre, Forest Range office (Territorial) and quarters

Major habitation/settlements in corridor: Tipi village with 23 houses

Corridor dependent villages: Tipi

Human artefacts on the corridor: Bhalukpong-Bomdila-Tawang Highway, Sessa Orchid Research Centre, Tipi Range office and quarters and school.



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds during October–January

Threats to the corridor:

1. Expansion of the Tipi township
2. Heavy traffic on Bhalukpong-Bomdila-Tawang road
3. Orchid Research Centre and Tipi Range Office

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Relocation of Sessa Orchid Research Centre and Tipi Range Office
3. Find alternatives for human settlements
4. Regulation of vehicular traffic at night in the Bhalukpong-Bomdila-Tawang road



2. PAKKE - DOIMARA AT DEZLING



Alternate name: Dezling

State : Arunachal Pradesh
Ecological Priority : High
Conservation Feasibility : High

This corridor connects Doimara Reserve Forest with Pakke Wildlife Sanctuary and is located between the town of Bhalukpong and Tipi. The corridor area starts from the Dhuwang Nullah and extends up to 900 m towards Tippi. The area is relatively plain and used extensively by elephants

Forest Division : Khellong

Connectivity : Pakke Wildlife Sanctuary with Doimara Reserve Forest

Geographical coordinates :

Latitude 27°01'13"–27°01'39" N
Longitude 92°37'21"–92°38'08" E
Length: 1 km
Width: 0.9 km

Forest type/ Vegetation: Tropical evergreen and semi-evergreen forest and plantations

Nearest PA: Pakke Wildlife Sanctuary (Arunachal Pradesh) and Nameri National Park (Assam)

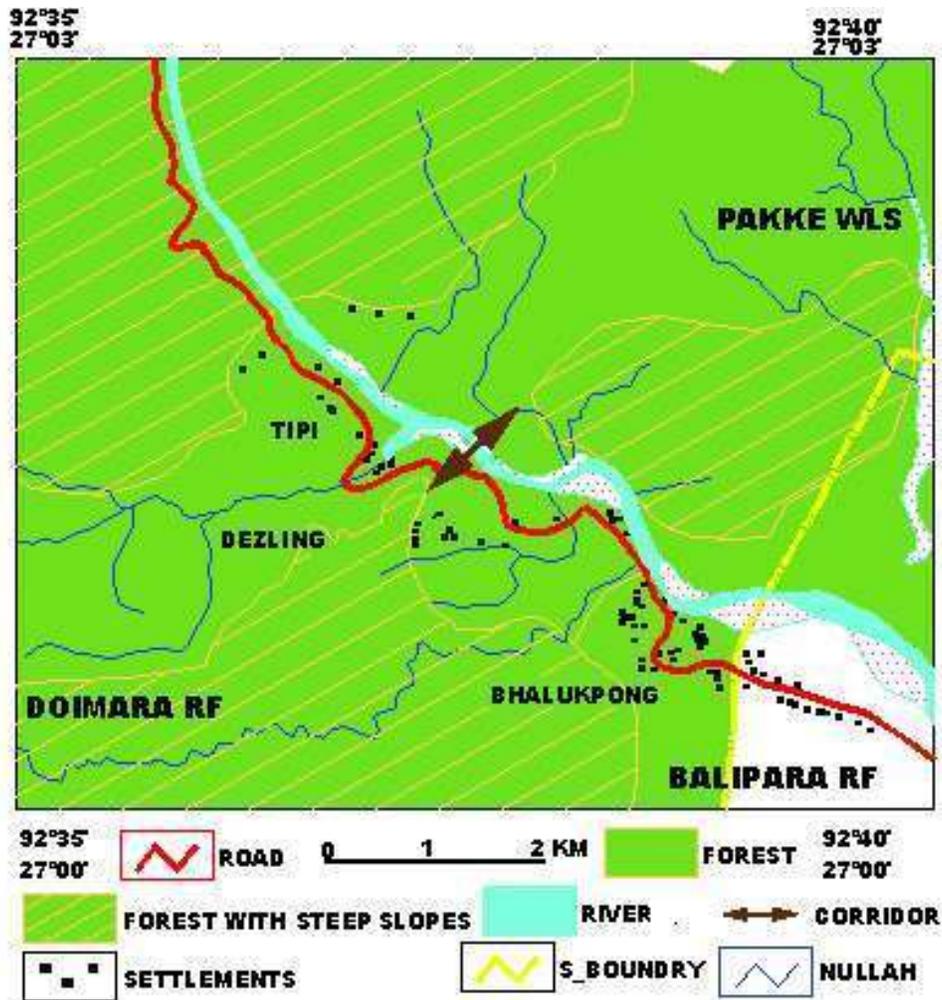
Legal status of the corridor: Reserve Forest

Major land-use: Forest plantation

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Bhalukpong and Tipi

Human artefacts on the corridor: Bhalukpong-Bomdila-Tawang highway



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds mostly in winter

Threats to the corridor:

1. Expansion of Tipi village and Bhalukpong town
2. Traffic along Bhalukpong-Bomdila-Tawang highway
3. Recent slash and burn cultivation (*jhum*)
4. Encroachment

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prevention of the expansion of Tipi village and Bhalukpong town towards the corridor
3. Preventing damage to plantation in the corridor area
4. Regulation of night traffic on Bhalukpong- Bomdila-Tawang road



3. PAKKE - PAPUM AT SEIJOSA NULLAH



Alternate name: Seijosa Nullah

State : Arunachal Pradesh
Ecological Priority : Medium
Conservation Feasibility : Medium

The corridor connects Pakke Tiger Reserve with Papum Reserve Forest and the elephants use the Seijosa nullah bed to move between these two habitats throughout the year. The corridor is about seven km from the Seijosa Police Check Gate.

Forest Division : Khellong

Connectivity : Pakke Wildlife Sanctuary with Papum Reserve Forest

Geographical coordinates :

Latitude : 26°58'39" N
Longitude : 93°00'51" E

Length: 0.8–1 km **Width:** 0.5 km

Forest type/ Vegetation: Tropical evergreen forest

Nearest PA: Pakke Wildlife Sanctuary

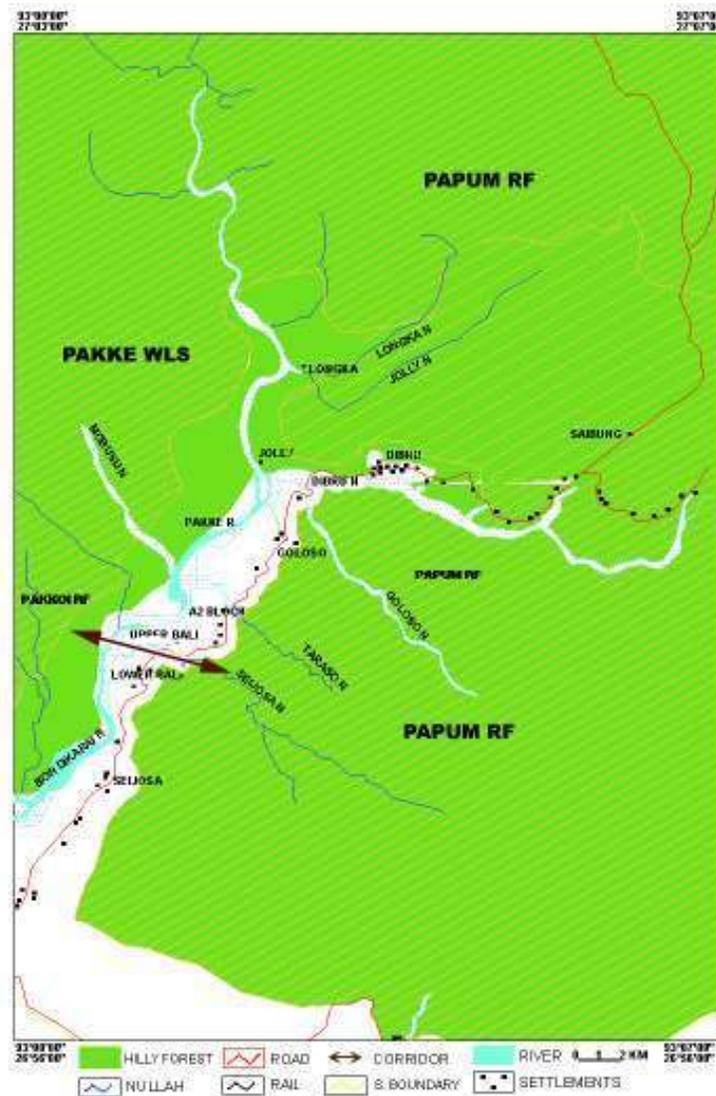
Legal status of the corridor: Reserve Forest

Major land-use: Forest, agriculture and settlement

Major habitation/settlements in corridor: Few settlements (Lower Bali) on the river bank

Corridor dependent villages: Upper Bali, Lower Bali and A2 / Mebuso1 *basti*

Human artefacts on the corridor: Road (Pakke-Kissang)



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds

Threats to the corridor:

1. Settlements on the bank of Seijosa Nullah and the river
2. Expansion of agricultural land
3. Traffic on Pakke-Kissang road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Finding alternatives for the few villagers living on the river bank
3. Regulation of night traffic on Pakke-Kissang road



4. PAKKE - PAPUM AT LONGKA NULLAH



Alternate name: Longka Nullah

State : Arunachal Pradesh
Conservation priority : High
Ecological priority : High

This is a narrow corridor that connects Pakke Tiger Reserve with Papum Reserve Forest and is at the foot hills near Longka nullah and is an old plantation area.

Forest Division : Khellong

Connectivity : Pakke Wildlife Sanctuary (Tiger Reserve) and Papum Reserve Forest

Geographical coordinates :

Latitude 27°01'11" N
Longitude 93°02'39" E

Length: 0.5 km

Width: 0.6 km

Forest type/ Vegetation: Tropical evergreen forest and plantation

Nearest PA: Pakke Wildlife Sanctuary

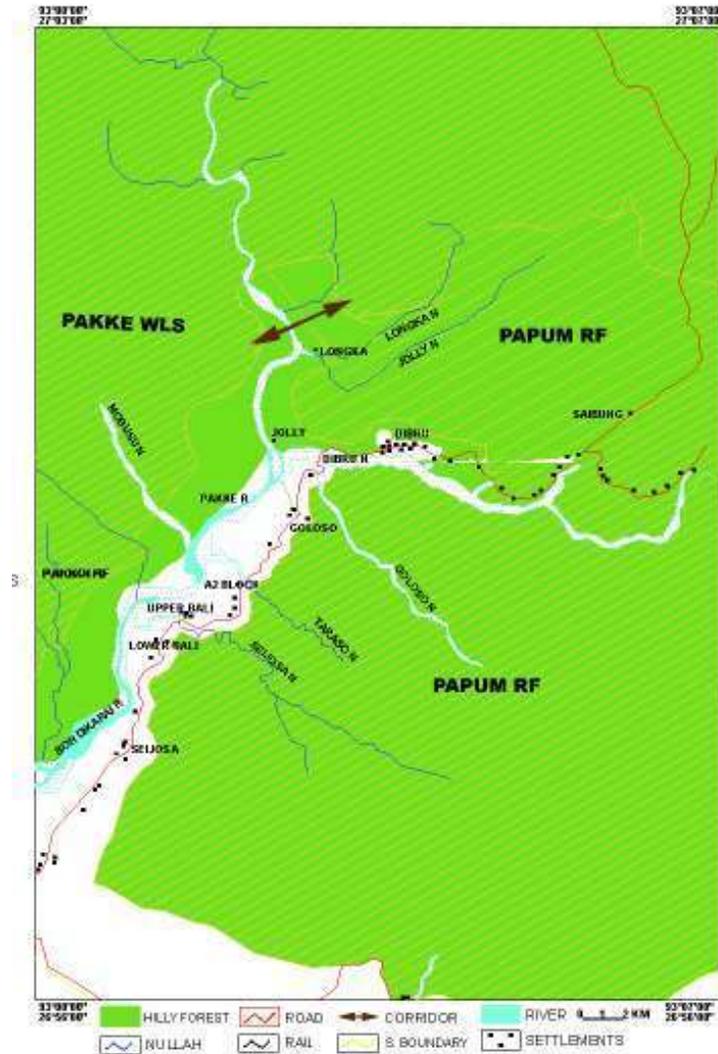
Legal status of the corridor: Reserve Forest

Major land-use : Forest

Major habitation/settlements in corridor : Nil

Corridor dependent villages : Longka and Jolly

Human artefacts on the corridor : Road (Pakke-Kissang)



Frequency of usage of the corridor by elephants: Regular; used by bulls as well as herds

Threats to the corridor:

1. Illegal felling of trees
2. Drilling activities for the dam
3. Traffic on Pakke-Kissang road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prevent illicit felling of trees
3. Finding alternatives for Longka village (3 families)
4. Regulate night traffic on the Pakke-Kissang road



5. DURPONG - DOIMUKH AT KHUNDAKHUWA



Alternate name: Karsinga

State : Arunachal Pradesh
Ecological Priority : Medium
Conservation Feasibility : Medium

The corridor connects Durpong Forest Reserve with the proposed Doimukh Reserve Forest. Elephants generally cross the Dikrong River through the Khundakhuwa Nullah to move between the two forest areas. National Highway- 52A passes through the corridor.

Forest Division : Banderdewa

Connectivity : Durpong Reserve Forest with Doimukh proposed Reserve Forest

Geographical coordinates :

Latitude 27°06'54"–27°07'09"N
Longitude 93°47'26"–93°48'26"E

Length: 3–3.5 km

Width: 1 km

Forest type/ Vegetation: Tropical semi-evergreen forest

Nearest PA: Itanagar Wildlife Sanctuary

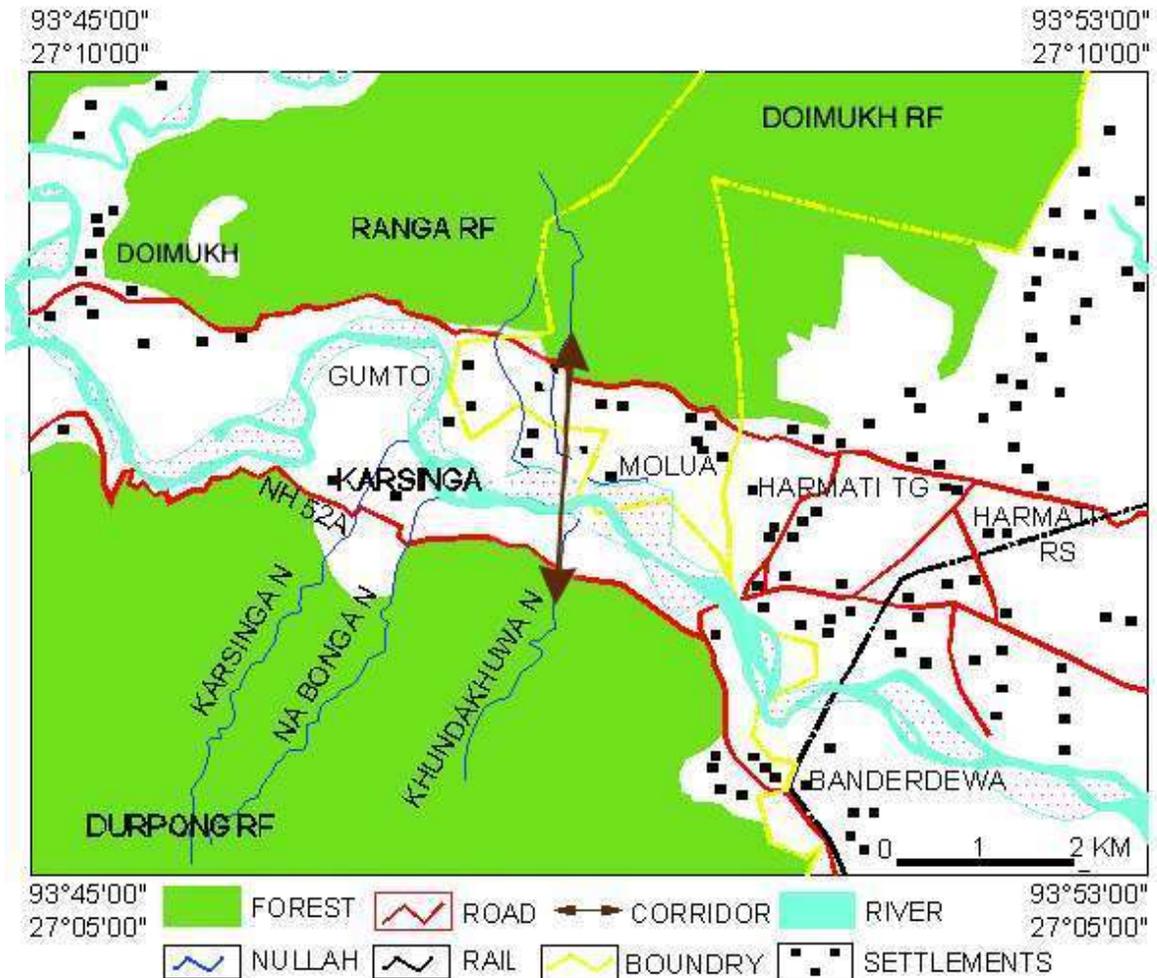
Legal status of the corridor: Reserve Forest

Major land-use: Forest, agriculture and settlements

Major inhabitants/settlements: Berup and Gumto

Corridor dependent villages: Karsinga (100 houses), Rillo-Gumto and Berup

Human artefacts on the corridor: Itanagar- Banderdewa road (National Highway-52A)



Frequency of usage of the corridor by elephants: Occasional; used by bulls

Threats to the corridor:

1. Gradual degradation of corridor forest cover due to slash and burn cultivation
2. Heavy vehicular traffic along National Highway-52A
3. Expansion of human settlements
4. Developmental activities

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulating night traffic along the National Highway-52A
3. Protection of Khundakhuwa nullah from encroachment
4. Finding alternatives for 55 households of Berup and Gumbo villages
5. Protection of the small grassland at the point where River Dikrong and Khundakhuwa nullah converge



6. DULUNG - SUBANSIRI



State : Arunachal Pradesh and Assam
Ecological Priority : Medium
Conservation Feasibility : Medium

The corridor connects Panir Reserve Forest (Arunachal Pradesh) and Dulung Reserve forest with Subansiri Reserve Forest (Assam) and is situated just south of the Subansiri hydroelectric site near Gerukamukh. It is a vital link between the elephant habitats of the east and west bank of Subansiri River. Due to the steep and rough terrain, there is little chance of elephant movement to the north of this corridor (towards Tale Valley Wildlife Sanctuary). Rare instances of elephant movement has been recorded north of this corridor along Pabho and Gayong nullah (approximately seven km north from the dam site) and along Sisip nullah (approximately 20 km north from the dam site)

Forest Division : Lakhimpur and Dhemaji (Assam) and Banderdewa (Arunachal Pradesh)

Connectivity : Panir Reserve Forest (Arunachal Pradesh) and Dulung Reserve Forest (Assam) with Subansiri Reserve Forest

Geographical coordinates :

Latitude 27°30'–27°31' N
Longitude 94°15'–94°16' E

Length: 2.5–3 km

Width: 0.5–1 km

Forest type/ Vegetation: Tropical semi-evergreen and deciduous forest

Nearest PA: Tale Wildlife Sanctuary

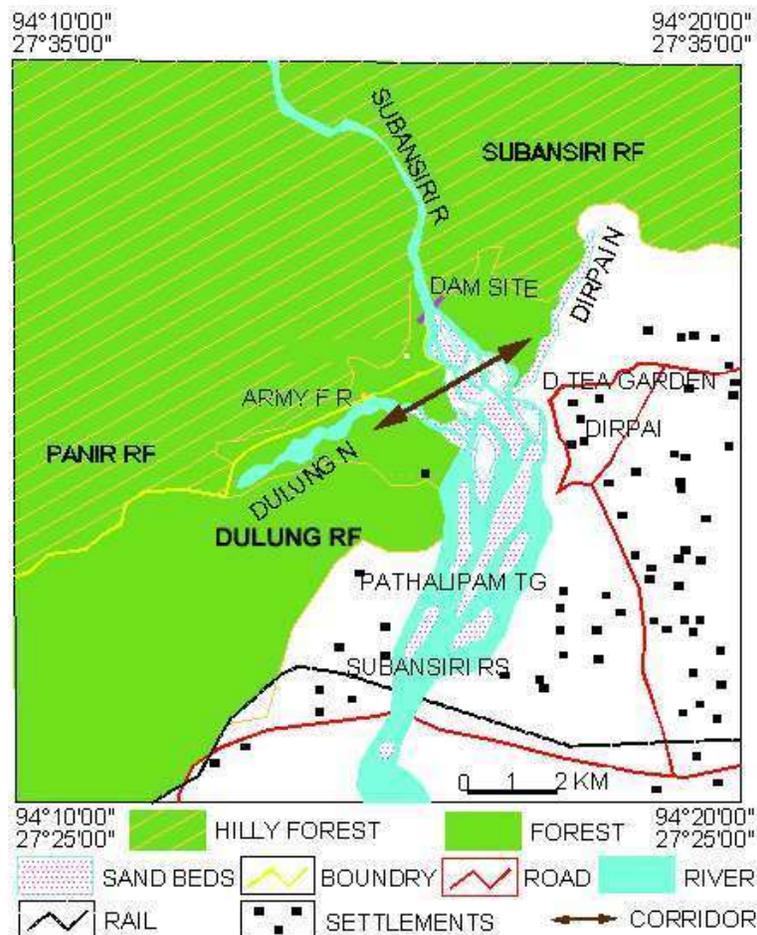
Legal status of the corridor: Reserve Forest

Major land-use: Forest and agriculture

Major inhabitants/settlements: Nil

Corridor dependent villages: Gerukamukh, Dulungmukh and labor colonies of tea garden

Human artefacts on the corridor: Road (Gogamukh-Gerukamukh) and activities related to dam construction (hydroelectric project in Gerukamukh)



Frequency of usage of the corridor by elephants: Occasional; Bulls and small groups

Threats to the corridor:

1. Human activity related to the hydroelectric project in Gerukamukh
2. Developmental activities in the area
3. Air Force bombing range adjacent to the corridor forest

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prohibition of human activities in corridor area, especially in the riverine island of Jababari Chapari.
3. Afforestation of the corridor
4. Relocation of the Air Force bombing range situated adjacent to the corridor forest
5. Preventing the authorities of the hydroelectric project from setting up labor camp inside the forest. (This may be put up between Gogamukh and Dirpai)
6. Preventing boulder extraction from the bed of the Subansiri River



7. D'ERING - MEBO AT SIGAR NULLAH



Alternate name: Sigar Nullah

State : Arunachal Pradesh
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects the D'Ering Memorial Wildlife Sanctuary and Mebo Reserve Forest on either side of the Siang River and forms an important passage for elephant movement to Dibang Forest Division through Aohali village.

Forest Division : Pasighat Forest Division and D'Ering Memorial Wildlife Sanctuary

Connectivity : D'Ering Memorial Wildlife Sanctuary with Mebo Reserve Forest

Geographical coordinates :

Latitude 28°04'35" N
Longitude 95°23'56" E

Length: 3 km

Width: 1 km

Forest type/ Vegetation: Tropical semi-evergreen forest

Nearest PA: D'Ering Memorial Wildlife Sanctuary

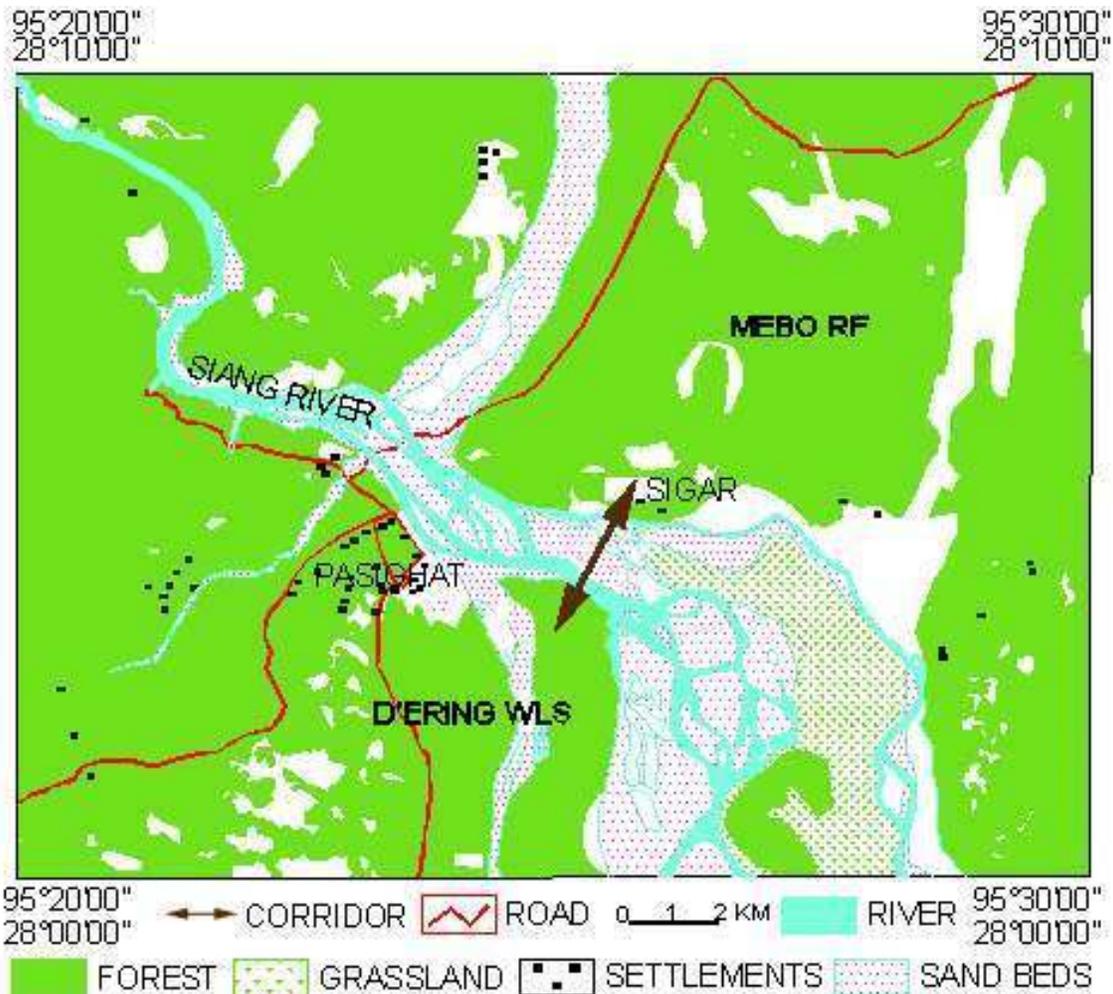
Legal status of the corridor: Reserve Forest and private land

Major land-use: Forest and agriculture

Major habitation/settlements in corridor: Sigar village (49 houses with a human population of 330)

Corridor dependent villages: Sigar, Raling (27 houses) and Motum, Siluk and Angkali

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Regular; used only during paddy season (October-December)

Threats to the corridor:

1. Degradation of the corridor forest
2. Agricultural activities
3. Encroachment

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Joint forest protection through eco-development in Sigar and adjacent villages and exploring the possibilities of declaring the corridor and surrounding areas as Community Reserves
3. Restricting encroachment and new settlements in the corridor



8. D'ERING - MEBO AT KONGKUL



Alternate name: Kongkul

State : Arunachal Pradesh
Ecological Priority : Medium
Conservation Feasibility : Medium

Elephants from D'Ering Wildlife Sanctuary use this corridor to move to Mebo Reserve forest through the Sissar River bed. This corridor then leads to Dibang Forest Division criss-crossing several private forests. The corridor is near Kongkul village, a new settlement of Padam community and is at about six to seven kms from Namsing village.

Forest Division : Pasighat Forest Division and D'Ering Memorial Wildlife Sanctuary

Connectivity : D'Ering Memorial Wildlife Sanctuary with Mebo Reserve Forest leading to Dibang Reserve Forest of Roing Forest Division

Geographical coordinates :

Latitude 27°56'–27°57' N
Longitude 95°23'–95°25' E

Length: 2 km

Width: 0.5 km

Forest type/Vegetation: Tropical evergreen forest. Area around Kongkul village has been converted into agricultural land for mustard and paddy cultivation.

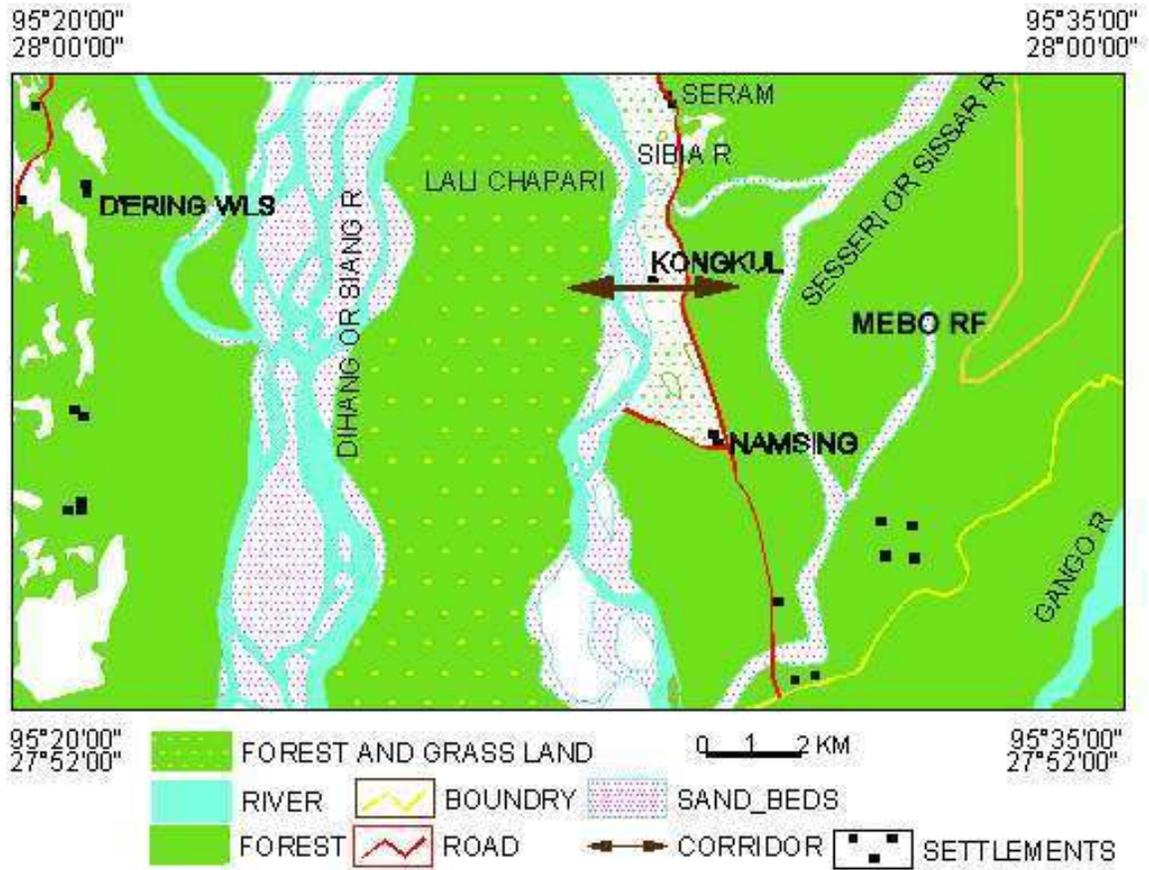
Nearest PA: D'Ering Memorial Wildlife Sanctuary

Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest, agriculture and settlement

Major habitation/settlements in corridor: Kongkul (60 inhabitants of Padam community)

Corridor dependent villages: Kongkul



Human artefacts on the corridor: Road (Namsing-Mebo)

Frequency of usage of the corridor by elephants: Regular; used by bulls and herds of 20–30 during paddy season (October–December)

Threats to the corridor:

1. Degradation of the corridor forest due to agricultural activities (*jhum*) in Kongkul village
2. Encroachments
3. Erosion of forest land by the Siang River

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Seeking alternatives for Kongkul village
3. Protecting the corridor forest by eco-development in Kongkul village
4. Declaring the corridor and surrounding forest areas as Community Reserves



9. KOTHA - BURHIDIHING



State : Assam
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor connects the Kotha Reserve Forest (Digboi Forest Division) and adjacent elephant populations of Changlang district of Arunachal Pradesh with the Burhidihing Reserve Forest (Doom Dooma Forest Division) thereby maintaining the linkage with Terai Reserve Forest, Kakojan Reserve Forest and Nalani Reserve Forest. The area is highly fragmented by tea gardens and human–elephant conflict is on the rise.

Forest Division : Digboi and Doom Dooma

Connectivity : Kotha Reserve Forest (Digboi Forest Division) and Kharsang forest area of Changlang district, Arunachal Pradesh with Burhidihing Reserve Forest (Doom Dooma Forest Division)

Length: 6 km **Width:** 1 km

Forest type/Vegetation: Tropical semi evergreen

Nearest PA: Dihing-Patkai Wildlife Sanctuary

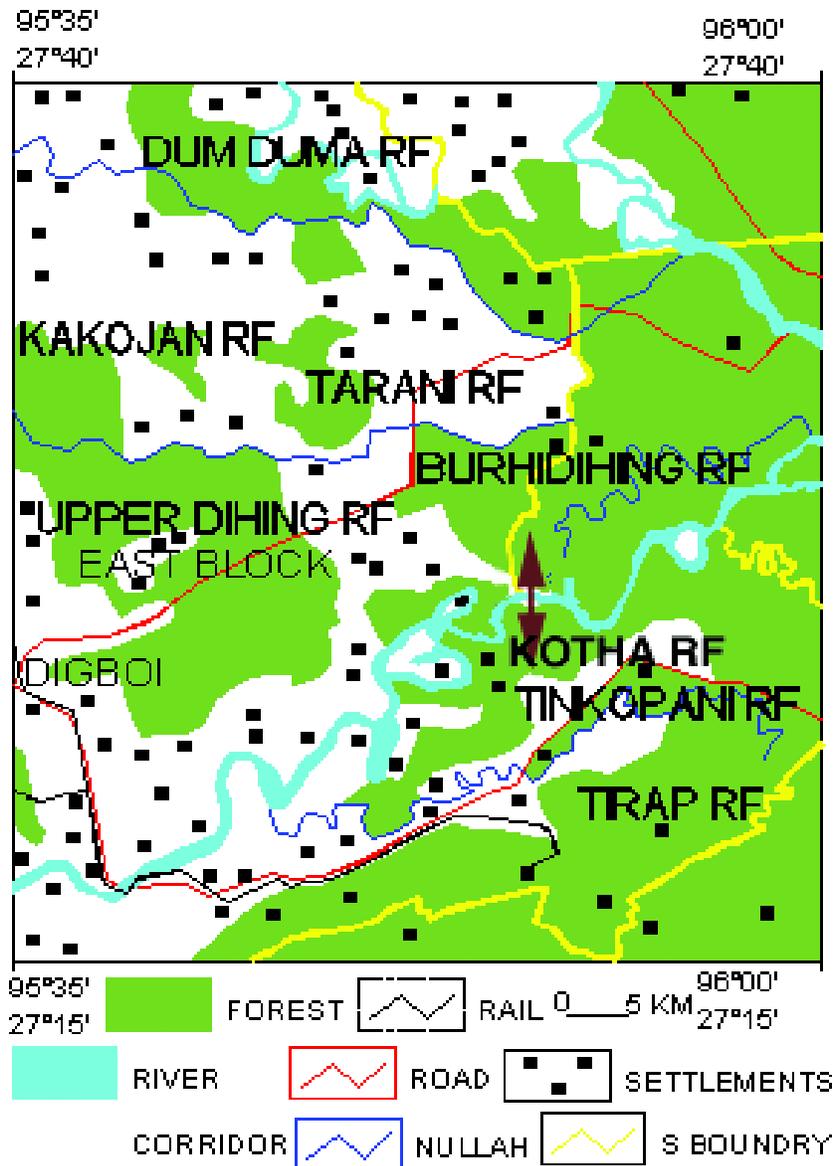
Legal status of the corridor: Reserve Forest, forest land leased to tea gardens and private land

Major land-use: Forest, tea garden, agriculture and settlement

Major habitation/settlements in corridor: Monogaon and Takeli pathar

Corridor dependent villages: Monogaon and Takeli pathar

Human artefacts on the corridor: Tea gardens and their processing factories and labor colonies



Frequency of usage of the corridor by elephants: Regular and seasonal

Threats to the corridor:

1. Settlements
2. Tea gardens, their processing factories and labor colonies
3. Agriculture

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Seeking alternatives for a few villages after proper identification to facilitate movement of elephants



10. UPPER DIHING EAST - UPPER DIHING WEST BLOCK AT BOGAPANI

Alternate name: Bogapani

State : Assam
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor lies between the Upper Dihing East and West blocks of forestland and passes through Bogapani tea estate and a few settlements. Tea gardens, heavy traffic on National Highway 38 and a railway line (Digboi-Tinsukia) are the major impediments for elephant movement. The railway line has caused the death of seven elephants in a single accident in 2001.

Forest Division : Digboi

Connectivity : Upper Dihing East and West Blocks

Geographical coordinates:

Latitude 27°25'16" N
Longitude 95°36'34" E

Length: 3 km

Width: 0.5 km

Forest type/ Vegetation: Tropical semi-evergreen forest, plantation and agricultural land

Nearest PA: Dihing Patkai Wildlife Sanctuary

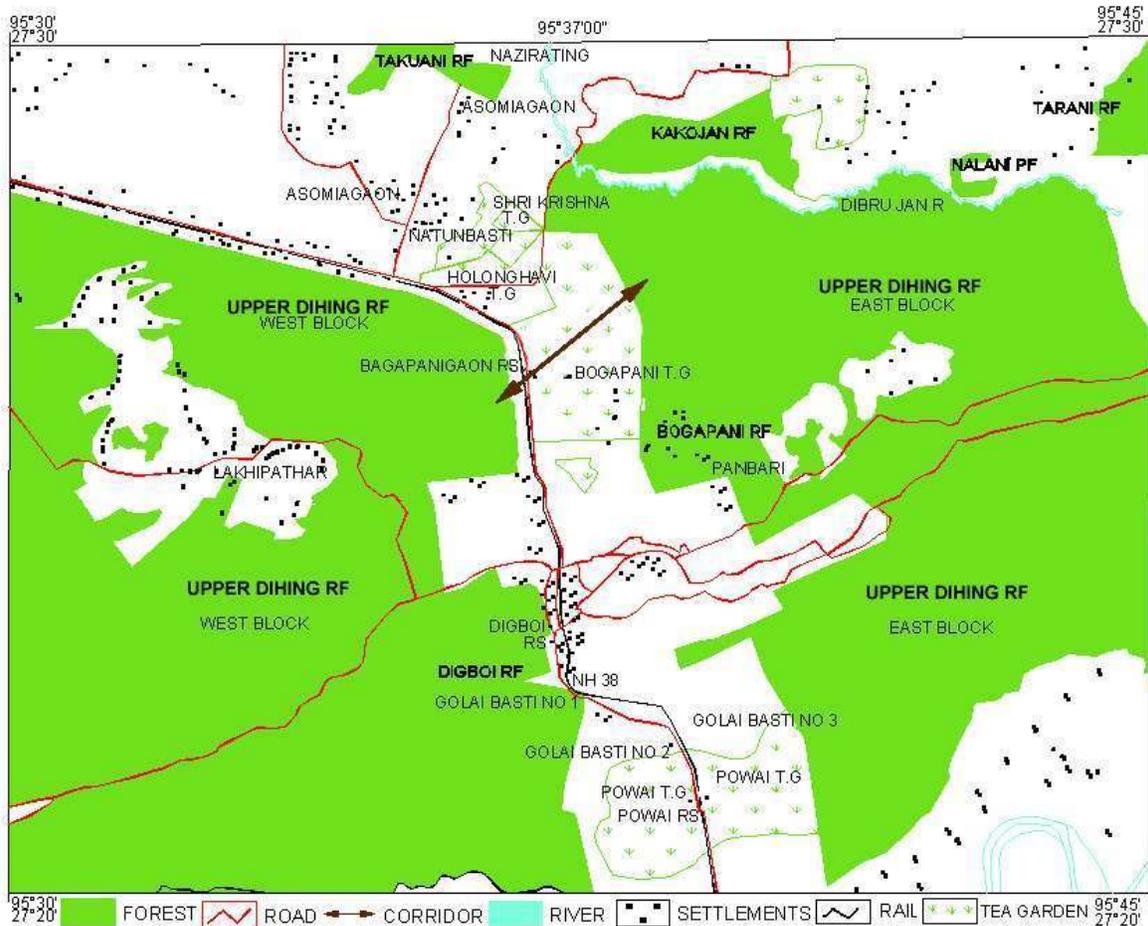
Legal status of the corridor: Reserve Forest, forest land leased out to tea gardens and *patta* land

Major land-use: Forest and tea garden

Major habitation/settlements in corridor: Bogapani and Panbari

Corridor dependent villages: Bogapani labor colony, Panbari, Ramnagar and new settlements that keep coming up along the railway track

Human artefacts on the corridor: Road (National Highway-38), railway track (Dibrugarh-Tinsukia-Dimapur) and Panbari school



Frequency of usage of the corridor by elephants: Regular (Seasonal)

Threats to the corridor:

1. Tea garden
2. Heavy traffic along the National Highway-38
3. Agricultural land and crop depredation
4. Railway line

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of night traffic along the National Highway-38
3. Seeking alternatives for existing settlements and other artefacts in and around the corridor
4. Instruction to train drivers to slow down the train in the corridor region
5. Prevent change of land-use pattern of tea gardens



11. UPPER DIHING EAST - UPPER DIHING WEST BLOCK BETWEEN GOLAI - PAWAI

State : Assam
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor facilitates elephant movement between the Upper Dihing East and West blocks. As a result of crop depredation, villages have stopped cultivation in the area since 2000–2001. New settlements have started coming in the corridor area.

Forest Division : Digboi

Connectivity : Upper Dihing East with West block

Geographical Coordinates :

Latitude 27°21'54" N
Longitude 95°38'06" E

Length: 6–7 km **Width:** 0.5 km

Forest type/ Vegetation: Tropical semi-evergreen forest, paddy fields and tea gardens

Nearest PA: Dihing Patkai Wildlife Sanctuary

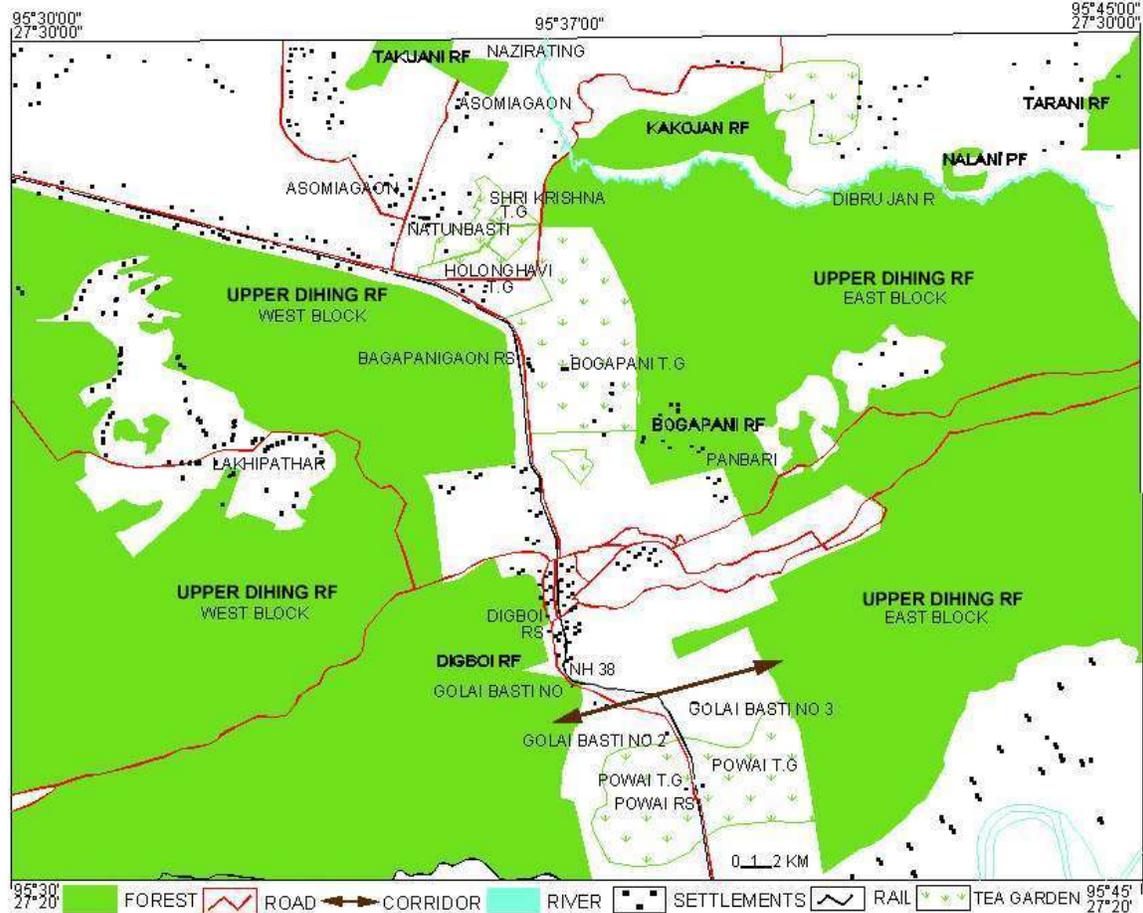
Legal status of the corridor: Reserve forest *patta* land

Major land-use: Forest, agriculture, settlement and tea gardens

Major habitation/settlements in corridor: Seven or eight concrete houses coming up in Golai No 2 .

Corridor dependent villages: Golai No. 1, 2 and 3 and Powai village

Human artefacts on the corridor: Houses and road (Digboi-Margherita)



Frequency of usage of the corridor by elephants: Regular

Threats to the corridor:

1. New and old settlements along the road
2. Loss of forest cover

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Seeking alternatives to the human settlements
3. Preventing new constructions
4. Afforestation of the corridor



12. KALAPAHAR - DAIGURUNG



State : Assam
Ecological Priority : High
Conservation Feasibility : High

This corridor, located about 22 km from Silonijan (Karbi Anglong) on the Silonijan-Chokikhola road is a small patch of forest located between Sotiona and Parolijan Village (Parolijan River). It is encircled by two hills, namely Kalapahar and Risak on either side. This corridor has connectivity with the Kaziranga National Park via Kalioni Reserve Forest.

Forest Division: East Karbi Anglong and Golaghat

Connectivity: Kalapahar USF (Nambor West block, East Karbi Anglong Division) with Daigurung part of the Daigurung-Nambor Wildlife Sanctuary (Nambor North block, Golaghat Division).

Geographical coordinates:

Latitude 26°24' N
Longitude 93°47' E

Length: 2 km

Width: 2 km

Forest type/ Vegetation: Tropical semi-evergreen forests

Nearest PA: Daigurung-Nambor Wildlife Sanctuary and Garampani Wildlife Sanctuary

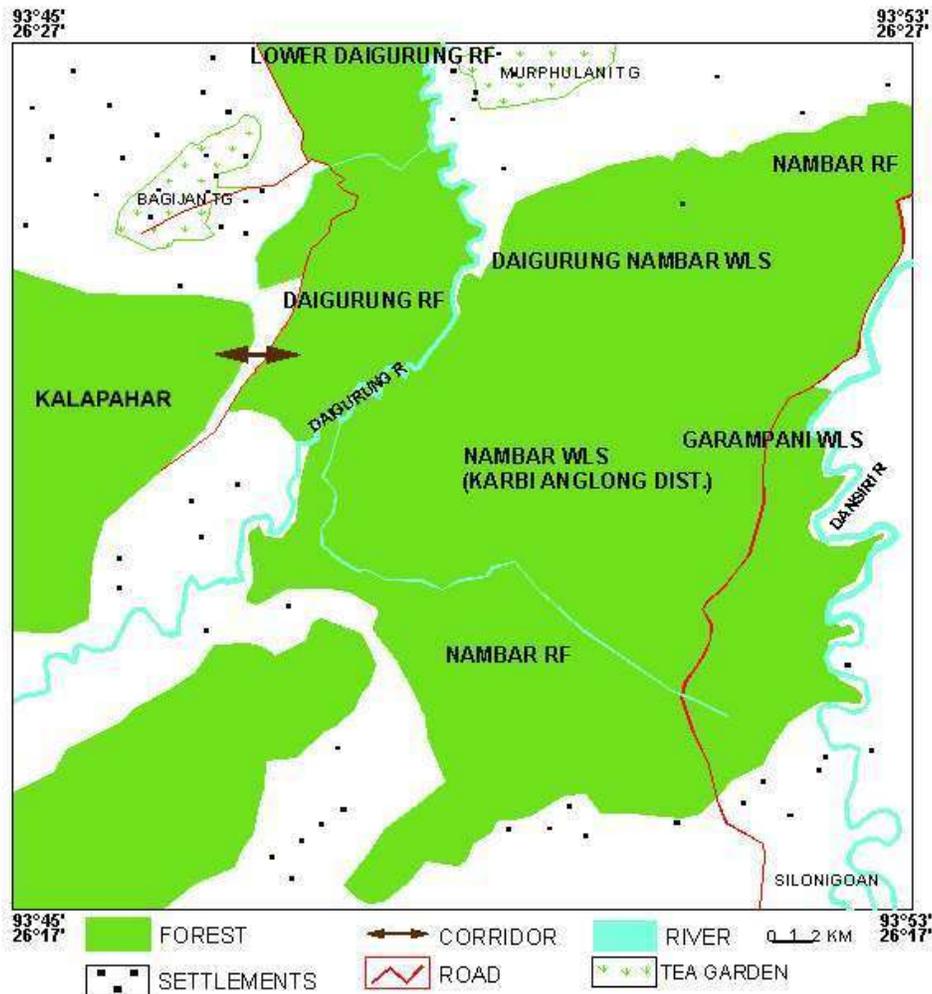
Legal status of the corridor: Unclassified State Forest (USF)

Major land-use: Forest

Major habitation/ settlements in corridor: Nil

Corridor dependent villages: Bogijan, Sotiona, Rihajan and Koilamati

Human artefacts on the corridor: Road (Silonijan-Chakikhola road and Silonijan-Murphulani road)



Frequency of usage of the corridor by elephants: Regular; used throughout the year

Threats to the corridor:

1. Road traffic
2. Deforestation of the corridor forest and adjacent forests
3. Expansion of the adjacent villages
4. Agriculture including slash and burn (*jhum*) cultivation
5. Grazing

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prevent expansion of the settlements and agriculture
3. Regulation of night traffic on the Silonijan-Chakikhola road and Silonijan-Murphulani road
4. Prevent deforestation and minimize grazing



13. KAZIRANGA- KARBI ANGLONG AT PANBARI

Alternate name: Panbari

State : Assam
Ecological Priority : High
Conservation Feasibility : High

This corridor connects the elephant habitats of Kaziranga National Park with the Karbi Anglong forest. The corridor area towards Kaziranga National Park on the eastern side of National Highway 37 is mostly under agriculture. The Panbari forest to the west of the highway has good forest.

Forest Division: Eastern Assam Wildlife Division

Connectivity: Kaziranga National Park with Panbari Reserve Forest and Karbi Anglong Hills

Geographical coordinates:

Latitude 26°36'04" N
Longitude 93°29'04" E

Length: 1 km **Width:** 0.85 km

Forest type/ Vegetation: Tropical semi-evergreen forests and agricultural land

Nearest PA: Kaziranga National Park and North Karbi Anglong Wildlife Sanctuary

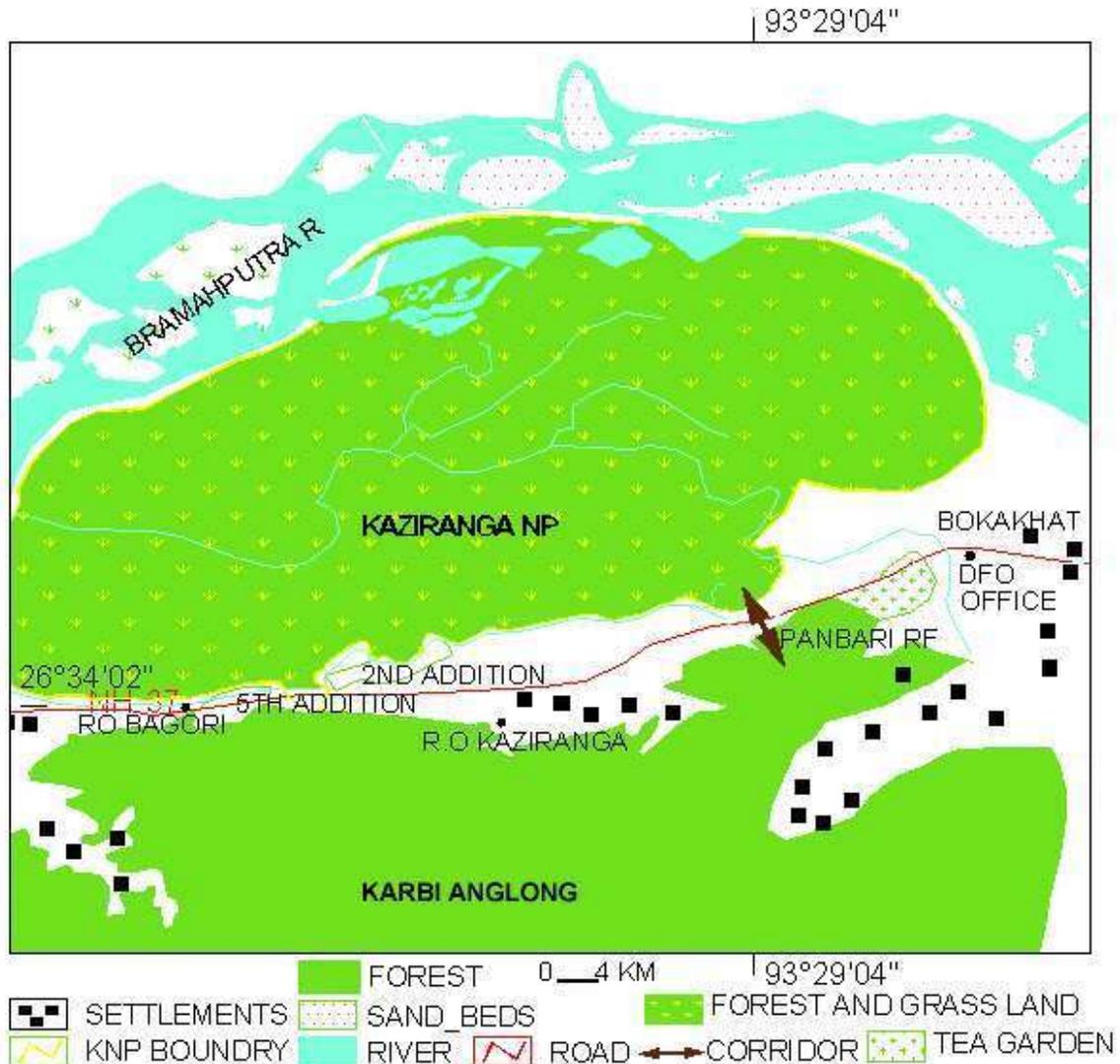
Legal status of the corridor: Reserve Forest and proposed addition (3rd addition) to Kaziranga National Park

Major land-use: Forest and agriculture

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Methoni Tea Garden

Human artifacts on the corridor: Road (National Highway 37)



Frequency of usage of the corridor by elephants: Regular and seasonal; used mostly in October-February

Threats to the corridor:

1. Heavy traffic on National Highway 37
2. Agricultural land between the boundaries of Kaziranga National park and National Highway 37

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulating traffic flow on National Highway 37 at night
3. Speeding up final notification of the corridor area as a National Park



14. KAZIRANGA - KARBI ANGLONG AT KANCHANJURI

Alternate name: Kanchanjuri

State : Assam
Conservation Priority : High
Ecological Feasibility : High

This corridor connects the elephant habitats of Kaziranga National Park with Burhapahar and Karbi Anglong forests. The corridor area passes through tea gardens and is close to National Highway 37.

Forest Division: Eastern Assam Wildlife Division

Connectivity: Kaziranga National Park with Burhapahar and Karbi Anglong Hills

Geographical coordinates:

Latitude 26°34'03" N
Longitude 93°10'07" E

Length: 2 km **Width:** 0.5 km

Forest type/ Vegetation: Tropical moist deciduous forest and tea plantations

Nearest PA: Kaziranga National Park

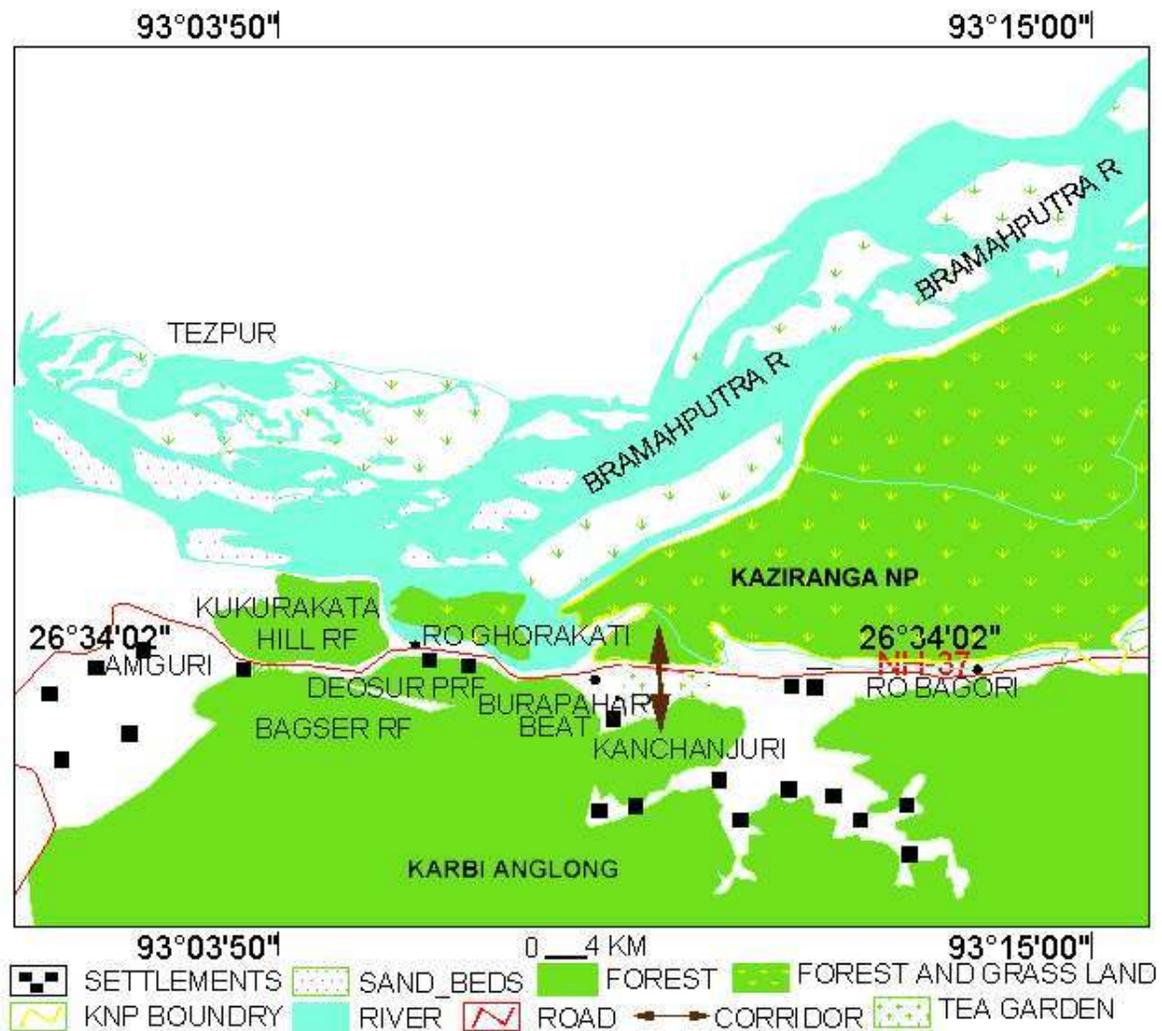
Legal status of the corridor: Reserve Forest and proposed 4th addition to Kaziranga National Park.

Major land-use: Tea plantations and forest.

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Kanchanjuri village and Burrhapahar tea estate

Human artefacts on the corridor: Road (National Highway 37, Guwahati-Dibrugarh)



Frequency of usage of the corridor by elephants: Regular

Threats to the corridor :

1. Heavy traffic on National Highway 37
2. Tea plantation

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Conversion of tea gardens into forestland.
3. Regulation of traffic flow at night on National Highway 37



15. KUKURAKATA - BAGSER AT AMGURI



Alternate name: Kaziranga- Bagser

State : Assam
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects the elephant habitats of Kaziranga National Park and Kukurakata Reserve Forest with Bagser Reserve Forest and the forest of Karbi Anglong. It passes through tea garden, settlement and forest patches

Forest Division : Eastern Assam Wildlife Division

Connectivity: Kaziranga National Park and Kukurakata Reserve Forest with Bagser Reserve Forest and the forest of Karbi Anglong

Geographical coordinates:

Latitude 26°34'02"–26°34'04" N
Longitude 93°03'49"–93°04'03" E

Length: 0.8 km

Width: 0.5 km

Forest type/ Vegetation: Tropical semi-evergreen forest, tea gardens and grass-land

Nearest PA: Kaziranga National Park

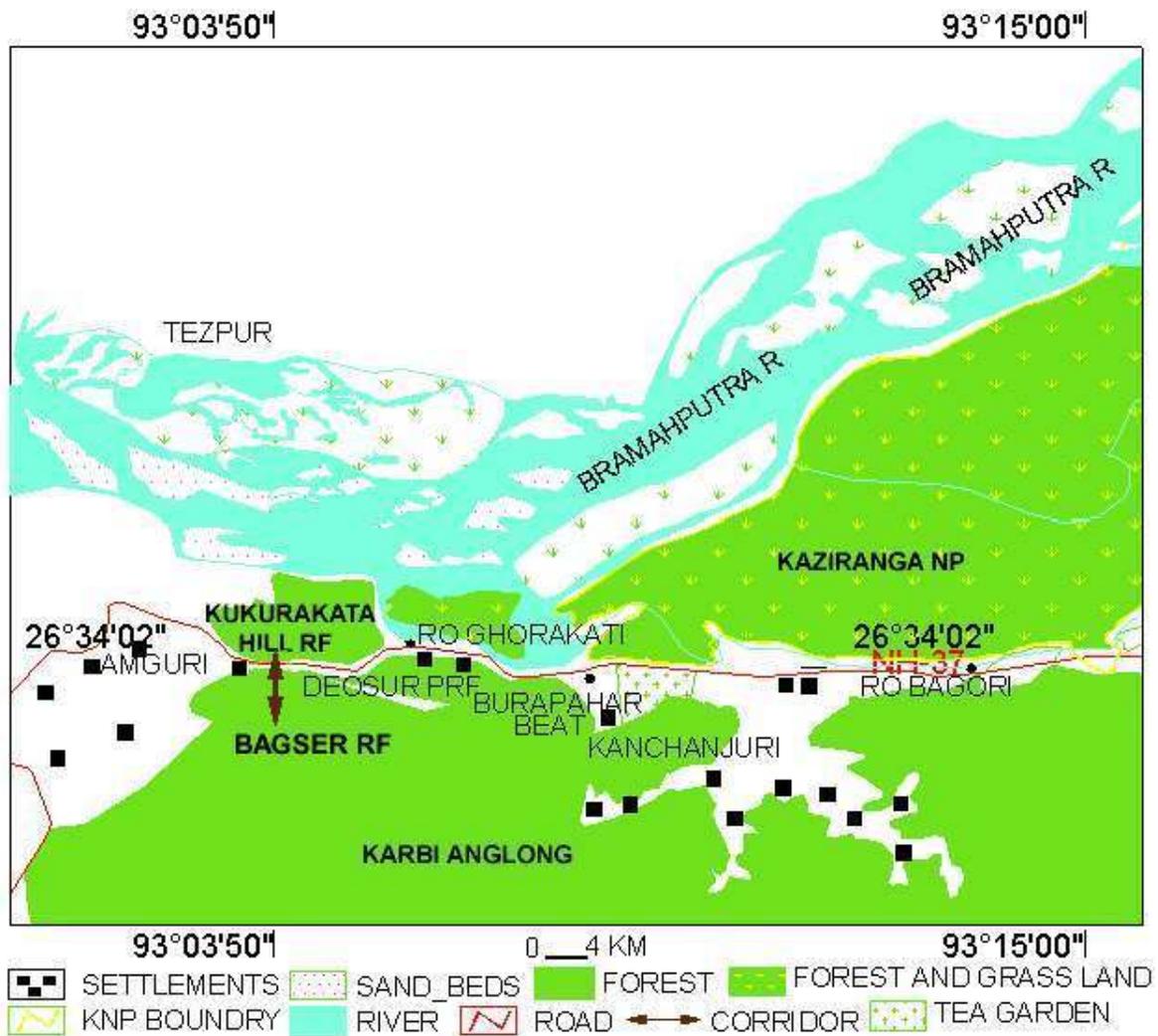
Legal status of the corridor: Forest land leased to tea gardens and revenue land

Major land-use: Agriculture, tea garden and forest

Major habitation/settlements in corridor: Amguri

Corridor dependent villages: Amguri

Human artefacts on the corridor: School, *dhaba* (road-side hotel) and road (National Highway 37)



Frequency of usage of the corridor by elephants: Regular

Threats to the corridor

1. Heavy traffic along National Highway 37
2. Road side *dhaba* and hotels and the resulting settlement and biotic pressure

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulating night traffic along National Highway 37
3. Preventing destructive developmental activities
4. Relocation of the roadside *dhaba* and hotels outside the corridor



16. CHARDUAR - SINGRI HILL



State : Assam
Ecological Priority : Medium
Conservation Feasibility : Low

This corridor passes through tea gardens and settlements of Sonitpur district and is known to have very high man–animal conflict.

Forest Division : Sonitpur West

Connectivity: Sonai Rupai Wildlife Sanctuary and Charduar Reserve Forest and adjoining forests with Singri Hill Reserve Forest.

Geographical coordinates:

Latitude 26°36'41"–26°48'39" N
Longitude 92°26'58"–92°29'37" E

Length: 30 km

Width: 1.5 km

Forest type/ Vegetation: Tropical deciduous forest, agriculture and tea gardens

Nearest PA: Sonai Rupai Wildlife Sanctuary and Orang National Park

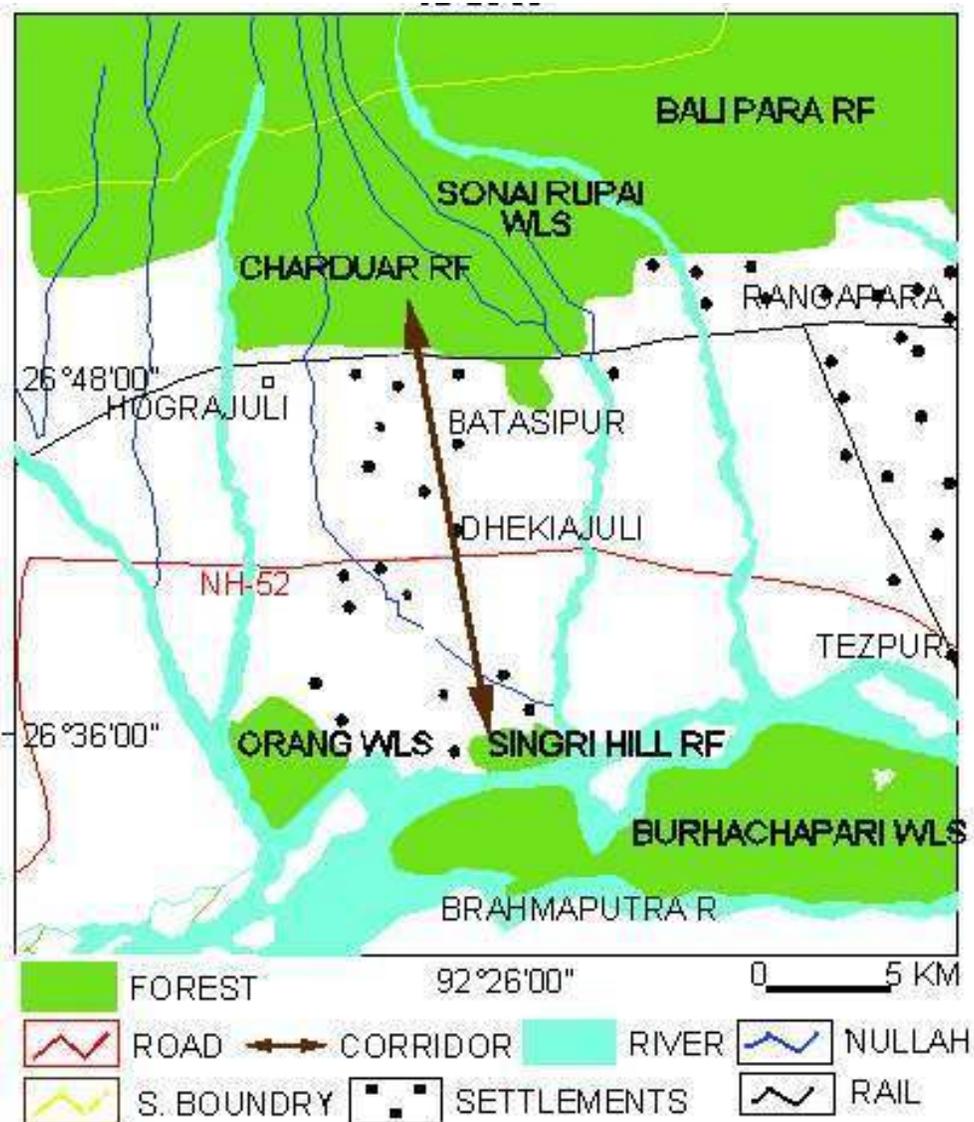
Legal status of the corridor: Private land and forest land leased to tea gardens

Major land-use: Agriculture, settlement and tea gardens

Major habitation/settlements in corridor: Posabasti, Panchnoi, Dipabasti, Rowmari *basti*, Narayankati, Sirajuli, Borsola, Singri. Apart from the villages, there are 16 tea estates viz., Chapai, Monmohini, Monabag, Semaguri, Tinkharia, Panbari, Dhinai, Tulip, Sirajuly, Dibruding, Singri, Bagaribari, Pachim Singri (Chitalomari), Pub Singri, Hugrajuli and Dhekiajuli

Corridor dependent villages: Batasipur, Dhekiajuli and the above villages

Human artefacts on the corridor: National Highway 52 (Guwahati to North Lakhimpur), processing plants of tea gardens



Frequency of usage of the corridor by elephants: Regular and seasonal; used between October and February

Threats to the corridor:

1. Human settlements
2. Agricultural lands
3. Tea garden and their processing plants

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Lobbying with tea gardens to leave a part of the land for easy movement of elephants and prevention of change of land-use pattern in these tea gardens



17. SAIPUNG - NARPUH



State : Meghalaya
Ecological Priority : Low
Conservation Feasibility : Medium

The corridor connects Saipung Reserve Forest with Narpuh II Reserve Forest and is bordering North Cachar Hills of Assam. Lynju and Sumleng rivers drains the corridor area. This habitat supports very few elephants. The land is owned by two village Chiefs (Dolloi) viz., Saipung elaka and Sutnga elaka. At present the land is leased to Biате tribe, a sub-tribe from Mizoram.

Forest Division : Jaintia Hills

Connectivity : Saipung Reserve Forest with Narpuh II Reserve Forest

Geographical coordinates :

Latitude 25°08'–25°13' N
Longitude 92°33'–92°42' E

Length: 10–11 km

Width: 5 km

Forest type/Vegetation: Tropical evergreen and moist deciduous with *jhum* patches

Nearest PA: Barail Wildlife Sanctuary

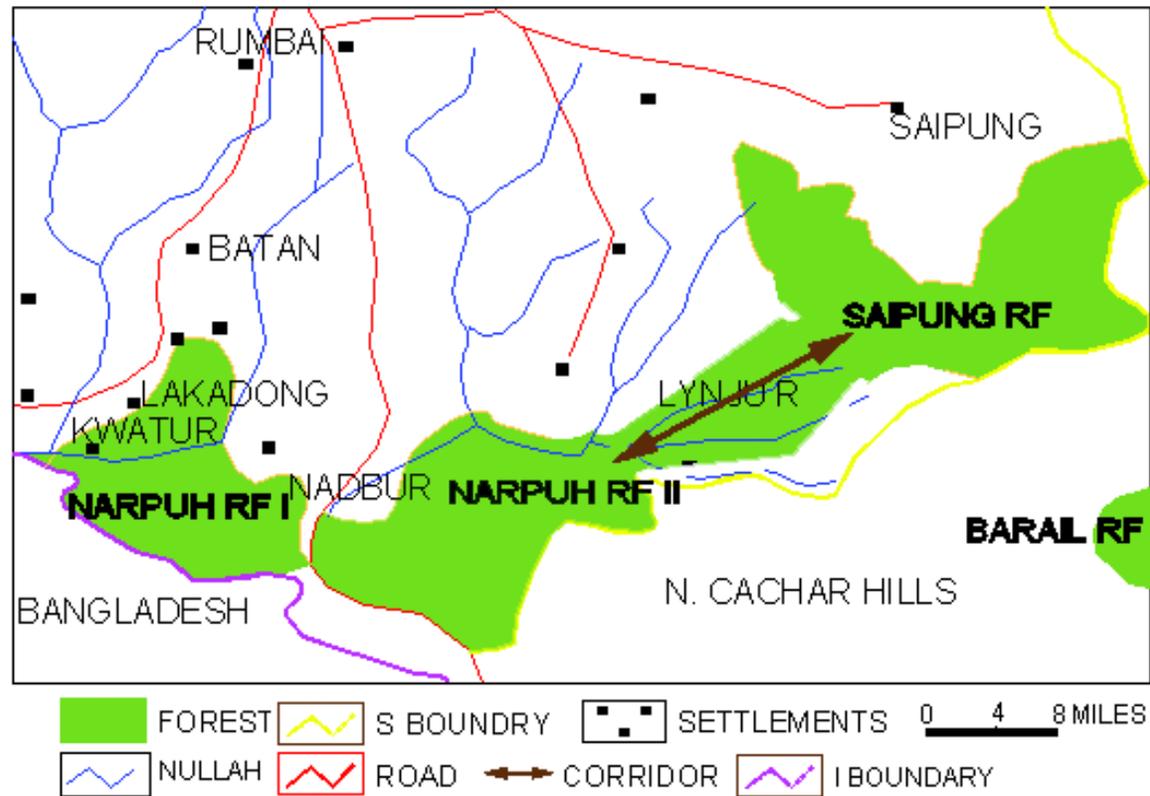
Legal status of the corridor: Private forest.

Major land-use: Agriculture (*jhum*) and settlements

Major habitation/settlements in corridor: Khoingoi, Mulchang, Saitwal and Bombaithal with total of 40 bamboo houses and a human population of 250

Corridor dependent villages: Khoingoi, Mulchang, Saitwal and Bombaithal

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Occasional. About five to nine elephants use this corridor (A total of 11 elephants were counted in this corridor during the State Forest Department census of 2002)

Threats to the corridor:

1. Expansion of villages. There are about 40 houses with about 250 people which is not a major threat at present but can lead to one if not checked.

Conservation plan

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Seeking alternatives for the four villages (Khoingoi, Mulchang, Saitwal and Bombaithal)
3. Exploring the possibility of establishing a Community Reserve

Remarks: The Wildlife Division of Meghalaya has already proposed to acquire the corridor land which can serve as an elephant corridor by notifying Saipung Reserve Forest, Narpuh Reserve Forest and the corridor area into a sanctuary.



18. BAGHMARA-BALPAKRAM



State : Meghalaya
Ecological Priority : High
Conservation Feasibility : Medium

This corridor connecting Balpakram National Park with Baghmara Reserve Forest is vital in maintaining habitat contiguity of about 600 km² of elephant habitat. Elephants, during their movement, generally pass through Dambuk, Jhongkhol, Dambuk Atong and Hathibhel villages. Presently, the corridor is safe but due to rich deposits of coal in this area, the corridor could be affected in future.

Forest Division : Balpakram National Park

Connectivity : Balpakram National Park with Baghmara Reserve Forest

Geographical coordinates :

Latitude 25°13'–25°17' N
Longitude 90°43'–90°50' E

Length: 6 km

Width: 4.5 km

Forest type/ Vegetation: Tropical evergreen forest with plantation

Nearest PA: Balpakram National Park

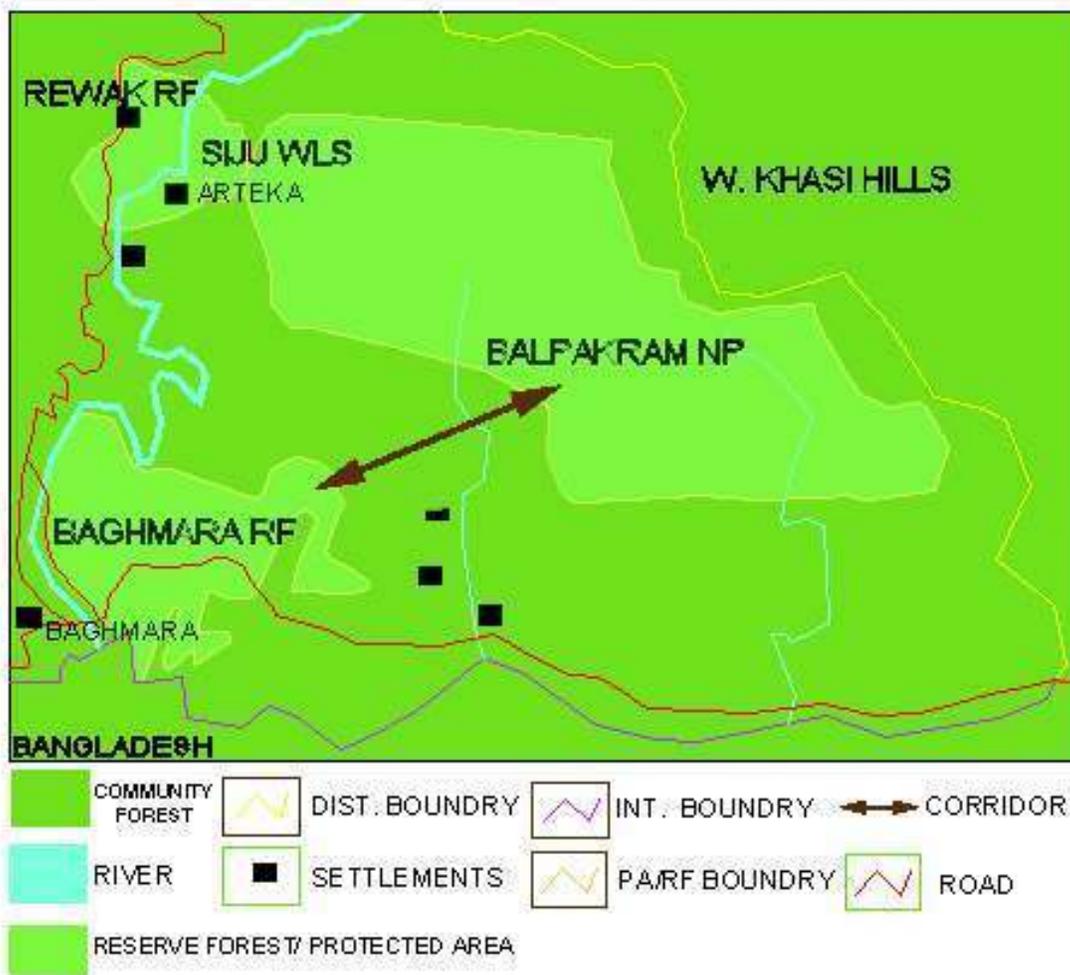
Legal status of the corridor: Clan land (*Aking* land)

Major land-use: Forest, plantation and agriculture (*jhum*)

Major habitation/settlements in corridor: Halwa Atong (80 houses; one school), Dambuk Jongkhol (6 houses), Dambuk Atong (19 houses), Chitmang Gonggrot (60 houses) and Hatibhel (Agachikona) (21 houses, 1 school)

Corridor dependent villages: Halwa Atong, Dambuk Jongkhol, Dambuk Atong, Chitmang Gonggrot and Hatibhel (Agachikona)

Human artefacts on the corridor: Road {Baghmara to Rongru Asim village (western side) and the road from Rongara town on the eastern side}



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds

Threats to the corridor:

1. Slash and burn (*jhum*) cultivation
2. The possible mining of a rich deposit of coal
3. Expansion of villages in the corridor forest
4. Destruction of natural forest for plantation, more rapidly in recent years

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Preventing the villagers from further forest destruction for monoculture plantation
3. Prohibiting the destructive developmental activities in the area
4. Prevention of potential mining of the area for coal
5. Exploring the possibility of establishing a Community Reserve



19. SIJU - REWAK



State : Meghalaya
Conservation Feasibility : High
Ecological Priority : Medium

This narrow corridor connecting Siju Wildlife Sanctuary with Rewak Reserve Forest is a very important passage for elephants and helps in maintaining habitat continuity between Balpakram-Siju-Rewak and Nokrek National park. Elephants cross the Simsang River through the sandy stretches in the corridor area. Elsewhere, the river is bound by steep limestone cliffs and large boulder formations along both the banks

Forest Division : Balpakram National Park

Connectivity : Siju Wildlife Sanctuary with Rewak Reserve Forest

Geographical coordinates :

Latitude 25°18'–25°20' N
Longitude 90°40'–90°42' E

Length: 2 km

Width: 3.5 km

Forest type/ Vegetation: Tropical evergreen forest with plantation and *jhum* land

Nearest PA: Siju Wildlife Sanctuary

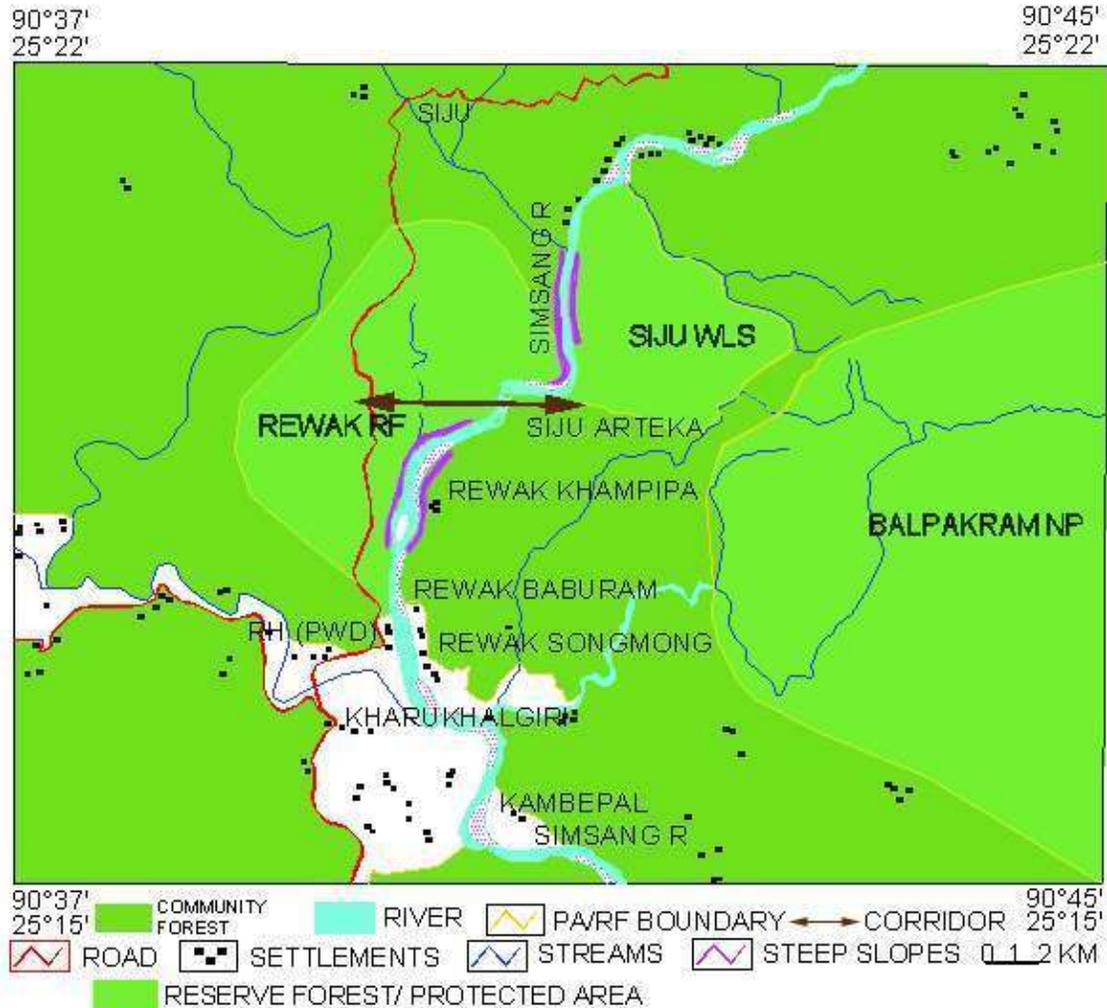
Legal status of the corridor: Clan land (*Akhing* land)

Major land-use: Forest and settlement

Major habitation/settlements in corridor: Arteka village with about 23 families and 125 people

Corridor dependent villages: Arteka, Siju and Rewak

Human artefacts on the corridor: Baghmara-Siju-William Nagar road



Frequency of usage of the corridor by elephants : Regular; used by bulls and herds of 10–30

Threats to the corridor:

1. Slash and burn (*Jhum*) cultivation
2. Arteka village in the corridor area and their biotic pressure
3. Monoculture plantation of arecanut

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prohibiting destructive developmental activities in and around the Siju Wildlife Sanctuary.
3. WTI is currently running a project seeking alternatives for reducing the dependence of Arteka village on the forests.
4. Improving forest cover in and around corridor
5. Exploring the possibility of establishing a Community Reserve



20. REWAK - IMANGIRI



State : Meghalaya
Ecological Priority : Medium
Conservation Feasibility : Medium

The corridor connects Rewak Reserve Forest with Imangiri Reserve Forest and passes through Akhing (clan) lands and settlements. There is no immediate threat to the corridor except human settlement and *jhumming*.

Forest Division : Garo Hills
Connectivity : Imangiri Reserve Forest with Rewak Reserve Forest

Geographical coordinates :

Latitude 25° 18'–25°22' N
Longitude 90° 35'–90°39' E

Length: 8–9 km **Width:** 2.5 km

Forest type/ Vegetation: Tropical evergreen forest

Nearest PA: Siju Wildlife Sanctuary

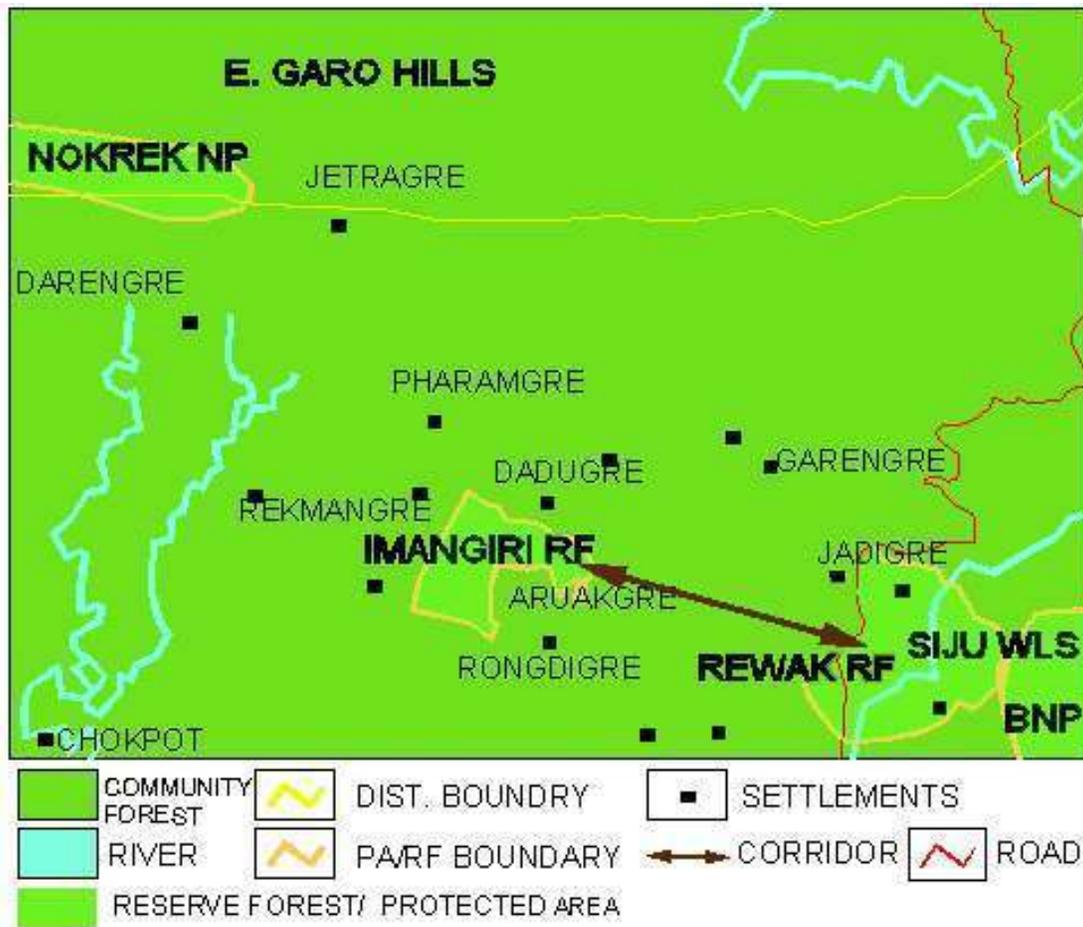
Legal status of the corridor: Clan land (Jadigittim *Akhing* land)

Major land-use: Forest, settlement and *jhum* cultivation

Major habitation/settlements in corridor: Tholigre, Nakatagre, Jadigittim, Depri Khosigre, Garengre and Damukgittum.

Corridor dependent villages: Tholigre, Nakatagre, Jadigittim, Depri Khosigre, Garengre and Damukgittum.

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds

Threats to the corridor:

1. Expansion of settlements and *jhum* cultivation

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Preventing the expansion of settlements towards the corridor
3. Exploring the possibility of establishing a Community Reserve



21. NOKREK - IMANGIRI



State : Meghalaya
Ecological Priority : Medium
Conservation Feasibility : Low

The corridor connects a large stretch of forest in and around Imangiri Reserve Forest with Nokrek National Park and adjacent areas. Due to inaccessibility of the corridor area by road and comparatively low human density in the area, the corridor is safe. However, coal and limestone mining are threats to the area.

Forest Division : Garo Hills

Connectivity : Imangiri Reserve Forest and Nokrek National Park

Geographical coordinates :

Latitude 25°20'–25°25' N
Longitude 90°30'–90°35' E

Length: 10 km

Width : 3–4 km

Forest type/Vegetation: Tropical evergreen forest along the southern boundary of Nokrek National Park and moist deciduous with patches of degraded secondary forest in and around Imangiri Reserve Forest

Nearest PA: Nokrek National Park

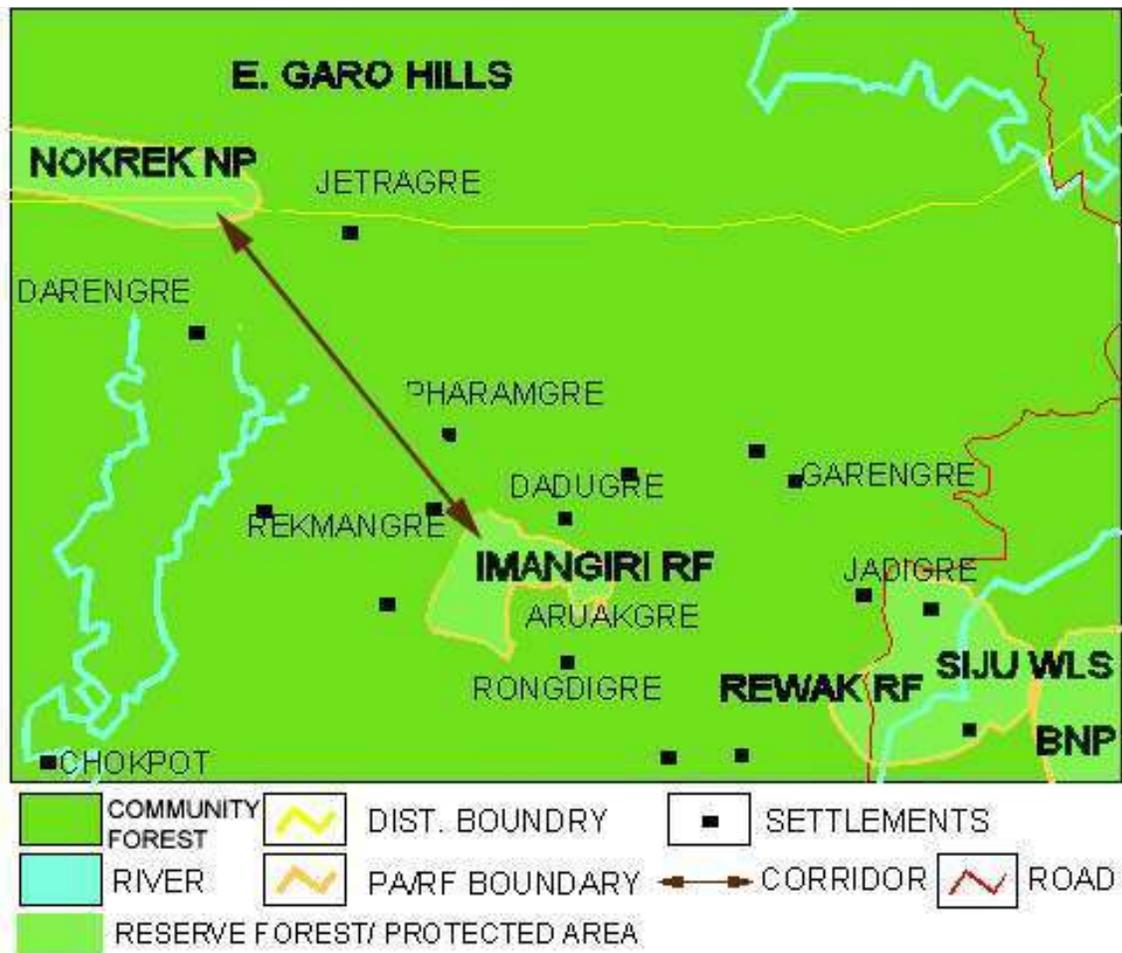
Legal status of the corridor: Private land (*Akhing* land)

Major land-use: Forest, settlement and *jhum* cultivation

Major habitation/settlements in corridor: Dadugre, Rekmangre, Nepali khunti, Pharamgre, Dobagre and Iman Asakgre

Corridor dependent villages: Dadugre, Rekmangre, Nepali khunti, Pharamgre, Dobagre, Iman Asakgre, Arukgre, Jetragre and Iman Durabanda

Human artefacts on the corridor: Road (Kharukhol-Chokpot)



Frequency of usage of the corridor by elephants : Regular

Threats to the corridor:

1. Present small scale coal mining and associated temporary roads opening up in the habitat is a threat
2. Limestone mining
3. Mining road (Kharukhol-Chokpot)

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Checking destructive developmental activities in the area
3. Prevention of large scale coal and limestone mining
4. Exploring the possibility of establishing a Community Reserve



22. RANGGIRA - NOKREK



State : Meghalaya
Ecological Priority : Medium
Conservation Feasibility : Low

Elephants from Ranggira, Sanchangiri and Galwang village Reserve Forest area use this corridor to move on to Nokrek National Park area via Bismagre, Bibragre, Sakalgre and Mandalgre private forest. Human settlements, North Eastern Hill University (NEHU) campus, fishery pond, 2nd police Battalion campus and other artifacts along the Tura-Rongram road obstruct their movement.

Forest Division : Garo Hills

Connectivity : Elephant population of West Garo Hills with Nokrek National Park thus leading to South Garo Hills

Geographical coordinates :

Latitude 25°31'–25°34' N
Longitude 90°12'–90°17' E

Length: 7–8 km

Width: 1.5–2 km

Forest type/ Vegetation: Tropical moist deciduous forests

Nearest PA: Nokrek National Park

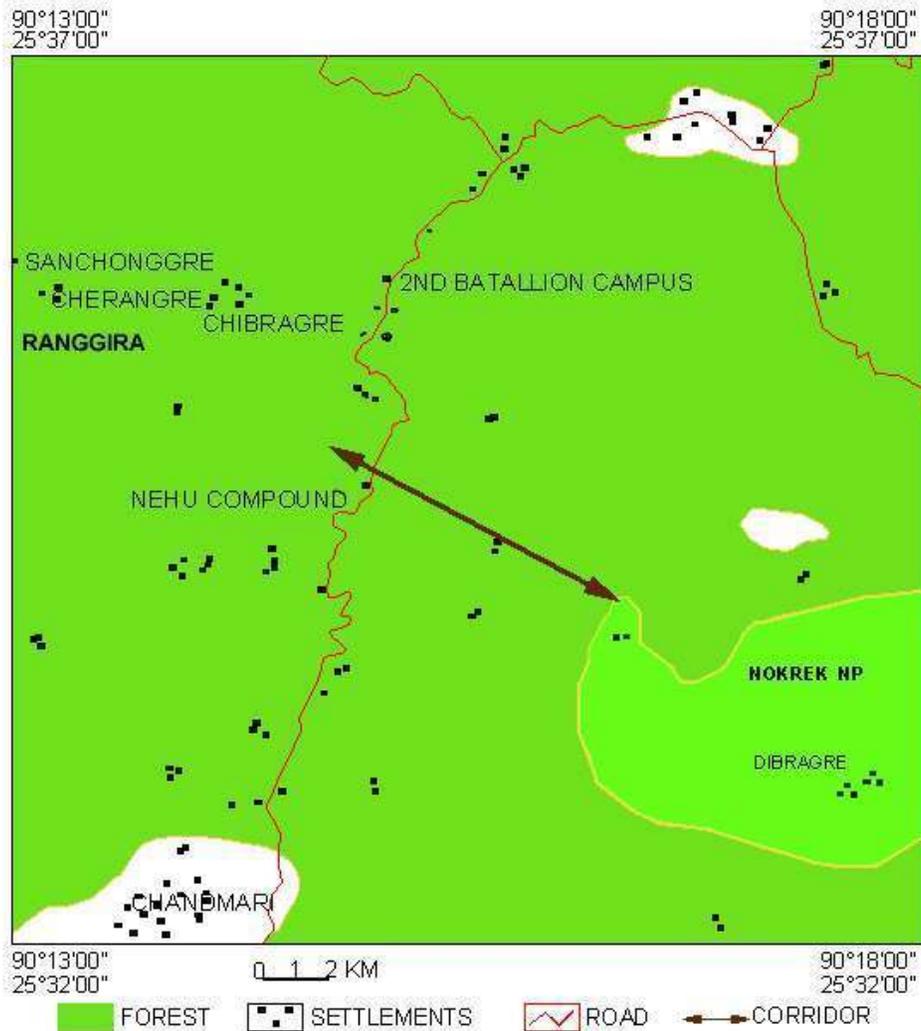
Legal status of the corridor: Clan land (*Akhing* land)

Major land-use: Forest, plantation, settlement, agriculture and NEHU campus

Major habitation/settlements in corridor: Chasingre, Phagugre, Chibragre, Ganol Sangma, 2nd police Battalion campus and Boldorenggre

Corridor dependent villages: Chasingre, Phagugre, Chibragre, Ganol Sangma and Boldorenggre.

Human artefacts on the corridor: NEHU campus, 2nd police Battalion campus, fishery pond and road (Tura-Guwahati)



Frequency of usage of the corridor by elephants: Regular and seasonal; used mostly in October-February

Threats to the corridor:

1. Expansion of human settlement and *Jhum* cultivation.
2. NEHU campus, especially fencing of the land
3. 2nd police Battalion campus

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Negotiation with NEHU authorities to spare the main corridor area for elephant movement.
3. Prevention of new settlements in the corridor area
4. Exploring the possibility of establishing a Community Reserve





CHAPTER-8



Elephant Corridors of Southern India

Surendra Varma,¹ Arun Venkataraman,² R. Sukumar³ and P.S. Easa⁴

The southernmost elephant populations of India range over the two principal mountain chains of southern India (the Western Ghats and a part of the Eastern Ghats) in the states of Kerala, Karnataka, Tamil Nadu and Andhra Pradesh. The elephant habitats in this range, that lie between 8°15' and 15°30' N and between 74°15' and 78°00' E are diverse and include tropical evergreen, semi-evergreen, moist deciduous, dry deciduous and dry thorn forests, grasslands and monoculture plantations. The elephants inhabit an area ranging in elevation between 100 msl and 2000 msl. There are about eight populations within this range based on contiguity of habitats.

Northern Karnataka has about 40–60 elephants isolated from the other populations of the Western Ghats. The elephants are present in Uttara Kannada and Belgaum districts of the state inhabiting dry and moist deciduous forests.

The elephants inhabiting the crest-line of Karnataka are highly scattered and are distributed in the evergreen forests and montane grasslands of South Kanara, Mangalore, Shimoga and Chickmangalur districts. This population has only about 60 elephants in small isolated groups.

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The moist deciduous forest of Bhadra Wildlife Sanctuary is the major elephant habitat that lies on the Malnad plateau on the eastern flanks of the Western Ghats. The largest single population of elephants in Asia occupy areas south of this region extending from the Brahmagiri hills to the Eastern Ghats, comprising the Nilgiri hills of Tamil Nadu, the Bandipur-Nagarahole Protected Area complex of Karnataka, Wayanad in Kerala and the Biligiri Ranganswamy Temple Sanctuary of Karnataka adjoining the Satyamangalam, Kollegal, Hosur and Dharmapuri forest divisions. The region has diverse vegetation types with over 3300 km² out of a total of about 12,600 km² lying within the Protected Area network. This complex is estimated to have a minimum of 6300 elephants. The area also has high incidences of human–elephant conflict.

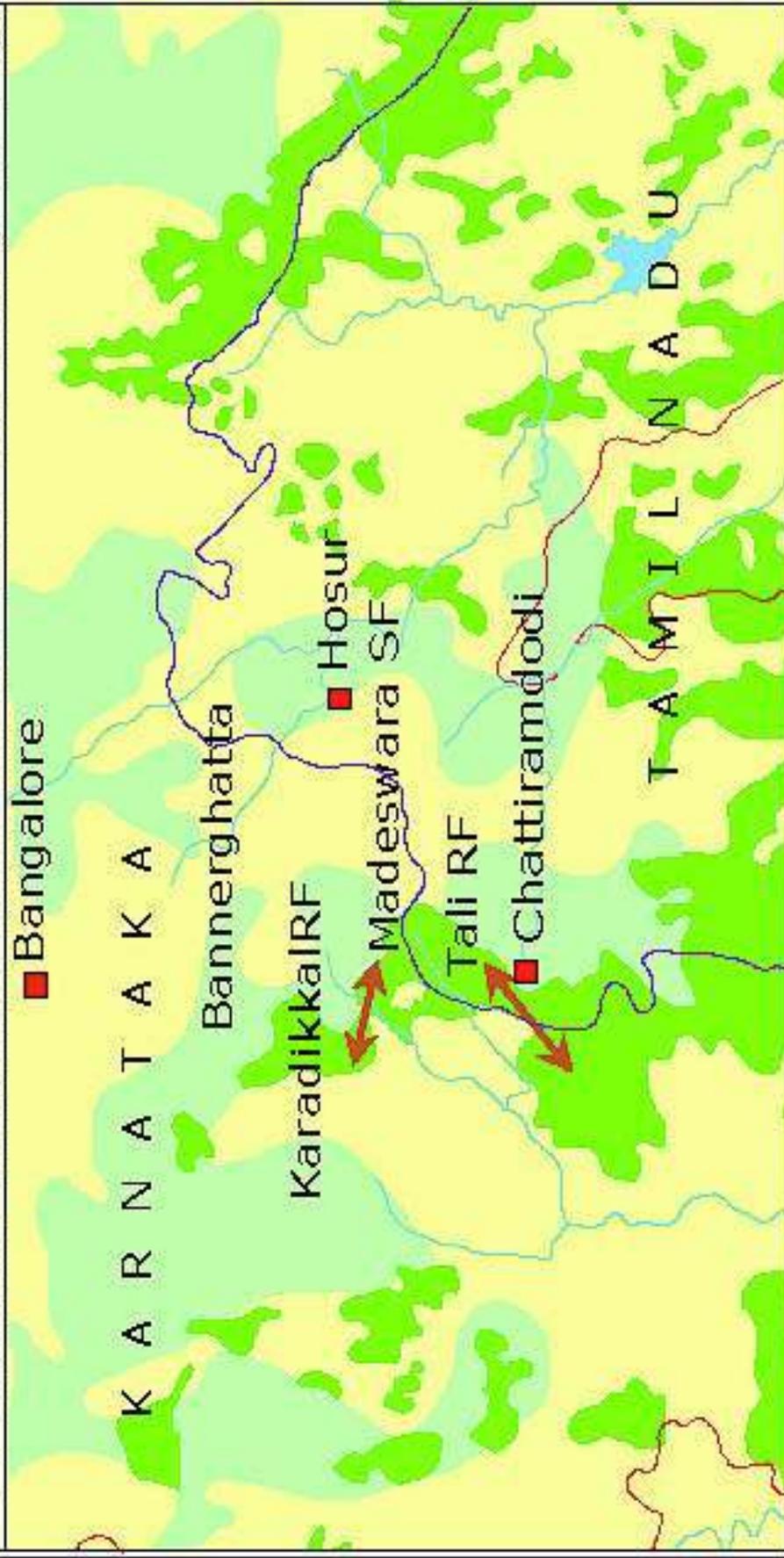
Other than these large populations, two isolated herds also exist in this area. An isolated herd of about 30 elephants inhabit the Kaundinya Wildlife Sanctuary in Chittoor district of Andhra Pradesh and have originally migrated from the Hosur and Anekal forest divisions of Tamil Nadu. A small group of about six elephants is also reported from an isolated area in Tirupattur Forest Division of Tamil Nadu.

Down south, the elephant population of Nilambur, Silent Valley and Coimbatore belt is spread over 2300 km² of habitat comprising diverse vegetation types ranging from evergreen forests to high altitude shola and grasslands.

The Anamalai-Parambikulam area is a stretch of about 5500 km² and is home for about 1600 elephants. This area covers a number of forest divisions of Kerala and Tamil Nadu including Protected Areas such as the Indira Gandhi Wildlife Sanctuary, Paramabikulam Wildlife Sanctuary, Chimmoni Wildlife Sanctuary, Peechi-Vazhani Wildlife Sanctuary, Thattekkad Bird Sanctuary, Eravikulam National Park and Chinnar Wildlife Sanctuary in addition to the Palni hills, Vazhachal, Nelliampathi, Malayattur, Mankulam and Munnar areas. The diversity of vegetation due to altitudinal ranges and the small number of human settlements make this one of the best conservation units for elephants in southern India.

The Idukki Wildlife Sanctuary and the adjacent areas of Ayyappankoil and Nagarampara Ranges and part of the Munnar and Kothamangalam forest divisions have a small population of elephants in an isolated patch of forests of about 300 km² with a number of settlements within and around the forests. The elephant population south of this inhabits the Periyar-Srivilliputhur-Highway complex extending up to the Achenkoil forest through Ranni, Konni, Punalur and Thenmala forest divisions. This extent of about 3300 km² has about 1500 elephants in an evergreen forest-dominated landscape. The southern-most population of elephants in India, numbering about 200, ranges in the evergreen forests of Agasthyamalai, Neyyar, Shendurney and Peppara wildlife sanctuaries and Kalakkad-Mundanthurai Tiger Reserve.

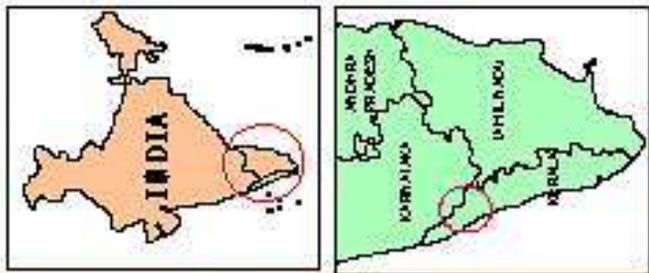
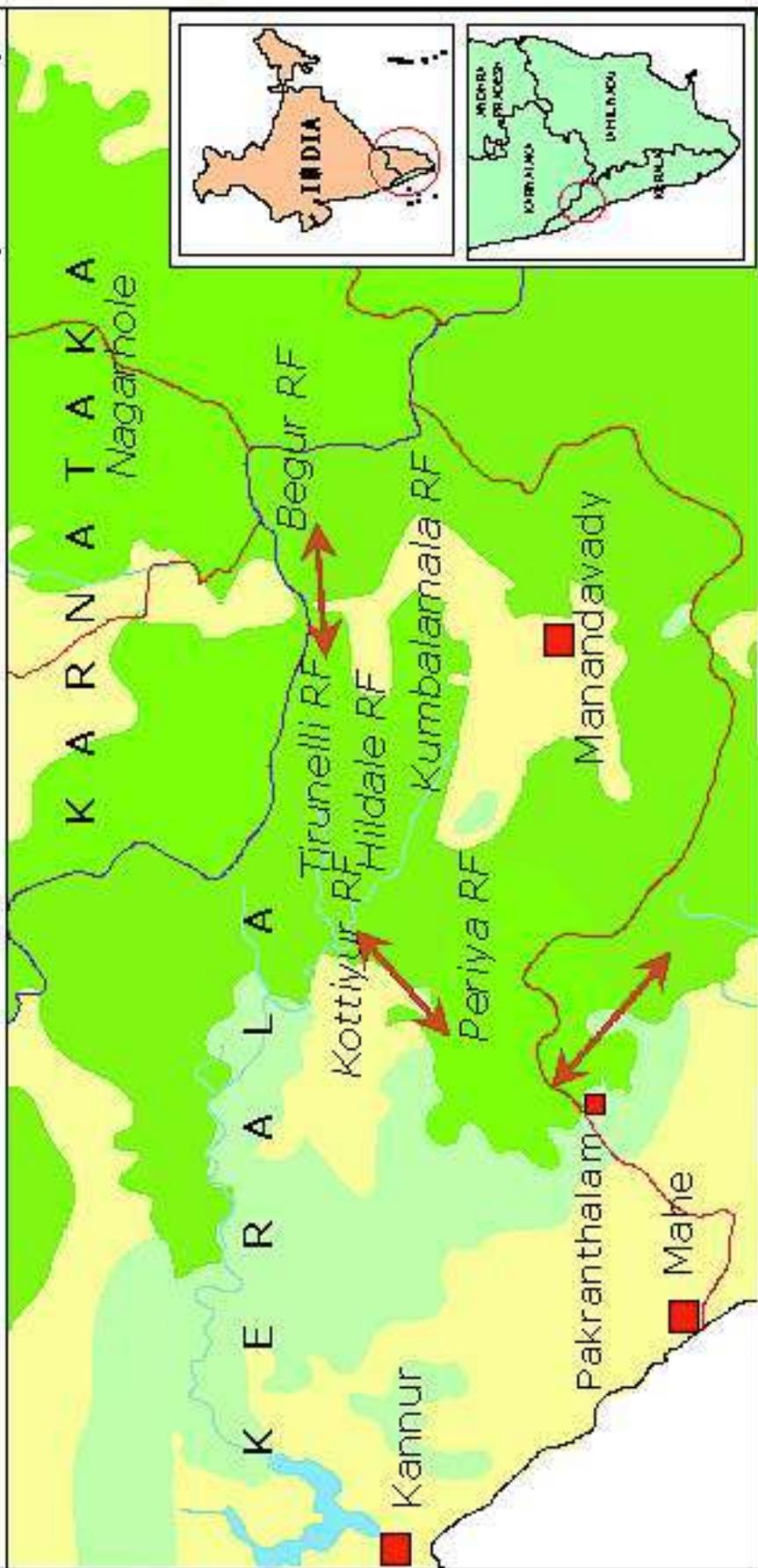
ELEPHANT CORRIDORS IN SOUTH INDIA (Part I)



LEGEND	
	Reserve Forest
	Scrub & grassland
	Unclassified Forest
	Water bodies
	Arable land with Settlements
	Hosur
	Elephant Corridor
	Steep Slope
	DIVISION boundary
	State boundary

Km 5 0 10 Km

ELEPHANT CORRIDORS IN SOUTH INDIA (Part II)

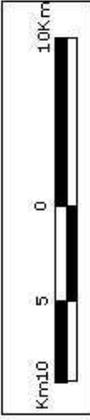
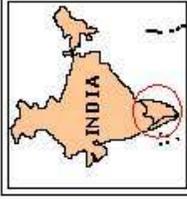


LEGEND

Reserve Forest	Water bodies	Elephant Corridor	Steep Slope
Scrub & grassland	Arable land with Settlements	Division boundary	State boundary
Unclassified Forest			



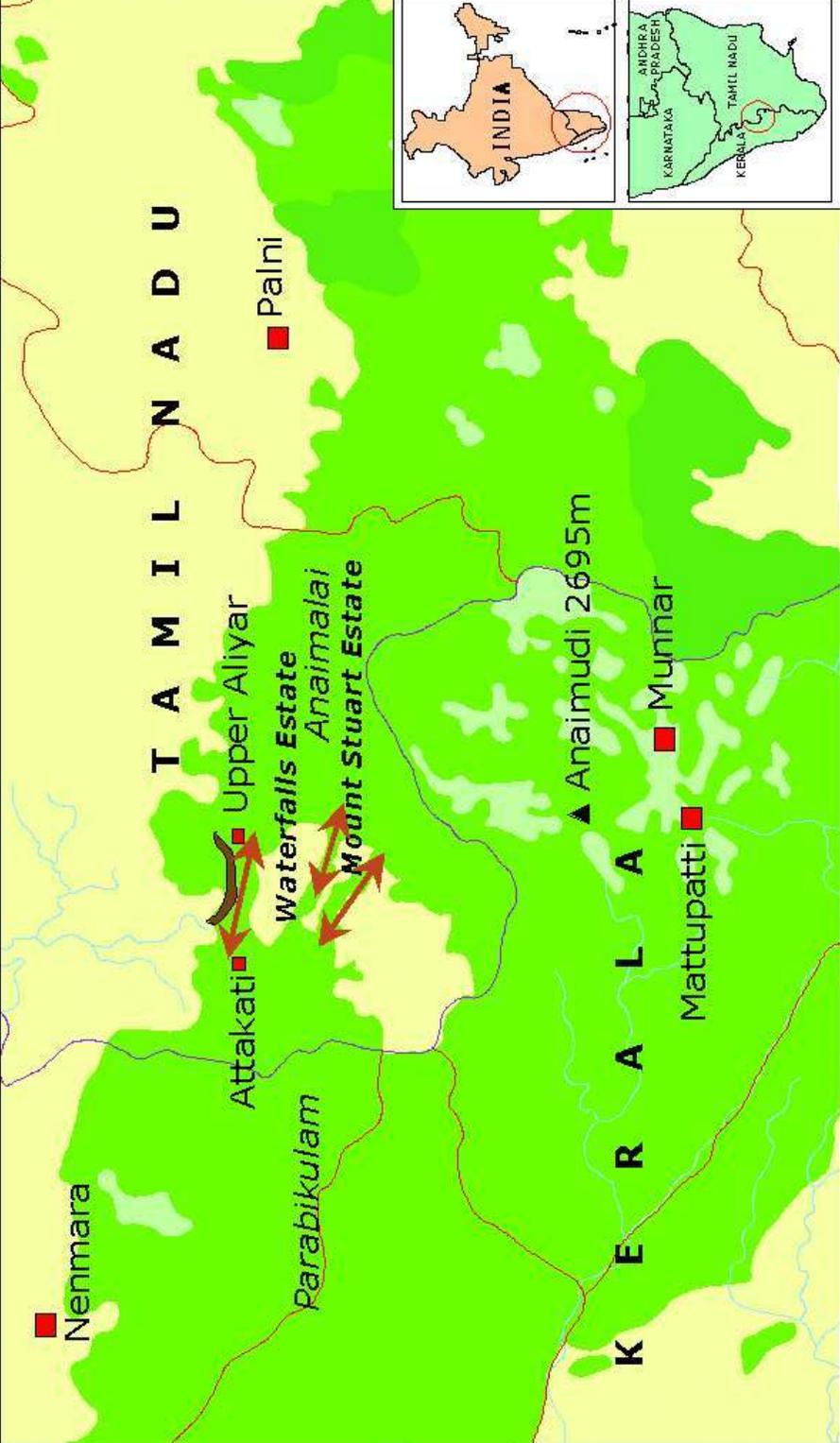
ELEPHANT CORRIDORS IN SOUTH INDIA (Part III)



LEGEND

- Reserve Forest
- Scrub & grassland
- Unclassified Forest
- Arable land with settlements
- Water bodies
- Important Towns
- Elephant Corridor
- State boundary
- Division boundary
- Steep Slope

ELEPHANT CORRIDORS IN SOUTH INDIA (Part IV)



LEGEND

Reserve Forest	Water bodies	Steep Slope
Scrub & grassland	Arable land with Settlements	Division boundary
Unclassified Forest	Elephant Corridor	State boundary

Scale: 0, 10 Km, 15 Km



1. KARADIKKAL - MADESWARA



Alternate name: Ragihalli

State : Karnataka
Ecological Priority : Medium
Conservation Feasibility : High

This narrow corridor that connects the northern and southern portions of Bannerghatta National Park is located between Bilaganaguppa and Jayapuradoddi settlements, connecting Karadikkal and Madeswara State forests. Shivapura is a major settlement adjacent to the corridor.

Forest Division : Bannerghatta National Park (BNP)

Connectivity : Northern and southern portion of Bannerghatta National Park

Geographical Coordinates:

Latitude 12°41'–12°42' N
Longitude 77°33'–77°34' E

Length: 1 km **Width:** 0.3–0.4 km

Forest type/ Vegetation: Tropical thorn and deciduous forests

Nearest PA: Bannerghatta National Park

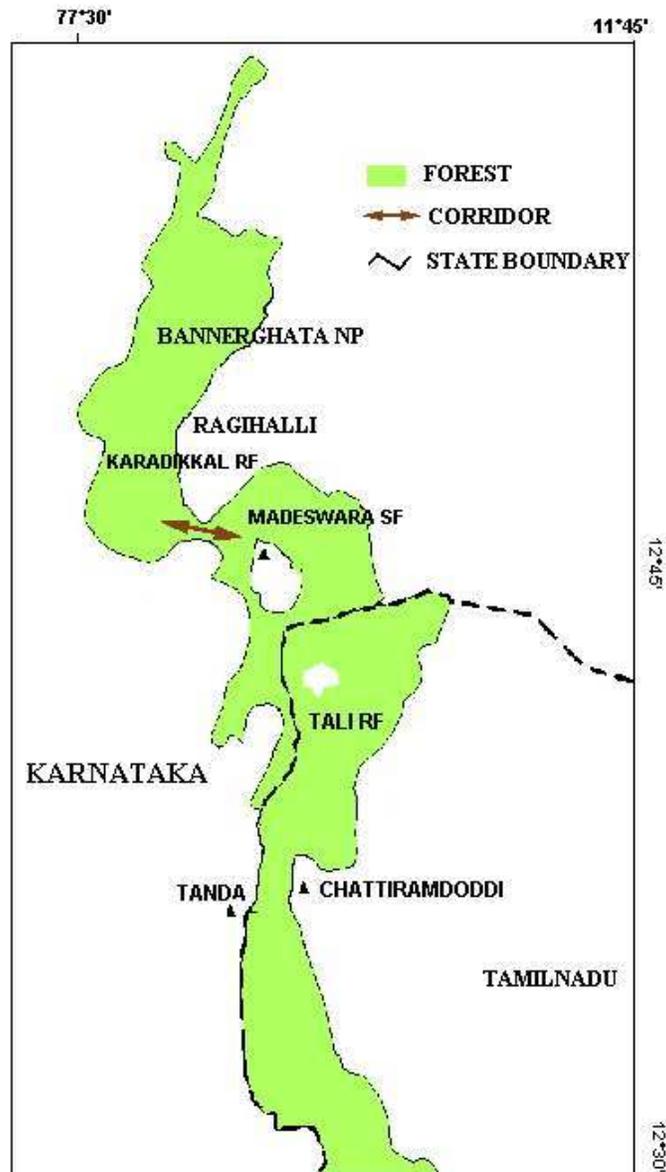
Legal status of the corridor: Reserve Forest

Major land-use: Forest

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Bilaganaguppa and Jayapuradoddi

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Regular

Threats to the corridor:

1. Cattle grazing and fuel wood collection
2. Disturbance due to illegal granite quarrying

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Reducing cattle grazing and fuel wood collection in the corridor area.
3. Acquisition of land near Jayapuradoddi village for increasing width of corridor



2. TALI



Alternate name: Chattiramdoddi - Hunsanhalli

State : Karnataka and Tamil Nadu
Ecological Priority : Medium
Conservation Feasibility : High

The Bannerghatta National Park, parts of Bangalore Forest Division in the Kanakpura range and the northern part of Hosur Forest Division (Tali Reserve Forest) are at present cut off from the southern part of Hosur Forest Division due to cultivation between Chattiramdoddi and Hunsanhalli villages. If the northern portion, comprising of Bannerghatta National Park and its adjacent ranges, have to maintain their viability as elephant habitat, it is essential to establish a corridor in this region.

Forest Division : Bangalore Rural and Hosur

Connectivity: Bannerghatta National Park and northern part of Hosur Division with southern part of Hosur Division

Geographical Coordinates:

Latitude 12°35'–12°36' N
Longitude 77°30'–77°31' E

Length: 2 km

Width: 1 km

Forest type/ Vegetation: Tropical deciduous and scrub forests

Nearest PA: Bannerghatta National Park and Cauvery Wildlife Sanctuary

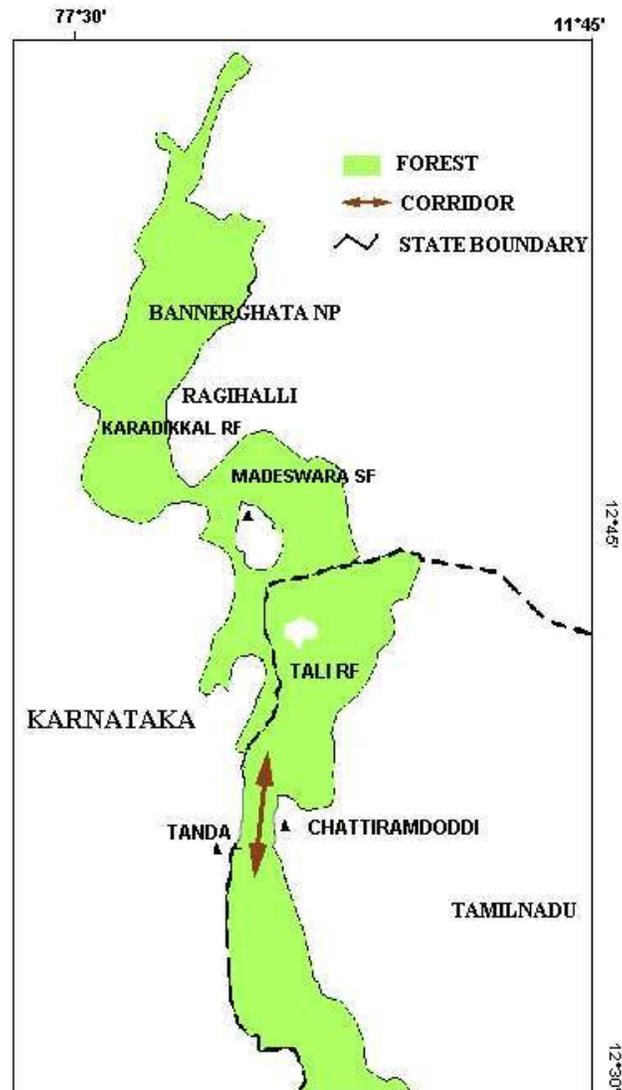
Legal status of the corridor: Reserve Forest

Major land-use: Forest and settlements

Major habitation/settlements in corridor: Tanda village

Corridor dependent Villages: Belakerri, Basavanapuram, Tanda, Chhatni and Achchubalu

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Regular; used by herds and bulls

Threats to the corridor:

1. Disturbance from Belakerri and Basavanapuram villages for fuel wood collection and cattle grazing.

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Survey of the land between Chattiramdodi and Tanda village for potential acquisition to widen the corridor
3. Minimizing cattle grazing and fuel wood collection
4. Prevention of further encroachments in the corridor



3. EDAYARHALLI - DODDASAMPIGE



Alternate name: Bekkatur-Arabikere, Kollegal

State : Karnataka
Ecological Priority : High
Conservation Feasibility : High

The elephant range to the east of the Biligiri Rangan hills has been divided by a long strip of cultivation, extending south from the town of Kollegal, to the Tibetan settlement at Byloor for a distance of 50 km. This strip nearly cuts off the Doddasampige Reserve Forest of Biligiri Ranganswamy Temple Sanctuary from the Ramapuram range of Kollegal Division. Only a narrow corridor now exists between the villages of Kurubaradoddi and Aandipalya along the Kollegal-Satyamangalam highway.

Forest Division : Chamrajnagar Wildlife Division (Biligiri Ranganswamy Temple Sanctuary)

Connectivity : Chamrajnagar Wildlife Division (Biligiri Ranganswamy Temple Sanctuary) and Kollegal Division

Geographical Coordinates:

Latitude 11°55'15"–11°56'15" N
Longitude 77°15'20"–77°15'45" E

Length: 0.5 km

Width: 2 km

Forest type/ Vegetation: Tropical thorn and mixed deciduous forests

Nearest PA: Biligiri Ranganswamy Temple (BRT) Wildlife Sanctuary

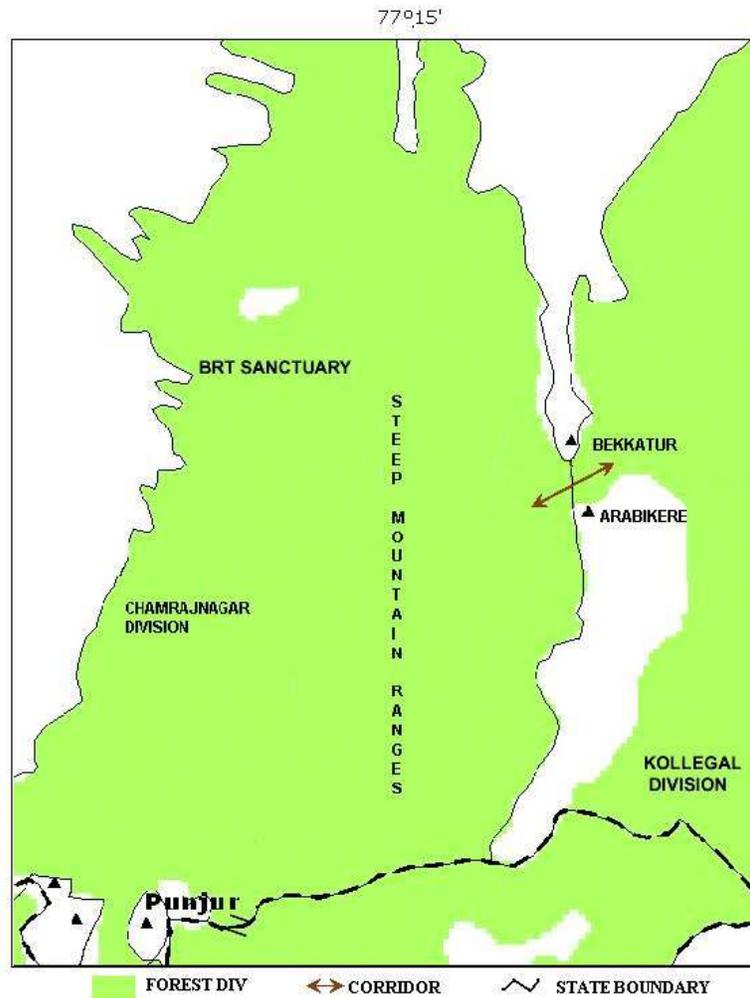
Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest and agriculture (fallow)

Major habitation/settlements in corridor: Nil.

Corridor dependent villages: Bekkatur, Arabikere, Hosadoddi, Kurubaradoddi, Silaikattanadoddi and Aandipalya

Human artefacts on the corridor: Kollegal-Sathyamangalam Highway



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds

Threats to the corridor:

1. Kollegal-Sathyamangalam highway.
2. Human habitation and crop cultivation around the corridor areas.

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Acquisition of 37.5 acres of agricultural land of Aandipalya village will broaden the corridor
3. Declaration of this area as part of the BRT sanctuary with adequate on-ground protection

Remarks: This land has recently been acquired by Wildlife Trust of India as the first part of a securing plan for the movement of elephants.



4. CHAMRAJNAGAR - TALAMALAI AT PUNJUR

Alternate name: Punjur- Kolipalya

State : Karnataka
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects the Chamrajnagar and Satyamangalam Forest Divisions at Punjur. In 1990, tribals from the Biligiri Rangan hills were rehabilitated in this corridor and the forest was cleared for cultivation. This has proven to be an obstruction to the movement of elephants along this tract. To the east of the Punjur valley, there is insignificant movement along the steep hill slopes, while to the west of Kolipalya there are human settlements and cultivation.

Forest Division : Chamrajnagar Wildlife Division

Connectivity : Punjur Range (Chamrajnagar Wildlife Division) and Hasanur Range (Satyamangalam Division)

Geographical Coordinates:

Latitude 11°46'–11°47' N
Longitude 77°05'–77°06' E

Length: 1.5 km

Width: 1 km

Forest type/ Vegetation: Tropical deciduous and thorn forests

Nearest PA: Biligiri Ranganswamy Temple (BRT) Wildlife Sanctuary

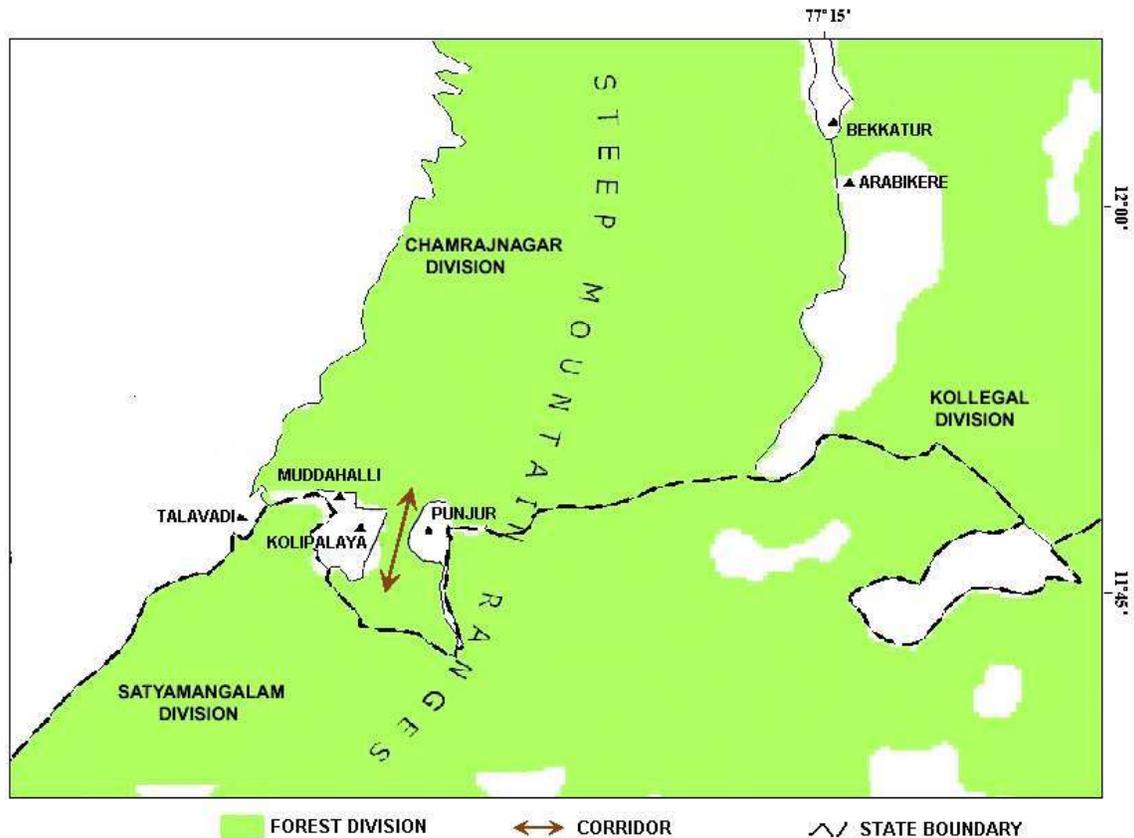
Legal status of the corridor: Reserve Forest

Major land-use: Forest, settlements and agriculture

Major habitation/settlements in corridor: Tribal settlements

Corridor dependent villages: Punjur, Kolipalaya, Kumbesvaran Gudi, Bejjalapalya, Irainapur, Mukanpalaya and Banavadi and tribal settlements

Human artefacts on the corridor: Chamrajnagar-Satyamangalam Highway



Frequency of usage of the corridor by elephants: Regular; used by bulls as well as herds.

Threats to the corridor:

1. Tribal settlements in the corridor area
2. Frequent fire set by Non Timber Forest Produce (NTFP) collectors
3. Fuel wood collection and cattle-grazing

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Land survey west of the village Bejjalapalya and at Punjur for possible corridor acquisition for increasing its width
3. Exploration of the possibility of restoration of the corridor by voluntary rehabilitation of tribals



5. CHAMRAJNAGAR - TALAMALAI AT MUDDAHALLI

Alternate name: Talavadi-Muddahalli

State : Karnataka and Tamil Nadu
Ecological Priority : High
Conservation Feasibility : Medium

This is the second corridor that connects the Chamrajnagar and Satyamangalam Forest Divisions. Elephants use this corridor to access the Suvarnavati Reservoir. The corridor lies between the villages of Talavadi and Muddahalli.

Forest Division : Chamrajnagar Wildlife and Satyamangalam

Connectivity : Chamrajnagar Wildlife Division and Satyamangalam Forest Division

Geographical Coordinates:

Latitude 11°46'–11°47' N
Longitude 77°01'–77°03' E

Length: 1.5 km

Width: 1 km

Forest type/ Vegetation: Tropical deciduous and thorn forests

Nearest PA: Biligiri Ranganswamy Temple (BRT) Wildlife Sanctuary

Legal status of the corridor: Reserve Forest

Major land-use: Forest and settlements

Major habitation/settlements in corridor: Muddahalli

Corridor dependent villages: Talavadi, Muddahalli and Kumbesvaran Kovil

Human artefacts on the corridor: Road (Talavadi-Mudahalli) and fence around the forest department plantation



Frequency of usage of the corridor by elephants: Regular; used by herds as well as bulls.

Threats to the corridor:

1. Forest department's plantation within the fenced plots
2. Frequent fire set during NTFP collection, fuel wood collection and cattle grazing

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Removal of the fences of forest department plantation in the corridor
3. Survey of land between Kumbesvaran Kovil and Banavadi for potential acquisition.



6. TALAMALAI - GUTTIYALATTUR



Alternate name: Sujalkatti - Bannari

State : Tamil Nadu
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor is extensively used by elephants during the dry season. The habitat is degraded due to fuel wood collection, cattle grazing, NTFP collection, human habitation and agricultural lands bordering the corridor

Forest Division : Satyamangalam

Connectivity : Moyar valley with Guttiyalattur Reserve forest

Geographical Coordinates:

Latitude 11°31'–11°34' N
Longitude 77°07'–77°11' E

Length: 9 km

Width: 5–3 km

Forest type/ Vegetation: Tropical dry deciduous and scrub forests

Nearest PA: BRT Wildlife Sanctuary

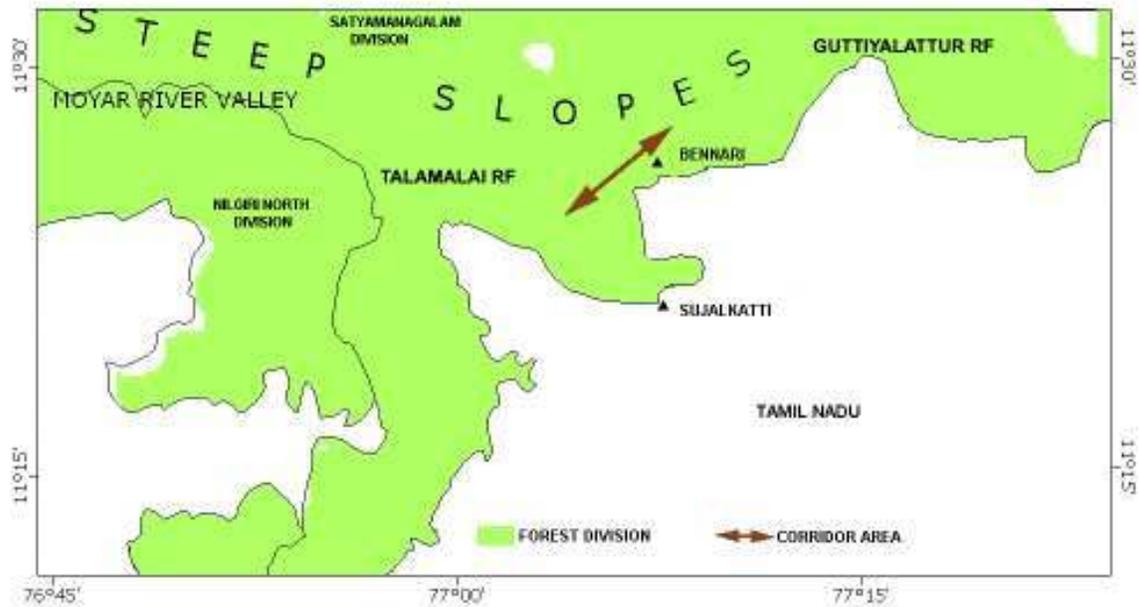
Legal status of the corridor: Reserve Forest

Major land-use: Forest, settlements and miscellaneous plantation

Major habitation/settlements in corridor: Bannari

Corridor dependent villages: Bannari and Pudupirkadavii

Human artefacts on the corridor: Satyamangalam-Chamrajnagar highway



Frequency of usage of the corridor by elephants: Regular

Threats to the corridor:

1. Fuel wood collection, lopping of trees, especially those that form part of elephant diet, cattle grazing, colonization by *Prosopis juliflora* and the invasion of weeds like *Lantana camara*, *Opuntia dillenii*, *Dodonaea viscosa* and *Calotropis gigantea*
2. Proposed railway line linking Bangalore, Chamrajnagar and Satyamangalam

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Detailed land survey north of Bannari, towards Vinayakar Kovil
3. Declaration of Sujalkatti-Bannari as a Protected Area



7. AVARAHALLA - SIGUR



Alternate name: Mavinhalla-Chemmanatham

State : Tamil Nadu
Ecological Priority : Medium
Conservation Feasibility : Medium

This is a narrow corridor connecting the Mudumalai Wildlife Sanctuary and the Nilgiri North Division. The corridor faces threats from tourist resorts that are rapidly coming up in the adjoining areas.

Forest Division: Mudumalai Wildlife Sanctuary and Nilgiri North

Connectivity: Mudumalai Wildlife Sanctuary with Nilgiri North Division

Geographical Coordinates:

Latitude 11°33' N
Longitude 76°41' E

Length: 0.5 km **Width:** 1 km

Forest type/ Vegetation: Tropical thorn and deciduous forests

Nearest PA: Mudumalai Wildlife Sanctuary

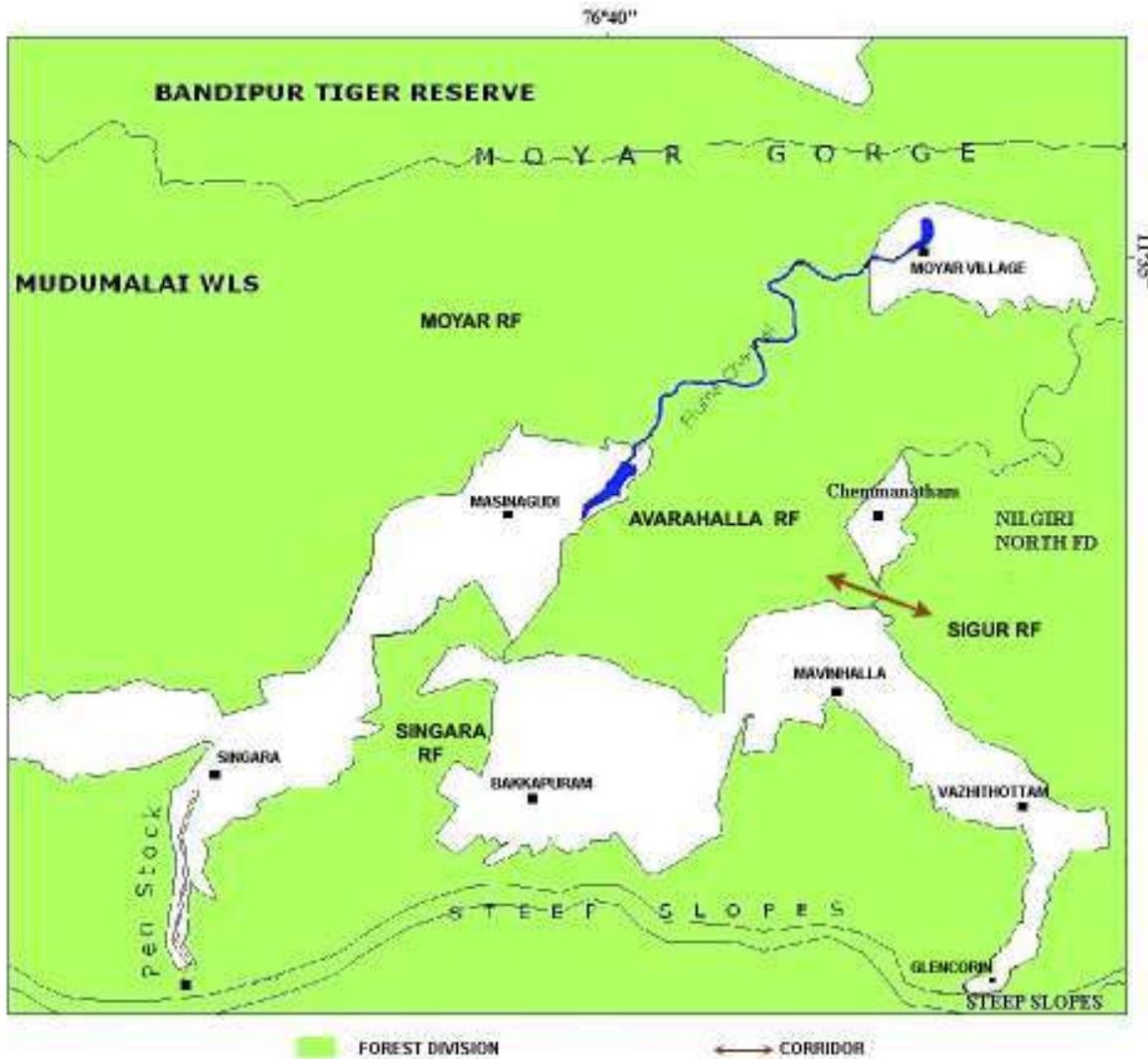
Legal status of the corridor: Reserve Forest, revenue and private land

Major land-use: Forest, small patches of private land and settlement

Major habitation/settlements in corridor: Mavinhalla and Chemmanatham

Corridor dependent villages: Mavinhalla and Chemmanatham

Human artefacts on the corridor: Tourist resorts



Frequency of usage of the corridor by elephants: Occasional

Threats to the corridor:

1. Cattle grazing and fuel wood collection is leading to degradation of the habitat
2. Holiday resorts coming up on all sides

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Surveying land south of Chemmanattam village towards Mavinahalla for potential acquisition
3. Monitoring of developmental activities especially, tourist resorts



8. KALHATTI - SIGUR AT GLENCORIN



Alternate name: Glencorin

State : Tamil Nadu
Ecological Priority : Medium
Conservation Feasibility : Medium

This corridor connects elephant habitats of the Kalhatti slopes Reserve Forest and the Sigur Reserve Forest and essentially comprises of one estate called Glencorin. This estate, the only flat land in the area, facilitates the seasonal movement of elephants.

Forest Division : Nilgiri North

Connectivity : Connects the Sigur plateau and the Mudumalai Wildlife Sanctuary

Geographical Coordinates:

Latitude 11°30'–11°31' N
Longitude 76°42'–76°42' E

Length: 0.5–0.75 km **Width:** 0.1 km

Forest type/ Vegetation: Tropical dry deciduous, riparian and thorn forests

Nearest PA: Mudumalai Wildlife Sanctuary

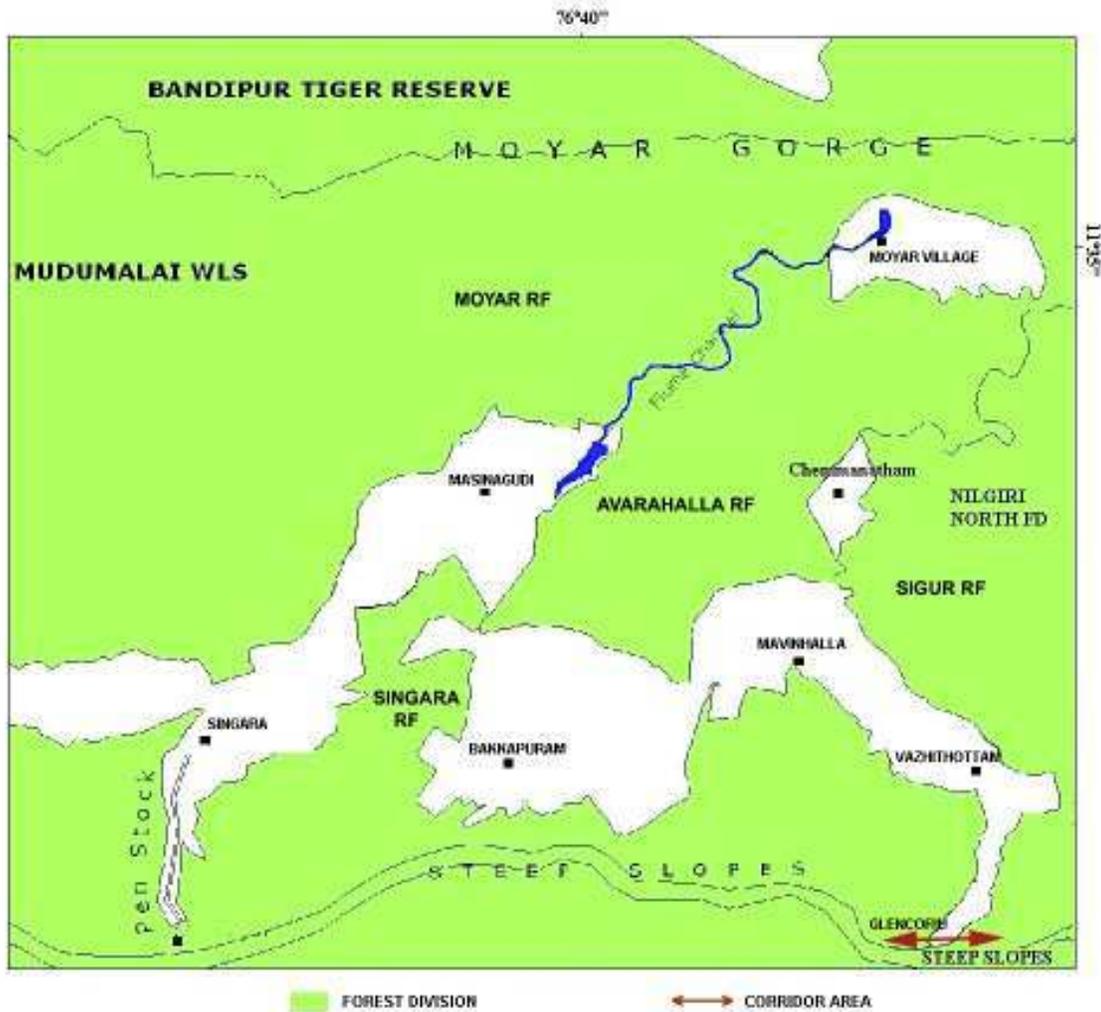
Legal status of the corridor: Private land

Major land-use: Private estate (not under use presently)

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Glencorin estate

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Regular

Threats to the corridor: Proposed resort

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Economic assessment and ground survey of Glencorin estate for potential acquisition



9. KANIYANPURA - MOYAR



Alternate name: Kaniyanpura

State : Karnataka
Ecological Priority : High
Conservation Feasibility : High

This corridor maintains the contiguity of habitat within the Bandipur National Park along its border with Satyamangalam Forest Division. The corridor is narrow and is bordered on one side by an elephant proof trench and on the other by the steep slopes of the Moyar gorge.

Forest Division : Bandipur National Park

Connectivity : Western part of Bandipur National Park with its eastern extremities

Geographical Coordinates:

Latitude 11°37'–11°37' N
Longitude 77°40'–77°41' E

Length: 1 km

Width: 0.4 km

Forest type/ Vegetation: Tropical thorn and deciduous forest

Nearest PA: Bandipur National Park

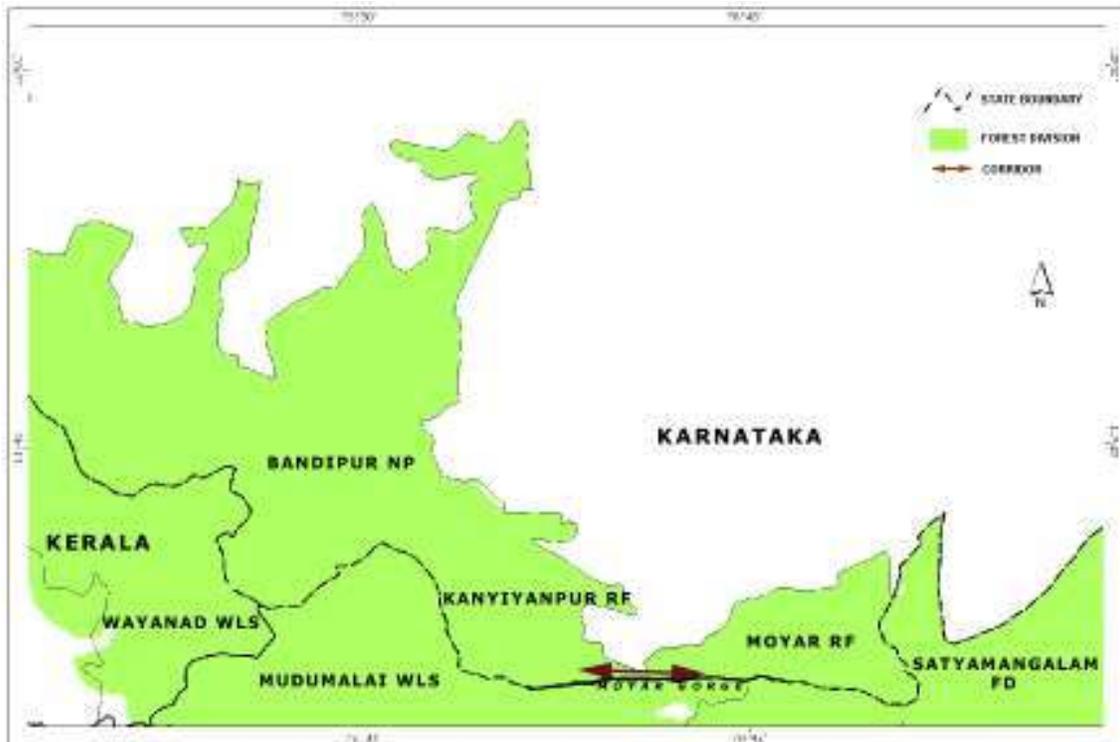
Legal status of the corridor: Reserve Forest

Major land-use: Forest

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Kaniyanpura and Karragihundi

Human artefacts on the corridor: Nil



Frequency of usage of the corridor by elephants: Regular; used by herds and bulls

Threats to the corridor:

1. Cattle grazing and fuel wood collection

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Monitoring the already acquired corridor for encroachment
3. Reducing habitat disturbances caused by cattle grazing and fuel wood collection

Remarks: This was initially a narrow corridor of about 0.1 km width. The Karnataka Forest Department with the financial assistance of the Directorate of Project Elephant have acquired the adjacent revenue land and annexed it to the Reserve Forest to widen the corridor near Karragihundi village.



10. MOYAR - AVARAHALLA



Alternate name: Masinagudi-Moyar

State : Tamil Nadu
Ecological Priority : High
Conservation Feasibility : Medium

The corridor is located between the Moyar and Masinagudi villages and maintains habitat connectivity within the Mudumalai Wildlife Sanctuary. A flume channel of a hydro-electric project passes through the corridor

Forest Division : Mudumalai Wildlife Sanctuary

Connectivity : Northeastern and southeastern part of Mudumalai Wildlife Sanctuary.

Geographical Coordinates:

Latitude 11°34'–11°35' N
Longitude 76°39'–76°41' E

Length: N/A **Width:** 6–7 km

Forest type/ Vegetation: Tropical deciduous and thorn forests

Nearest PA: Mudumalai Wildlife Sanctuary

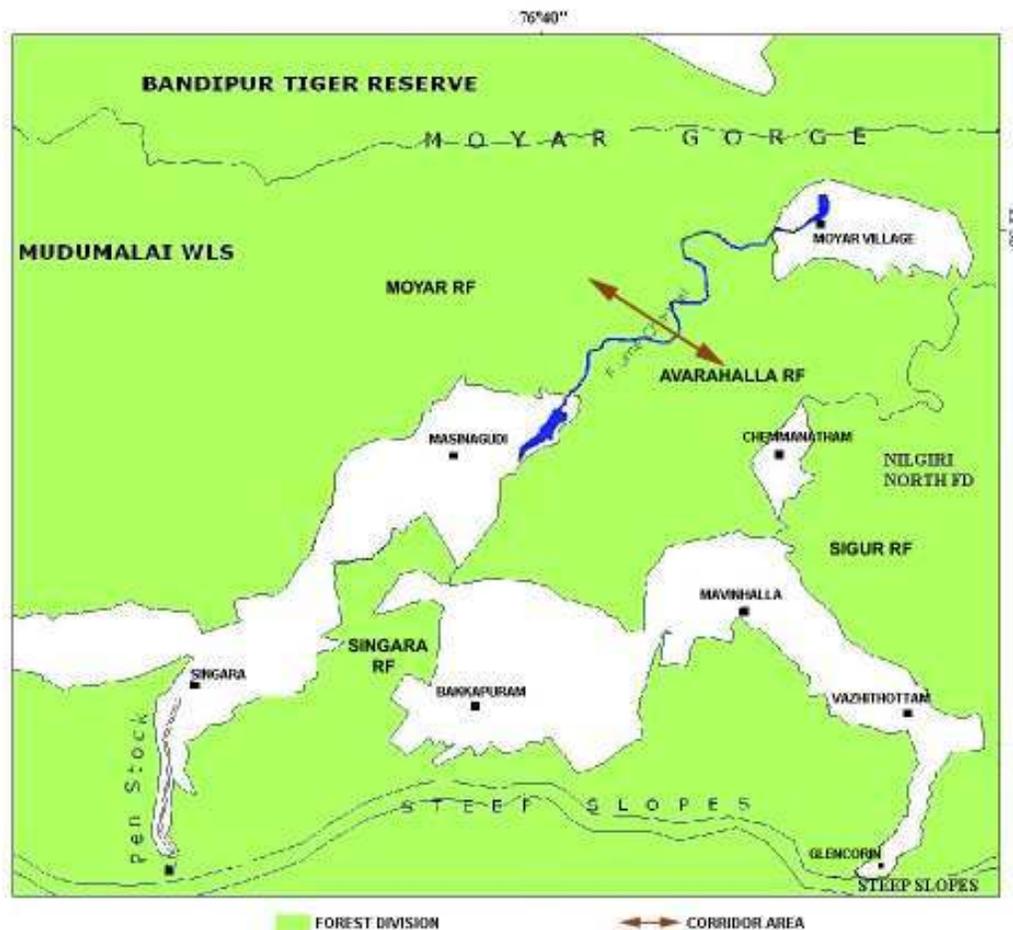
Legal status of the corridor: Wildlife Sanctuary

Major land-use: Forest

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Masinagudi and Moyar

Human artefacts on the corridor: Flume channel and road (Masinagudi-Moyar)



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds

Threats to the corridor:

1. Proposed widening of the flume channel by the Tamil Nadu Electricity Board
2. Cattle grazing and fire wood collection
3. Vehicular traffic on the Masinagudi-Moyar road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Monitoring of the proposed widening of the flume channel and other developmental activities of the Pykara Ultimate Stage Hydroelectric Project (PUSHEP)

Remarks: Length is not applicable in this corridor as either side is forest. The constriction is along the width due to the expansion of the Moyar and Masinagudi villages.



11. KALMALAI - SINGARA AND AVARAHALLA



Alternate name: Singara-Masinagudi

State : Tamil Nadu
Ecological Priority : High
Conservation Feasibility : Medium

This corridor lies between the villages of Singara and Masinagudi on the northern slopes of the Nilgiri Hills. It comprises of forests on either side of a road connecting these two villages. Approximately 50 meters of this forest on either side of the road is privately owned. The corridor is intensively used by elephants, which seasonally move from the Mudumalai Wildlife Sanctuary to the Nilgiri North Division. As movement is not possible along the Nilgiri slopes (due to Penstock pipes of a hydro-electric project between Glenmorgan and Singara), this corridor is of great significance.

Forest Division : Mudumalai Wildlife Sanctuary and Nilgiri North

Connectivity : Mudumalai with Nilgiri North Forest Division.

Geographical Coordinates:

Latitude 11°33'–11°33' N
Longitude 76°32'–76°32' E

Length: 0.2–0.5 km

Width: 3–4 km

Forest type/ Vegetation: Tropical thorn and deciduous forest

Nearest PA: Mudumalai Wildlife Sanctuary

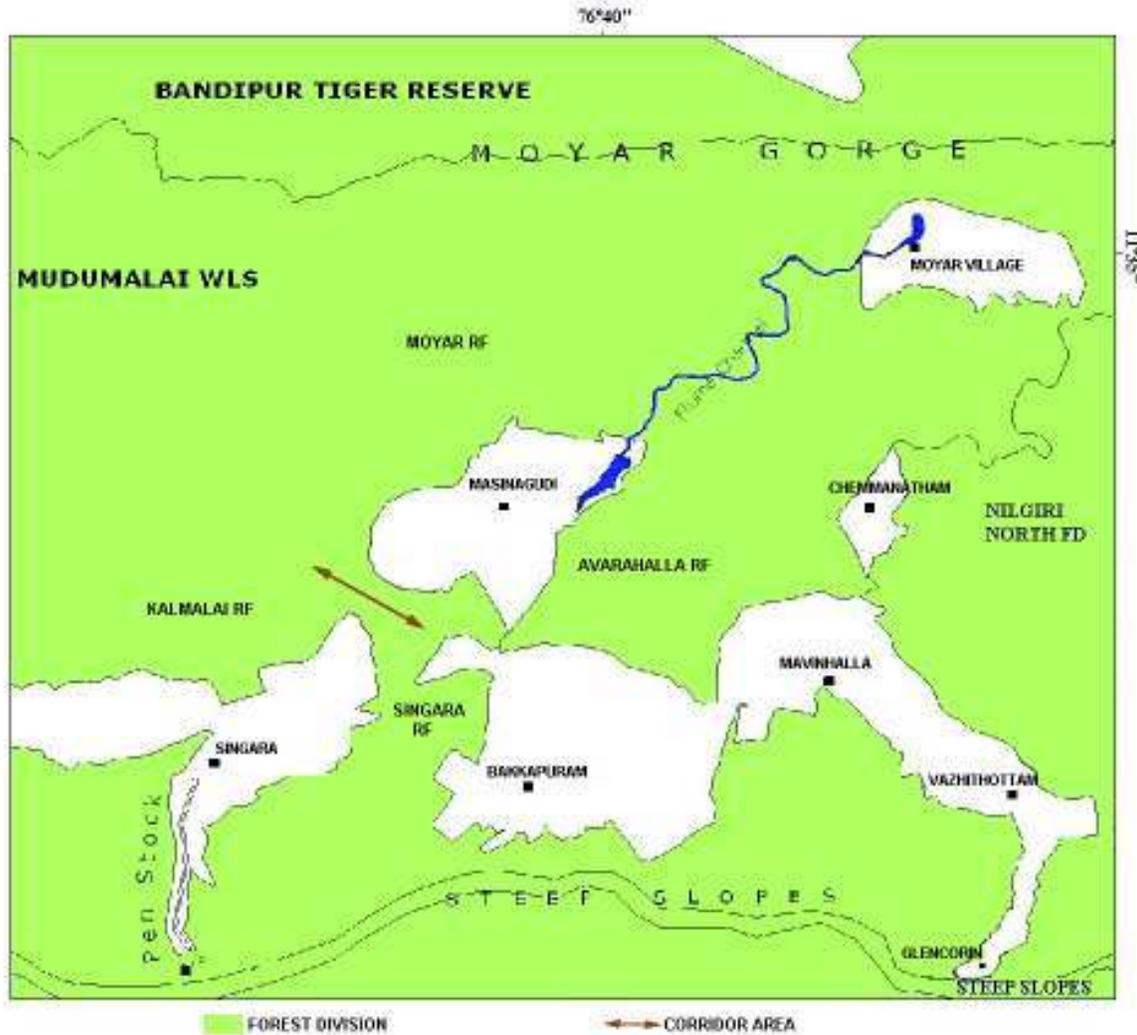
Legal status of the corridor: Private and *patta* land

Major land-use: Forest

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Singara and Masinagudi

Human artefacts on the corridor: Canal of Pykara Ultimate Stage Hydroelectric Project (PUSHEP) and Singara-Masinagudi road.



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds.

Threats to the corridor:

1. Development activities of the Pykara Ultimate Stage Hydroelectric Project (PUSHEP) and settlements
2. Impact of resorts

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Acquisition of the private land in and around the corridor



12. NILAMBUR KOVILAKAM - NEW AMARAMBALAM

Alternate name: Vazhikadavu

State : Kerala
Ecological Priority : Medium
Conservation Feasibility : High

The corridor is situated on the Gudalur- Nilambur ghat road. A stretch of forest exists on both sides of the road. However, the slopes are steep for elephant crossing at most parts. If crossing occurs, it is only possible at Nadugani, which is on fairly level ground. A major tract of this forest has been converted to areca nut, coconut and banana plantation.

Forest Division : Nilambur North

Connectivity : Nilambur and Manjeri Kovilakams (Nilambur North Division) with New Amarambalam Reserve Forest (Nilambur South Division)

Geographical Coordinates:

Latitude 11°17' N
Longitude 76°16' E

Length: 1km

Width: 0.5 km

Forest type/ Vegetation: Tropical semi-evergreen forest

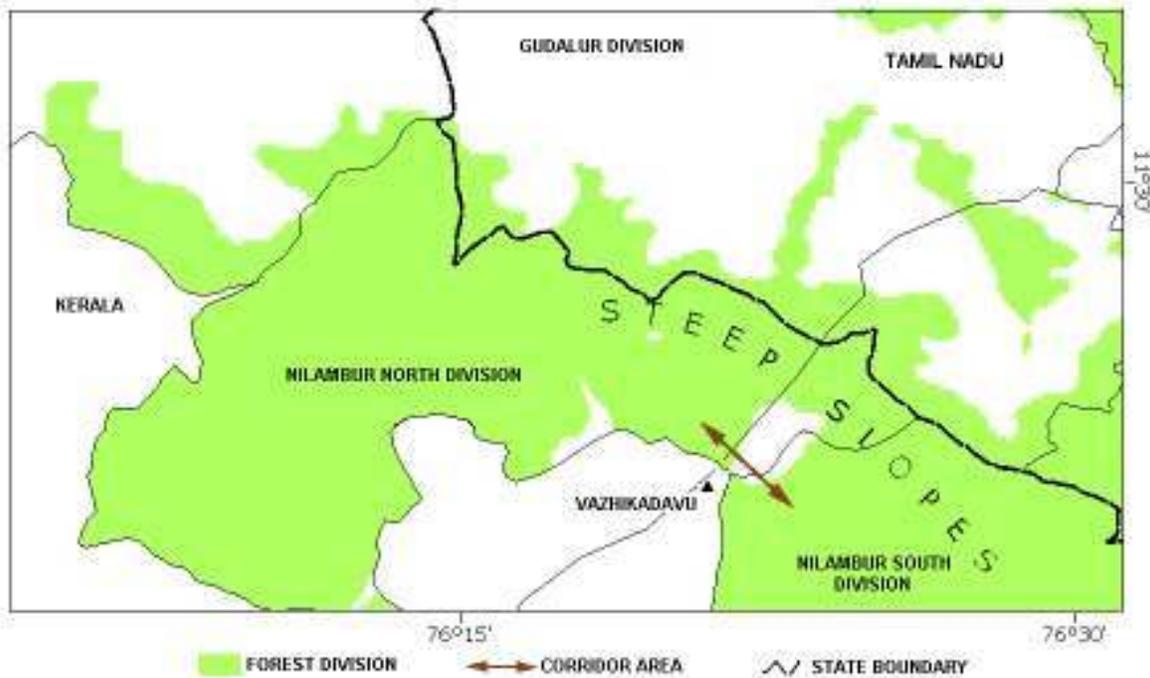
Nearest PA: Mudumalai Wildlife Sanctuary

Legal status of the corridor: Reserve Forest

Major land-use: Forest and plantation (arecanut, coconut, banana)

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Vazhikadavu and Karakkodu



Human artefacts on the corridor: Gudalur-Nilambur road.

Frequency of usage of the corridor by elephants: Rare; movement status not clearly known

Threats to the corridor:

1. Heavy vehicular movement
2. Plantation and agricultural activities

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Information on the current status of elephant movement needs to be obtained, especially through fieldwork near the Karakkodu and Revenue check post
3. Regulation of night traffic along the Gudalur-Nilambur road



13. PERIYA AT PAKRANTHALAM



Alternate name: Pakranthalam

State : Kerala
Ecological Priority : Medium
Conservation Feasibility : Medium

The corridor is narrow and connects the northern and southern portions of the Periya Reserve forest in Wayanad North Division along the Mananthavadi-Kuttiadi road at Pakranthalam. The corridor is situated on a hill road and the lower reaches of this corridor pass through fallow estate land.

Forest Division: Wayanad North

Connectivity: Northern and southern portion of Periya Reserve Forest

Geographical Coordinates :

Latitude 11°44' N
Longitude 75°46' E

Length: 0.5 km **Width:** 0.2 km

Forest type/ Vegetation: Tropical moist deciduous forest

Nearest PA: Wayanad Wildlife Sanctuary

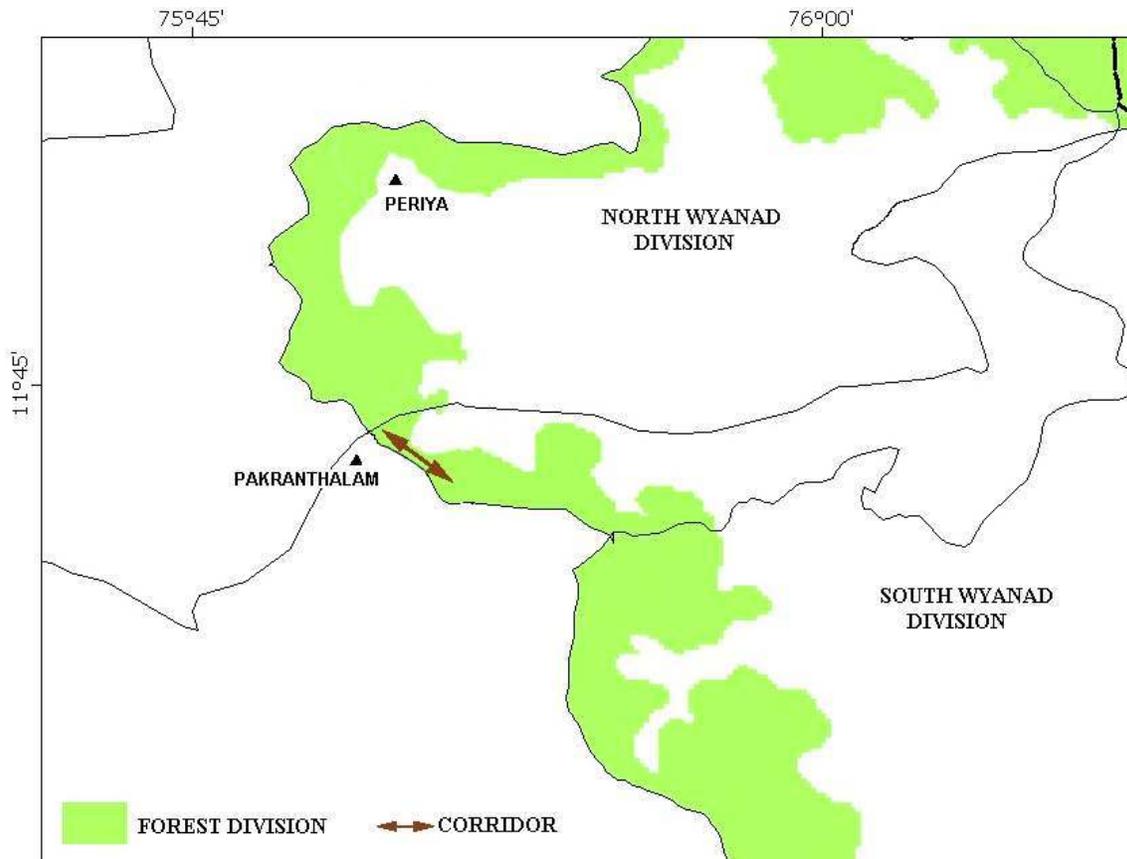
Legal status of the corridor: Reserve Forest

Major land-use: Forest, fallow land and settlement

Major habitation/settlements in corridor: Pakranthalam and Panoth

Corridor dependent villages: Pakranthalam, Panoth and Niravilpuzha

Human artefacts on the corridor: Kuttiadi-Mananthavadi road



Frequency of usage of the corridor by elephants: Regular and seasonal; used by bulls and herds during October–January

Threats to the corridor:

1. The corridor passes through fallow estate land which could be potentially cultivated
2. Development activities
3. Potential encroachments
4. Wood-based industries located in and around the forest division

Conservation plan:

3. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
4. Monitoring the activities of wood-based industries
5. Groundtruthing for possible acquisition of fallow agricultural lands

Remarks: The contiguity of habitats between the Periya Range of North Wayanad Forest Division and the Kuttiadi region of Kozhikode Forest Division is lost due to habitations along the Kuttiadi-Mananthavadi road.



14. TIRUNELLI - KUDRAKOTE



Alternate name: Brahmagiri- Tirunelli

State : Kerala
Ecological Priority : Medium
Conservation Feasibility : Medium

The elephant habitats of north Karnataka along the Brahmagiri Hills are connected to those on the Coorg plateau (also in Karnataka) through the northern Wayanad region of Kerala. The southern tip of the Brahmagiris extends into Kerala's Wayanad North Forest Division, where the Tirunelli Reserve Forest and Kudrakote Reserve Forest provide a narrow eastward connection to the Tholpetty Range of Wayanad Wildlife Sanctuary. This is an important corridor to maintain habitat contiguity for elephant populations along the Brahmagiris Hills

Forest Division : Wayanad north

Connectivity: Wayanad Wildlife Sanctuary with Wayanad North Division (Kerala) leading to Brahmagiri Wildlife Sanctuary (Karnataka)

Geographical Coordinates:

Latitude 11°53'–11°54' N
Longitude 75°59'–76°02' E

Length: 6 km

Width: 1–1.5 km

Forest type/ Vegetation: Tropical moist deciduous forest and teak plantation

Nearest PA: Wayanad Wildlife Sanctuary (Kerala) and Brahmagiri Wildlife Sanctuary (Karnataka)

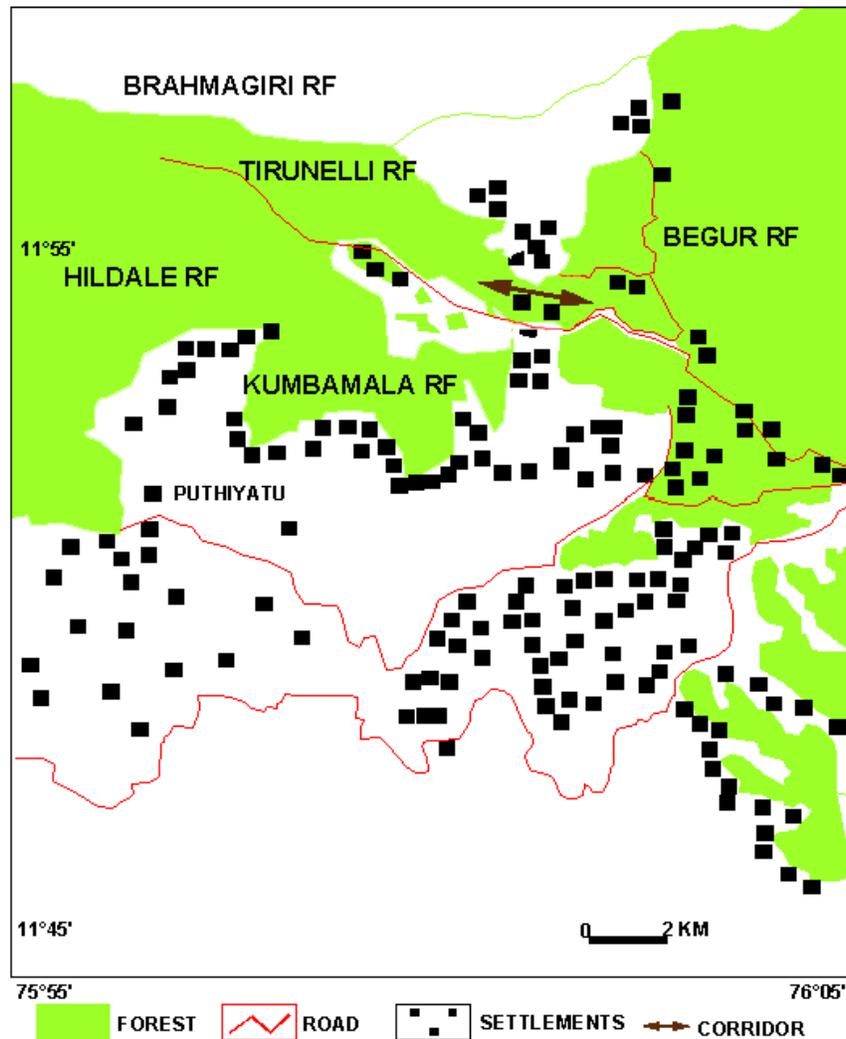
Legal status of the corridor: Reserve Forest with a small part as *patta* land

Major land-use: Forest, settlements, agriculture and plantation

Major habitation/settlements in corridor: Edayurvayal village

Corridor dependent villages: Appapara, Vaduvakkalim, Edayurvayal, Pulayankolli, Thirunelli, Padaladi

Human artefacts on the corridor: Tirunelli Temple road (Thetturoad)



Frequency of usage of the corridor by elephants: Regular

Threats to the corridor:

1. Settlements and agricultural activities (extreme human antagonism because of elephant–human conflict)
2. Extraction of timber
3. Regular vehicular movement along the Tirunelli Temple road (Thetturoad)

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Area between Edayurvayal and Appapara is very crucial and a detailed ground survey is needed for potential acquisition
3. Seek alternatives for Edayurvayal village



15. KOTTIYUR - PERIYA



Alternate name: Periya, Palchuram

State : Kerala
Ecological Priority : Medium
Conservation Feasibility : Medium

The corridor lies mainly within the Kottiyur Range of Kannur Forest Division and extends up to the Periya Reserve Forest of North Wayanad Division. On either side of the corridor steep terrain precludes animal movement.

Forest Division : Kannur and North Wayanad

Connectivity : Kottiyur Reserve Forest of Kannur Forest Division with Peria Reserve Forest of North Wayanad Division.

Geographical Coordinates:

Latitude 11°46'N
Longitude 75°47'E

Length: 0.5 km **Width:** 0.1 km

Forest type/ Vegetation: Tropical semi-evergreen forest

Nearest PA: Wayanad and Aralam Wildlife Sanctuaries

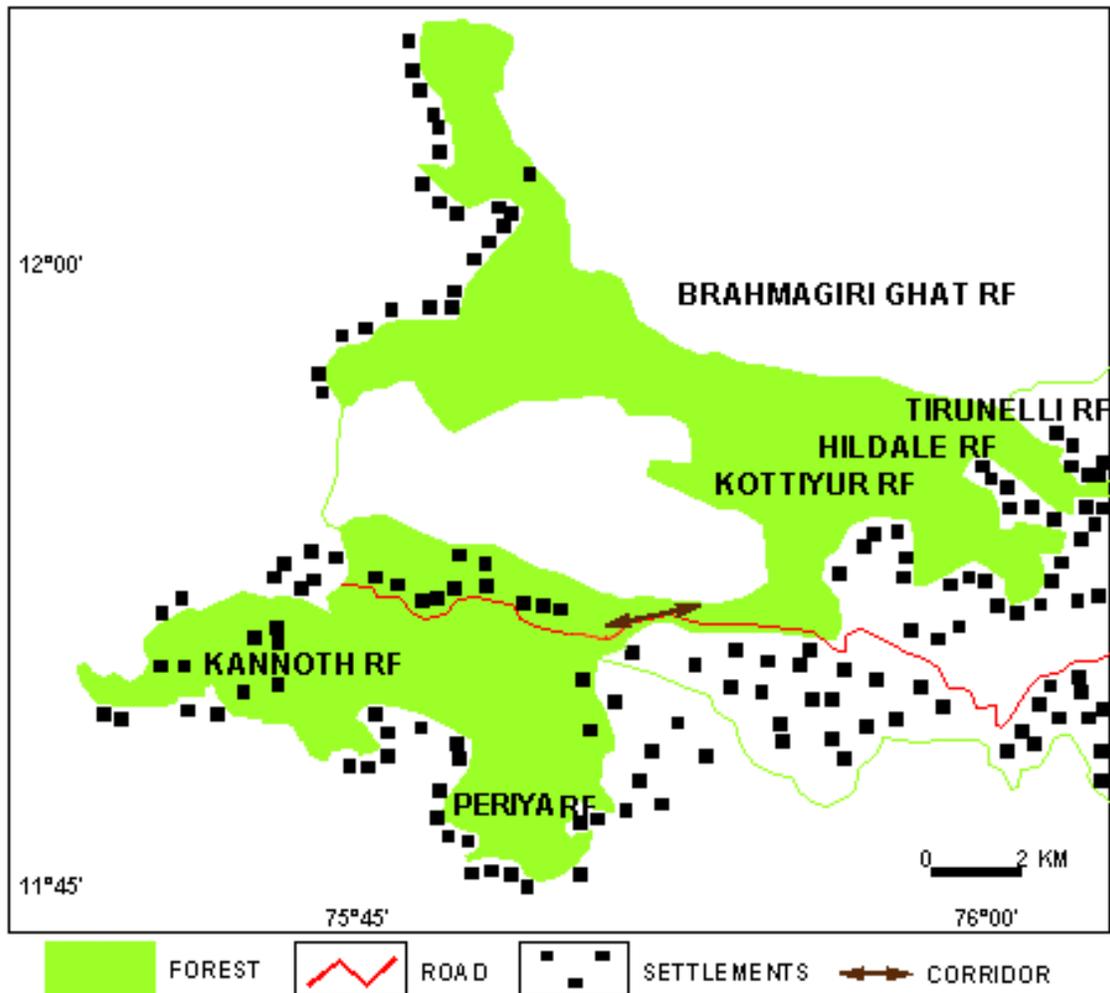
Legal status of the corridor: Reserve Forest

Major land-use: Forest and settlements

Major habitation/settlements in corridor: Periya, Pokkottu-Chapparam, Chandanathodu and CRP Kunnu villages

Corridor dependent villages: Periya, Pokkottu-Chapparam, Chandanathodu, CRP Kunnu and Alattil

Human artefacts on the corridor: Kottiyur-Palchuram-Mananthavady road



Frequency of usage of the corridor by elephants: Occasional; used mostly by bulls and small herds

Threats to the corridor:

1. Human settlements
2. Plantations

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Around 2000 families have expressed their willingness to the Forest Department to vacate the corridor land due to severe crop depredation by elephants. This area can be taken up for acquisition.

Remarks: The Forest Department has initiated actions to acquire the cultivated lands.



16. KALLAR AT GANDHAPALLAYAM



Alternate name: Kallar

State : Tamil Nadu
Ecological Priority : Medium
Conservation Feasibility : Low

The Kallar corridor is a narrow strip starting at Gandhapallayam (near Jackkanare) which bisects the Mettupalayam- Kottagiri highway. The habitat here is contiguous with the Pillur RF. The corridor is narrow with the steep slopes of the Nilgiri Hills on the east and an expansion of cultivation on the west. The corridor links the Satyamangalam and Nilgiri North Division with the Coimbatore Division and facilitates the movements of elephants further into Mannarghat Forest Division of Kerala

Forest Division : Coimbatore

Connectivity : Satyamangalam and Coimbatore Forest Divisions

Geographical Coordinates:

Latitude 11°20'–11°21' N
Longitude 76°51'–76°53' E

Length: 7 km

Width: 0.5–3 km

Forest type/ Vegetation: Tropical thorn and dry deciduous forests

Nearest PA: None

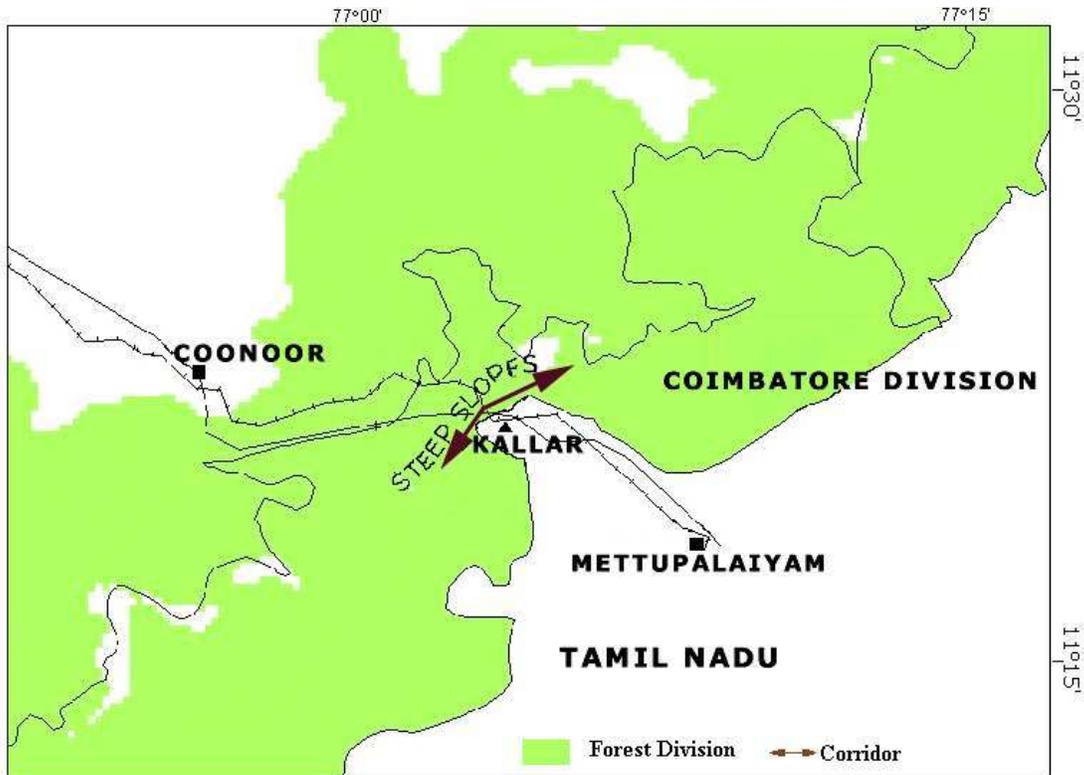
Legal status of the corridor: Reserve Forest and *patta* land

Major land-use: Forest, agriculture and settlements

Major habitation/settlements in corridor: Temporary settlements around plantations

Corridor dependent villages: Plantation based settlements and Kallar

Human artefacts on the corridor: Residential school, railway line and Ooty-Coimbatore road



Frequency of usage of the corridor by elephants: Occasional; used by bulls and herds

Threats to the corridor:

1. Plantation
2. Activities of residential school
3. Vehicular traffic along the Ooty-Coimbatore road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Acquisition of part of the betel-nut plantation near Kallar village to maintain the connectivity
3. Prevention of the encroachment (between Kallar and Adderley) on either side of Ooty-Coimbatore road in the corridor
4. Restriction of the activities of the residential school and associated developments within the corridor



17. BOOLAVAMPATTI - ATTAPADI



Alternate name: Anaikatty

State : Tamil Nadu
Ecological Priority : High
Conservation Feasibility : Medium

The corridor connects the Boolavampatti Reserve Forest and the Attapadi forest of Coimbatore Forest Division. Large scale human settlements and encroachment have slowly reduced forest availability and impeded elephant movement.

Forest Division : Coimbatore

Connectivity : Boolavampatti Reserve Forest with Attapadi Reserve Forest

Geographical Coordinates:

Latitude 11°07' N
Longitude 76°46' E

Length: 1.5 km

Width: 0.5 km

Forest type/ Vegetation: Tropical thorn and deciduous forest

Nearest PA: Nil

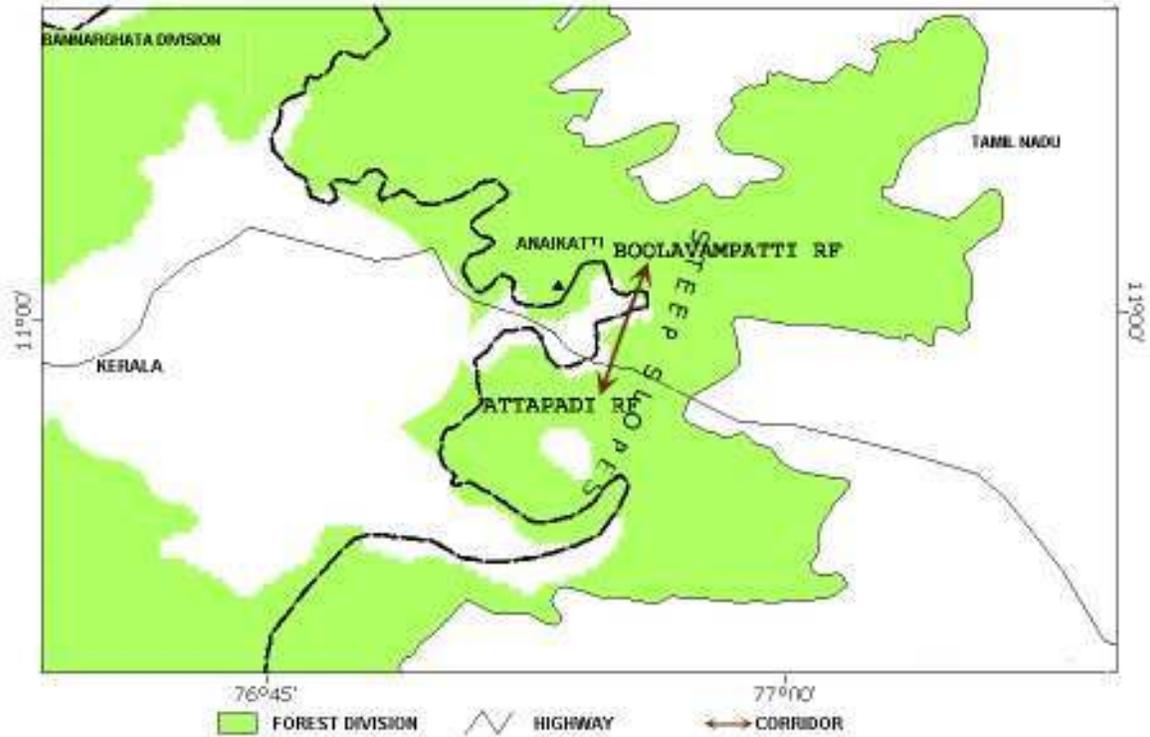
Legal status of the corridor: Reserve Forest

Major land-use: Forest and settlements

Major habitation/settlements in corridor: Anaikatti

Corridor dependent villages: Anaikatti

Human artefacts on the corridor: Anaikatti road



Frequency of usage of the corridor by elephants: Regular and seasonal

Threats to the corridor:

1. Encroachment

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Prevention of further encroachment



18. ANIMALAI AT PUNACHI



Alternate name: Attakati-Upper Aliyar

State : Tamil Nadu
Ecological Priority : High
Conservation Feasibility : High

This corridor is the northern-most of three corridors that link habitats in the Indira Gandhi Wildlife Sanctuary. The corridor lies along steep hill slopes and is used by elephants to move across wetter and drier habitats. The corridor has undisturbed forest cover.

Forest Division : Indira Gandhi Wildlife Sanctuary

Connectivity : Habitats within the Indira Gandhi Wildlife Sanctuary

Geographical Coordinates:

Latitude 10°26' N
Longitude 76°59'–77°00'E

Length: 1km **Width:** 0.5 km

Forest type/ Vegetation: Tropical moist deciduous forest

Nearest PA: Indira Gandhi Wildlife Sanctuary

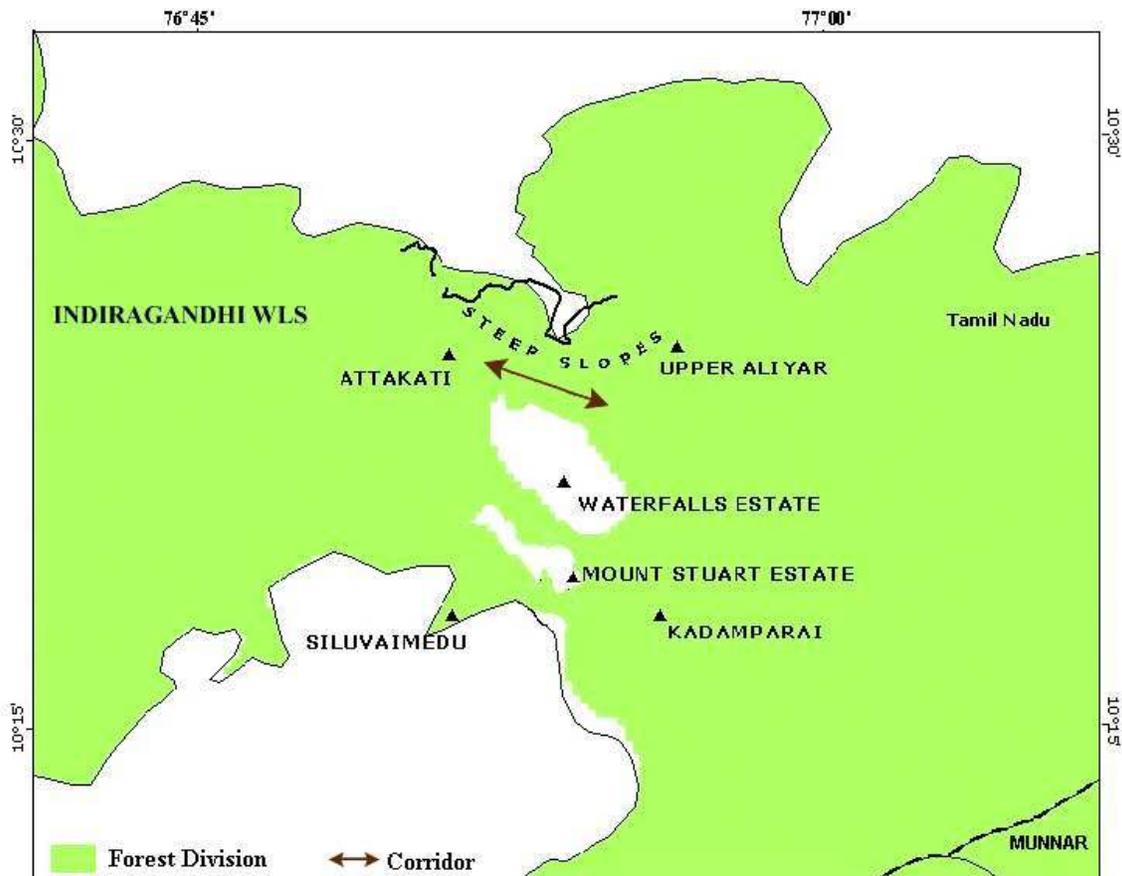
Legal status of the corridor: Wildlife Sanctuary and *patta* land

Major land-use: Forest

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Attakati and Upper Aliyar

Human artefacts on the corridor: Valparai-Pollachi road



Frequency of usage of the corridor by elephants: Regular; used by bulls and herds

Threats to the corridor:

Vehicular movement on the Valparai-Pollachi road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Detailed ground survey on the legal status of the corridor areas between stone quarry along the Attakati-Upper Aliyar road and a pump house near Waterfalls Estate
3. Regulation of traffic along the Valparai-Pollachi road



19. ANIMALAI AT WATERFALLS ESTATE



Alternate name: Ayerpadi-Waterfalls Estate

State : Tamil Nadu
Ecological Priority : High
Conservation Feasibility : Medium

This is the second corridor that links habitats in the Indira Gandhi Wildlife Sanctuary. Much like the previous corridor this one also lies along steep hill slopes and is used by elephants to move across wetter and drier habitats. This corridor comprises of a narrow strip of forest and private lands

Forest Division : Indira Gandhi Wildlife Sanctuary

Connectivity : West to East of Indira Gandhi Wildlife Sanctuary

Geographical Coordinates:

Latitude 10°23'–10°23' N
Longitude 76°59'–77°00' E

Length: 0.5 km

Width: 0.5 km

Forest type/ Vegetation: Tropical deciduous forest

Nearest PA: Indira Gandhi Wildlife Sanctuary

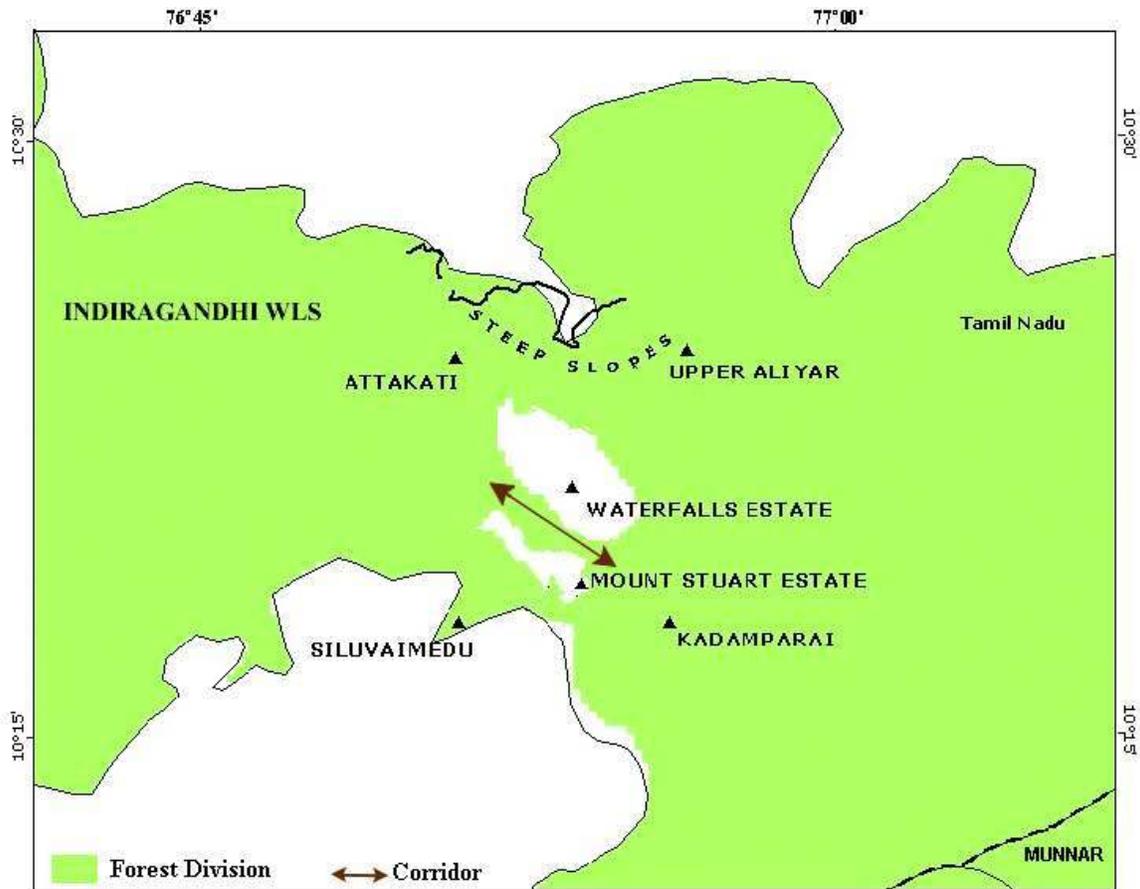
Legal status of the corridor: Wildlife Sanctuary and Private land

Major land-use: Forest and tea gardens

Major habitation/settlements in corridor: Waterfalls and Mount Stuart Estate

Corridor dependent villages: Waterfall estate and Mount Stuart estate

Human artefacts on the corridor: Pollachi-Valparai road



Frequency of usage of the corridor by elephants: Occasional; used by bulls and herds

Threats to the corridor:

1. Vehicular movement along the Pollachi-Valparai road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state.
2. Regulation of night traffic along the Pollachi-Valparai road
3. Detailed survey on the status of corridor land near Karuka. This area is located between Mount Stuart and Waterfalls Estates (West).



20. ANIMALAI BETWEEN SILUVAIMEDU - KADAMPARAI

Alternate name: Siluvaimedu-Kadamparai

State : Tamil Nadu
Ecological Priority : High
Conservation Feasibility : High

This is the third corridor that links habitats in the Indira Gandhi Wildlife Sanctuary. Like the other two, this corridor too lies along steep hill slopes and is used by elephants to move across from wetter to drier habitats.

Forest Division : Indira Gandhi Wildlife Sanctuary

Connectivity : West to East of Indira Gandhi Wildlife Sanctuary

Geographical Coordinates:

Latitude 10°22'–10°22' N
Longitude 76°59'–77°00' E

Length: 1km **Width:** 0.5 km

Forest type/ Vegetation: Tropical deciduous forest

Nearest PA: Indira Gandhi Wildlife Sanctuary

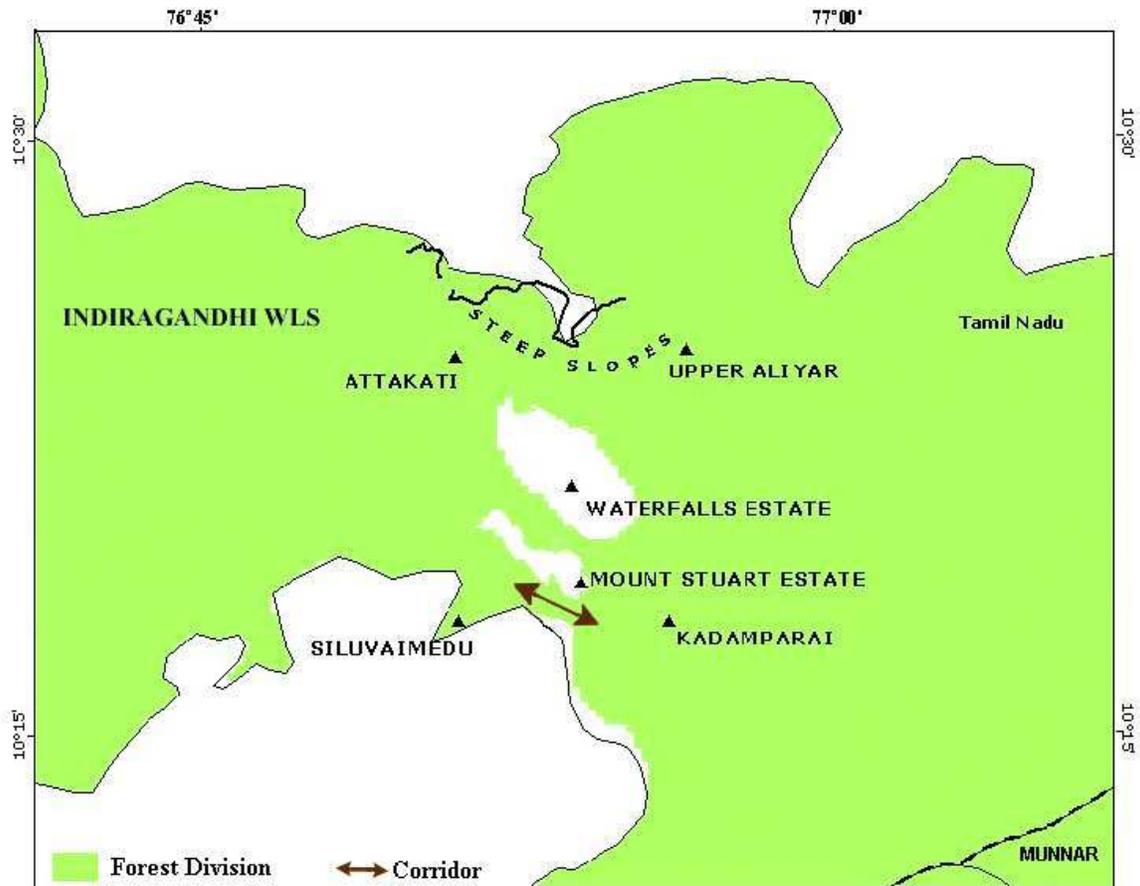
Legal status of the corridor: Wildlife Sanctuary

Major land-use: Forest

Major habitation/settlements in corridor: Nil

Corridor dependent villages: Siluvaimedu and Kadamparai

Human artefacts on the corridor: Pollachi-Valparai road



Frequency of usage of the corridor by elephants: Occasional; used by bulls and herds

Threats to the corridor:

Frequent vehicular movement along the Pollachi-Valparai road

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
2. Regulation of night traffic along the Pollachi-Valparai road





CHAPTER-9



Elephant corridors of India: An Analysis

Vivek Menon,¹ Sandeep Kr. Tiwari,² P.S. Easa,³ and R. Sukumar⁴

Nomadic mega-herbivores like the elephants with large home ranges are one of the species worst affected by habitat fragmentation. The 110,000 km² of forest (Bist, 2002) available for elephants in India constitutes only 16.28% of the country's forest cover (675,538 km²). Of this, only 23% of the area is protected (64 Protected Areas), thereby legally safeguarding only 24,580 km² of the elephant habitat. Most of the available elephant habitat is therefore not free from human

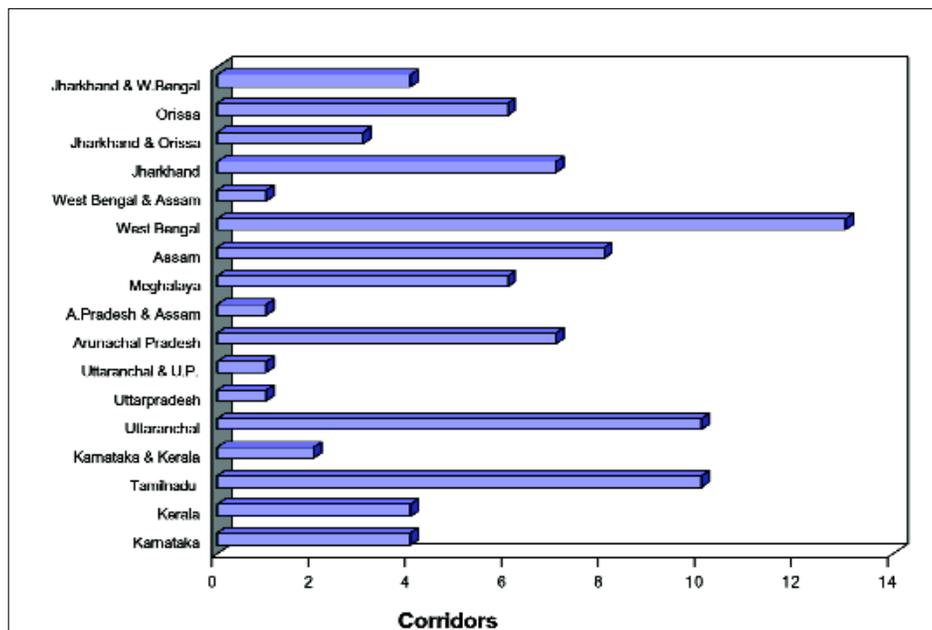


Figure 1: State-wise distribution of elephant corridors in India

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habitations and consequent disturbances. Many of the elephant habitats are connected by narrow forest patches and in case of several others, elephants have to pass through agricultural land, tea gardens and human settlements to reach other habitats.

Through an extensive review of available literature, intensive field surveys and interactions with forest officials and elephant researchers, a total of 88 elephant corridors have been identified in the country (Figure 1), of which 12 (13.64%) are inter-state corridors. A detailed methodology is given in Tiwari and Easa (in this publication) based on which this analysis is presented.

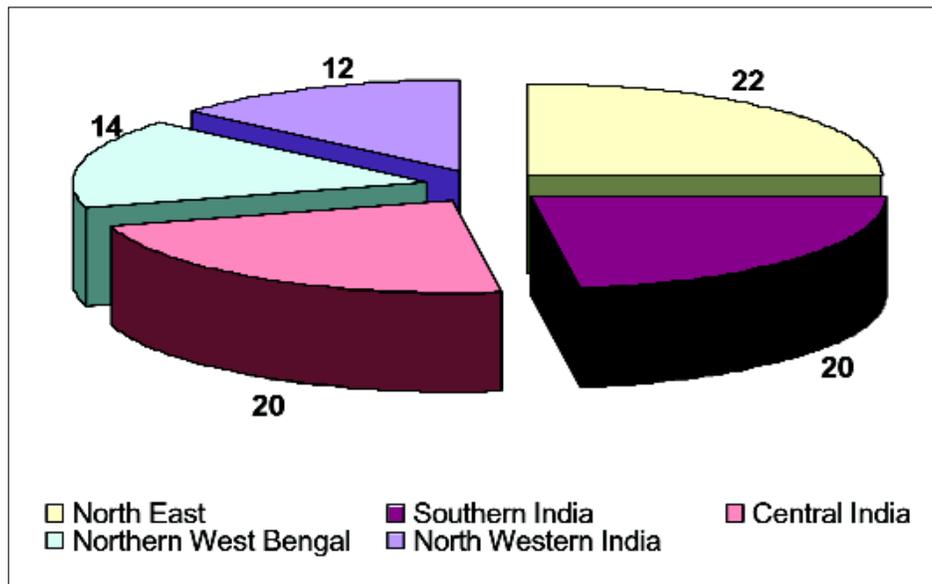


Figure 2: Elephant corridors in different zones of India

As seen in Figure 2, approximately 41% of the corridors are in north-eastern India and northern West Bengal. There is an inverse relationship between forest cover available in elephant ranging states (Figure 3) and the number of corridors in each state, indicating greater fragmentation of the smaller forest habitats. In other words, the more degraded the habitat, the more the number of corridors.

On a zonal basis, the highest number of corridors was seen in northern West Bengal, which has one corridor for every 157 km² of available elephant habitat. The lowest number was in southern India, where one corridor exists for every 1995 km² of the available habitat. Similarly for north-eastern India, one corridor exists for every 1764 km², central India has one corridor in every 1775 km² and northern India has one in every 460 km².

Of the identified corridors, about one third (30%) are of ecologically high priority and 67% are of medium priority. Based on conservation feasibility, 19.3% are of high priority, 55.7% of medium and 25% of low priority (Figure 4).

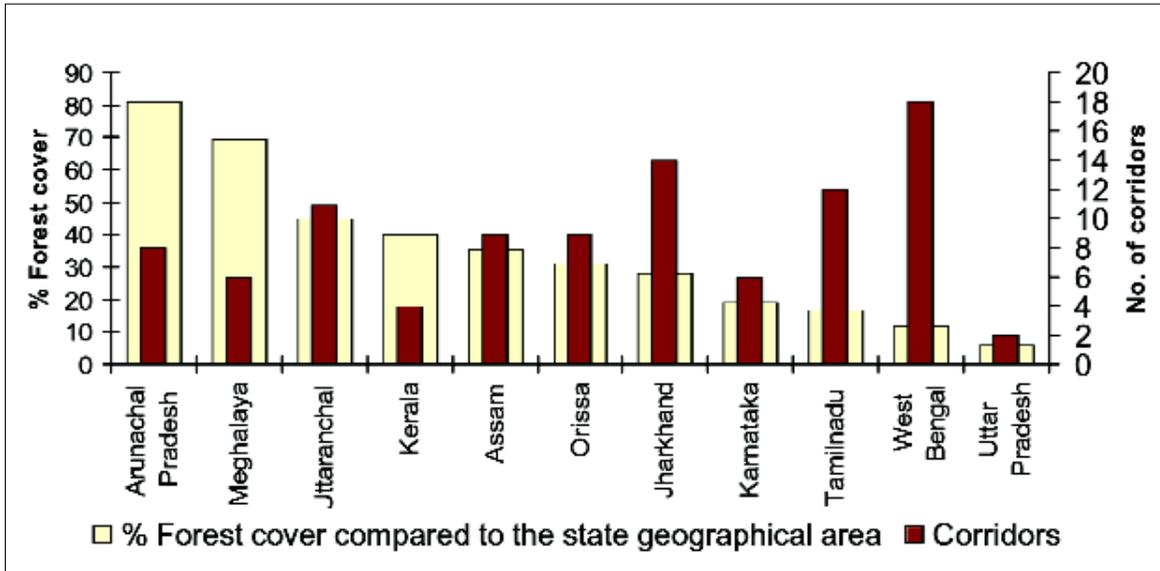


Figure 3: Forest cover and elephant corridors in different states of India

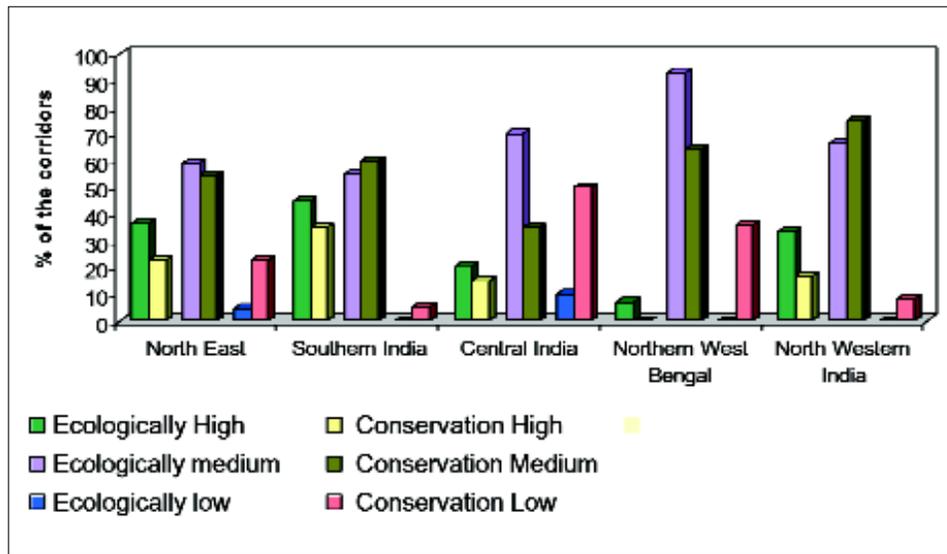


Figure 4: Prioritisation of elephant corridors in India

Corridor length varied from a maximum of between 40 -45 km in Rawasan-Sonanadi (Uttaranchal & U.P.) and Badampahar-Karida East (Orissa) to a minimum of 0.2–0.5 km in Kalmalai-Singara and Avarahalla (Tamil Nadu). Analysing this parameter, it is seen that more than 65% of the southern Indian corridors are of one kilometer or less. Similarly 63.7% of the corridors in north-eastern India are of three km and less. On the other hand, more than 93% of the corridors in northern West Bengal and 65% of the corridors in central India are of five km or more. Overall 28.5% of the corridors are one kilometer or less and 19.3% are between one and three kms. Others are above three km in length (Figure 5).

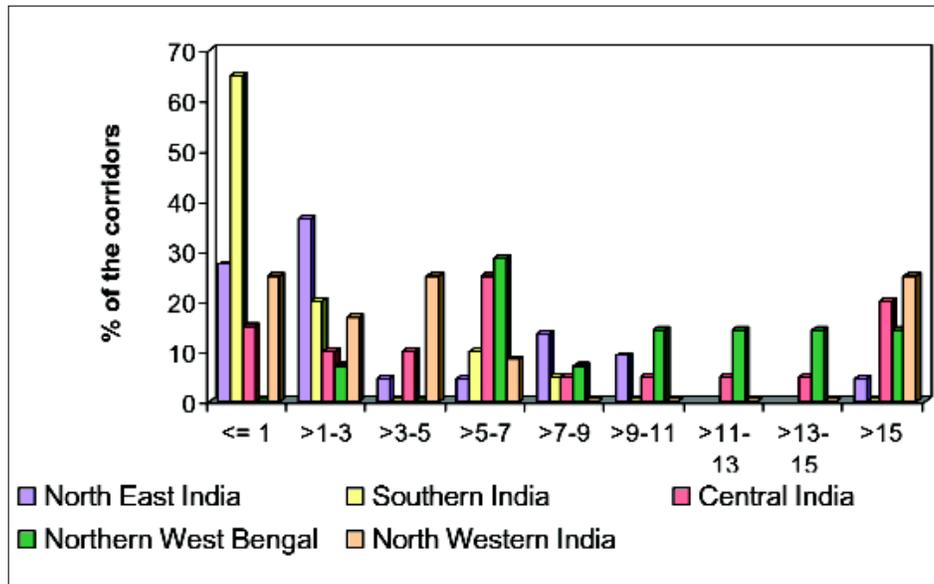


Figure 5: Length of corridors in different zones

When the constriction on either side of the corridor connecting the habitats is taken into consideration, approximately 45.5% of the corridors are of one kilometer or less in width and 41% are one to three km wide (Figure 6) indicating the prevalence of severe biotic pressure.

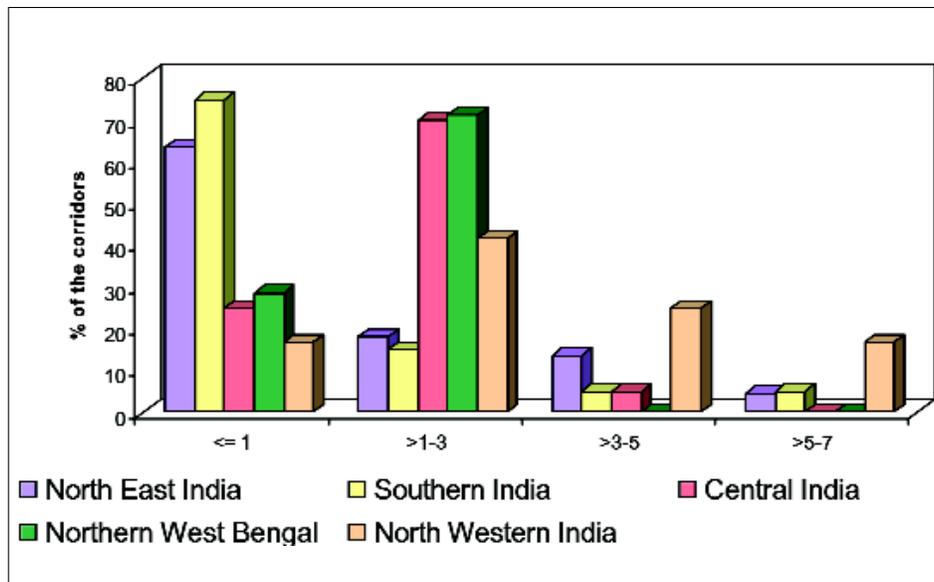


Figure 6: Width of corridors in different zones

An analysis of the legal status of the corridor land reveals that in southern India, approximately 65% of the land is under Protected Area and/or Reserve Forest and about 20% jointly under Reserve Forest, revenue land and private land (Figure 7). This indicates that a large chunk of elephant corridors have some legal protection.

On the other hand, about 78.6% of the corridors in northern West Bengal is under Reserve Forest and land leased to tea gardens. Most of the corridor areas pass through tea gardens and can be protected only by preventing further change of land-use pattern. In north-western India, about 16.7% of the corridor areas is under Protected Area and Reserve Forest. About 50% of the corridors are in Reserve Forests and 25% under Reserve Forest and Revenue land. About 32% of the corridors in north-eastern India are under Reserve Forests whereas the rest are in combination with other land holdings. Only 15% of the corridor areas in central India is under Reserve Forests. Fifty percent of the area is under Reserve Forests and revenue land.

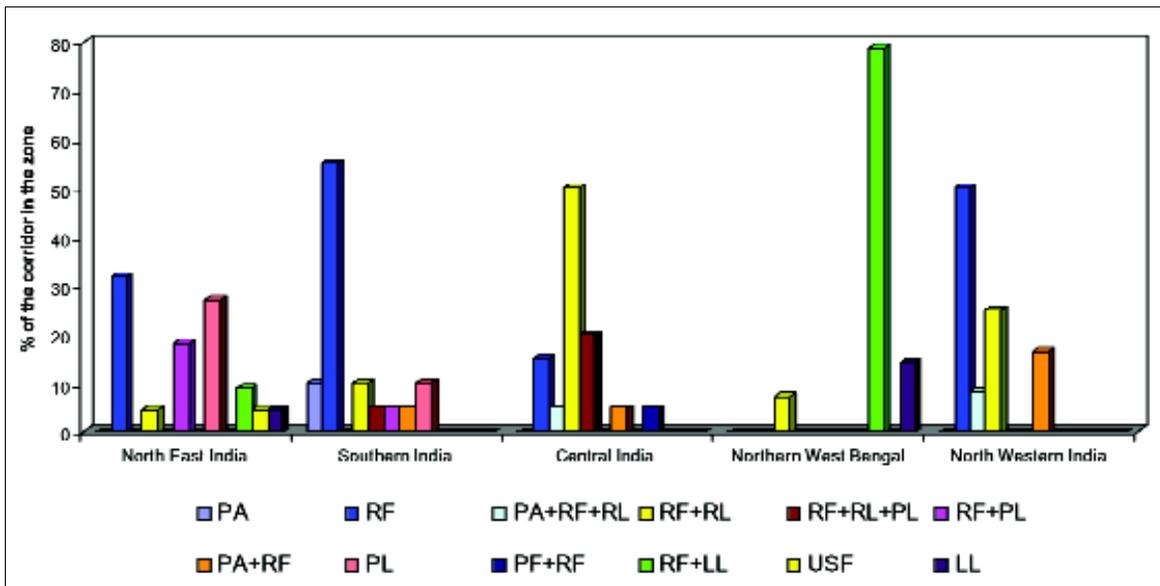


Figure 7: Status of corridor land in different zones of India

PA - Protected Area RF - Reserve Forest RL - Revenue land
 PL - Patta Land LL - Leased Land USF - Unspecified Forest

Corridors become more vital when they connect Protected Areas or are close to Protected Areas thereby increasing the habitat available to elephants on the fringe areas of the PAs. In southern India, more than 55% of the corridors are either within the PA or touching one PA and 35% of the corridors are close to PAs. In north-eastern India, more than 45% of the corridors are touching a PA and 36.4% are close to PAs. In northern West Bengal, about 57% of the corridors are touching a PA and 14.3% have PAs on either side thereby showing the importance of corridors in this region to maintain habitat continuity between two PAs. Overall 35% of the corridors are touching a PA, 9 % are within PAs, 7% have a PA on either side and 30% are close to PAs indicating that if the corridors are safeguarded, a larger chunk of habitat in fringe areas can be made available to the elephants (Figure 8).

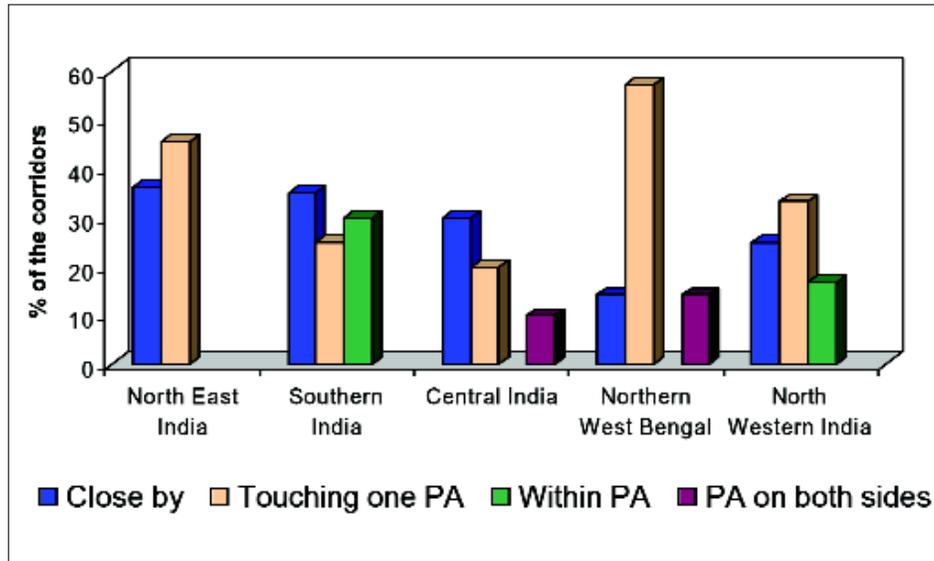


Figure 8: Protected Areas in and around the corridor

Biotic pressure on the corridors was also considered to understand the impact they have and how long the corridor would be able to sustain it. Looking at the land use pattern, the most severely affected corridors are in central India where almost 90% of the corridors are jointly under forest, agriculture and settlement and only 10% are totally under forest without any settlements. In northern West Bengal, 84.6% of the corridors pass through tea gardens, patches of forest and settlements and 7.7% of

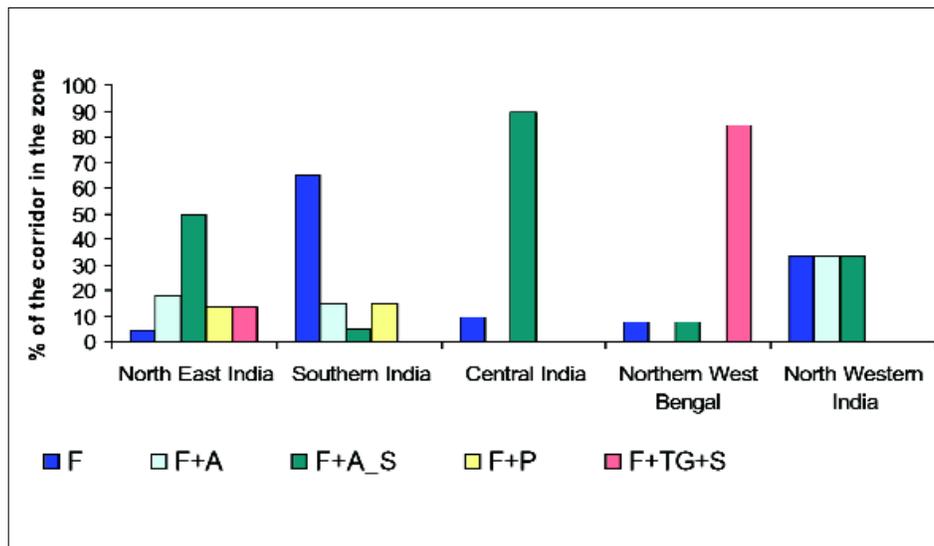


Figure 9: Land-use pattern of the corridor

F - Forest A - Agriculture S - Settlement
 TG - Tea garden P - Plantation

the corridors have patchy forest, agriculture and settlements indicating severe biotic pressure and possibly a cause for increased human–elephant conflict. In north-eastern India too, more than 50% of the corridor forests are under agriculture and settlements and 13.6% with tea gardens and settlements. Approximately 65% of the corridors in southern India are totally under forest and only 15% is also agricultural land. Efforts should be made to consolidate such areas through appropriate measures. In tea garden areas, relocating the labour colonies from the elephant movement paths could also be thought of. Overall, about 24% of the corridors are totally under forest, 40% under forest, agriculture and settlements and 16% under forest, tea gardens and settlements (Figure 9). The corridors under the combination of tea gardens and forests can be safeguarded only through strict enforcement of laws prohibiting change of land-use pattern.

Forty percent of the corridors in Southern India are without any settlement and 60% of the corridors with one to three settlements showing comparatively little pressure on the corridor. Similarly in north western India, more than 33% of the corridors are without settlements and 50% have one to three settlements. However, the central Indian corridors are under severe pressure with 30% of them having one to three settlements, another 30% with four to six settlements and about 25% with more than six settlements. Only 10% are without settlements. More than 40% of the corridors in north-eastern India are with one to three settlements and 18% with four to six settlements and 15% with seven to nine settlements. Overall, only 22.8% are free of settlements and 42% with one to three settlements. Efforts need to be made to rehabilitate many of these settlements outside the corridors to ensure the free movement of elephants (Figure 10).

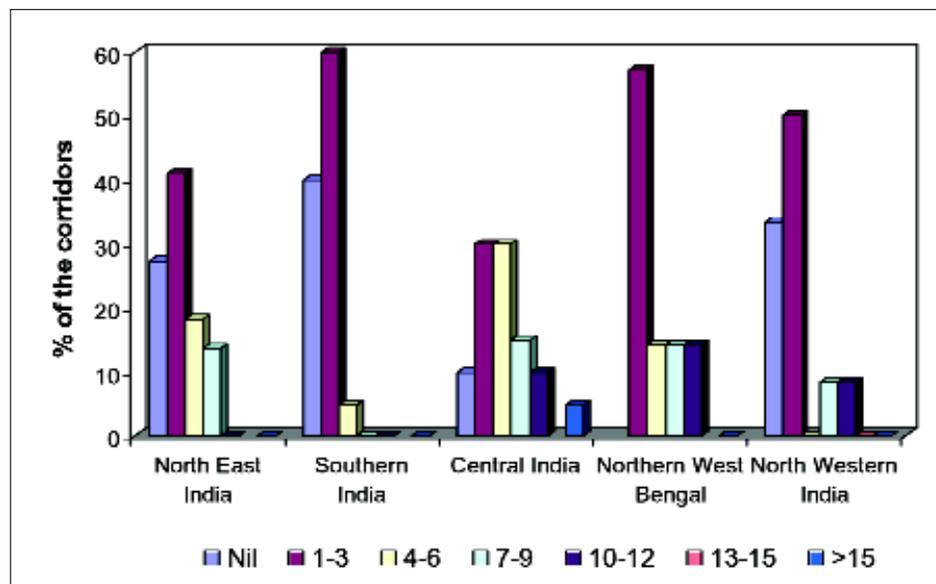


Figure 10: Presence of settlements in corridors

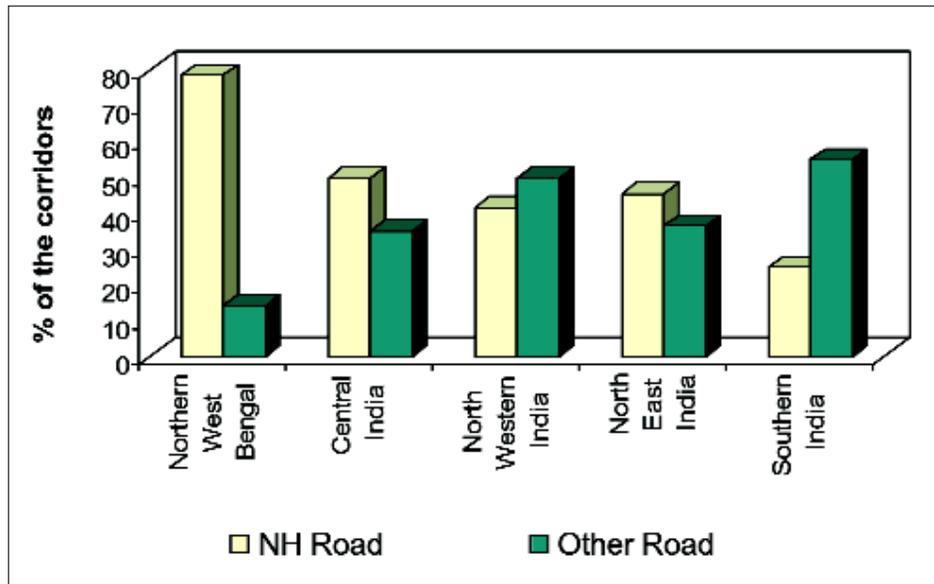


Figure 11: Percentage of corridors with roads

Apart from settlements, another important factor affecting the elephant corridors are the roads and railway lines passing through them (Figures 11 and 12). The physical presence of the roads and railway lines in the habitat creates new habitat edges, alters the hydrological dynamics and create a barrier to the movement of elephants and other animals, leads to habitat fragmentation and loss, apart from death due to train and vehicular hits. Rail and an increase in road traffic operates in a synergetic way across several lansdcaes and causes not only an overall loss and isolation of wildlife habitat, but also splits up the landscape in a literal sense.

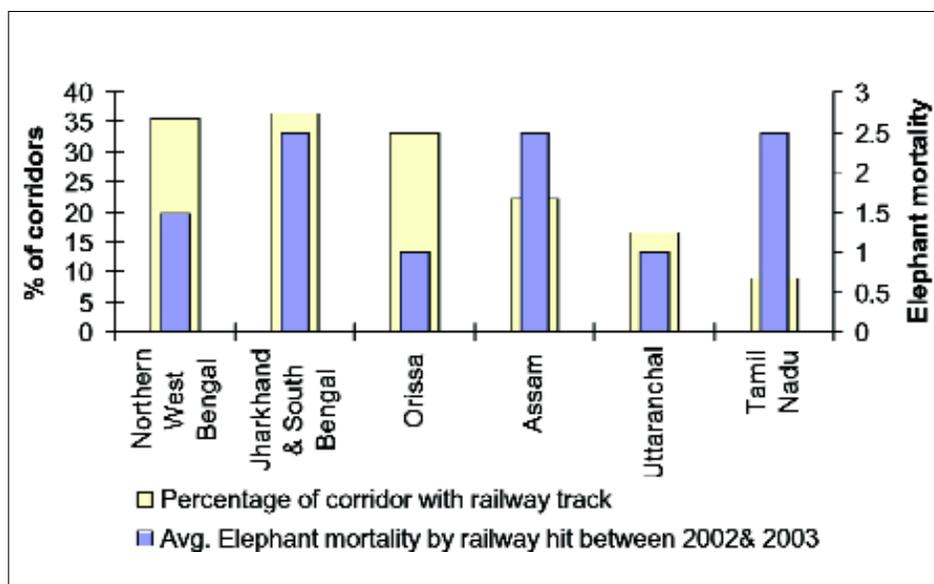


Figure 12: Corridors with railway track and elephant mortality by train hits in states

Various developmental activities have also come up on either side of the highways and railroads thereby further fragmenting the habitat and increasing biotic pressures. As can be seen in Figure 11, National Highways run through 78.6% of the corridors in northern West Bengal, 50% of the corridors in central India and 41.7% in north-western India. Overall 46.6% of the corridors have a highway passing through it. Almost 35.7% of the corridors in northern West Bengal, 36.4% in Jharkhand and south Bengal, 22% in Assam, 16.7% in Uttaranchal and 33% in Orissa have railroads running through them. This has resulted in the death of about 29 elephants in train accidents between 2002 and 2004 in elephant ranging states. However, some basic precautions need to be taken when a railway line passes through a corridor or habitat. Regulation of train speed, preventing dumping of food wastes in forests and realigning the schedules of the train so that it crosses important corridors during the daytime (which is a low movement time for wildlife) need to be taken up. Overbridges can also be constructed in corridors wherever possible to prevent accidents.

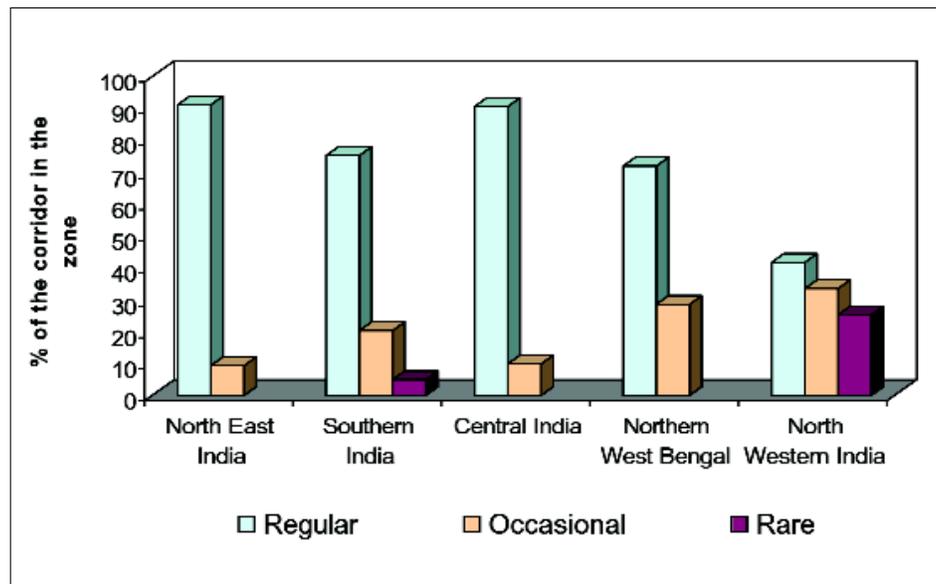


Figure 13: Usage of corridors by elephants

As can be seen in Figure 13, most of the corridors are being regularly used by elephants in almost all the zones. Overall, 77% are being regularly used, 19% are used occasionally and 5% are rarely used. Hence, prompt remedial measures need to be taken to safeguard these corridors to facilitate the free movement of elephants between two habitats thereby reducing conflict and ensuring flow of gene pool of the species.

It is important to have these corridors maintained or broadened to have larger, contiguous, habitation-free areas to ensure long-term viability of the populations. The identified corridors could be either secured or the land in the area acquired. These could be demarcated and importance conveyed through suitably located signages.

The areas may also be declared as elephant corridors by the State, followed by extending legal protection under various laws appropriate for the area. These include declaring the corridor as Ecologically Sensitive Area or Environmentally Compatible Land under the Environmental Protection Act and Rules or by declaring the corridor land as a Conservation Reserve or increase the boundary of Protected Areas to include the corridor under the Wildlife (Protection) Act, 1972 or by declaring the corridor land as Reserved or Protected Forest under the Indian Forest Act or as a Deemed Forest under the 1996 order of the Supreme Court. Other provisions in law especially those existing in the states can also be looked at in consultations with the respective State Governments and the Central Government.

Development policies in elephant habitats should be thoroughly discussed involving various stake holders to prevent further fragmentation and degradation. The overall policy in the areas should be long-term conservation of wildlife by ensuring larger forest areas.

APPENDIX I

Ecological prioritisation of identified corridors

	Area of habitat connected	Major land use	Size of elephant population connected	Usage by elephants	Alternative route	Presence of road	Presence of rail line	Total Points	Ranking
	A	B	C	D	E	F	G	H	I
Northern India									
Kansrau-Barkote	3	3	3	2	1	1	1	14	Mediur
Chilla-Motichur	3	2	3	3	2	1	1	15	High
Motichur – Gohri	3	1	3	1	1	1	1	11	Mediur
Rawasan-Sonanadi (Via Landsdown FD)	3	2	3	3	1	2	2	16	High
Rawasan-Sonanadi (Via Bijnor FD)	3	2	3	3	1	1	1	14	Mediur
South Patlidun-Chilkiya	3	3	3	3	1	2	2	17	High
Chilkiya-Kota	3	1	3	2	1	2	2	14	Mediur
Malani-Kota	3	2	3	3	1	2	2	16	High
Fathehpur - Gadgadia	3	3	1	2	2	1	2	14	Mediur
Gola Rankhu and Gorai-Tanda	3	1	1	1	2	1	2	11	Mediur
Kilpura-Khatima-Surai	2	2	1	2	1	1	2	11	Mediur
Lagga Bagga-Kishanpur	2	2	1	2	1	2	2	12	Mediur
Central India									
Mahilong – Kalimati	2	1	1	3	1	1	1	10	Mediur
Chandil – Matha	1	1	1	2	1	1	2	9	Low
Dalma-Chandil	2	1	1	2	2	1	1	10	Mediur
Dalma- Rugai	1	1	1	2	1	1	2	9	Low
Jhunjhaka- Banduan	1	1	1	3	1	2	2	11	Mediur
Dalapani- Kankrajhor	2	1	1	3	2	2	2	13	Mediur
Dumriya-Nayagram	2	1	1	3	1	1	2	11	Mediur
Dumriya- Kundaluka and Murakanjiya	2	1	1	3	2	1	2	12	Mediur
Leda – Bera	3	2	1	3	1	3	1	14	Mediur
Ankua – Ambia	3	3	1	3	1	2	2	15	High
Anjadbera- Bichaburu	1	1	1	3	2	1	1	10	Mediur
Karo - Karampada	2	3	1	3	2	2	1	14	Mediur
Badampahar-Dhobadhobin	1	1	1	3	2	2	2	12	Mediur
Badampahar – Karida East	2	1	2	3	2	1	2	13	Mediur
Similipal-Satkosia	3	1	3	3	2	2	2	16	High
Baula – Kuldiha	2	1	2	3	2	3	2	15	High
Kahnejena - Anantapur	2	1	1	3	2	1	1	11	Mediur
Tal - Kholgarh	2	1	1	3	2	1	1	11	Mediur
Nuagaon – Baruni	2	1	2	3	2	2	2	14	Mediur
Kotgarh – Chandrapur	3	1	2	3	2	2	2	15	High

	A	B	C	D	E	F	G	H	I
Northern West Bengal									
Mahananda – Kolbari and Tukriajhar	1	1	1	3	2	1	1	10	Medium
Apalchand- Mahananda	1	1	1	3	2	1	2	11	Medium
Apalchand- Gorumara	1	1	1	3	2	2	1	11	Medium
Apalchand-Kalimpong At Mal Block (Via Sylee)	2	1	1	3	1	1	1	10	Medium
Apalchand-Kalimpong At Mal Block (Via Meenglass)	2	1	1	3	1	1	1	10	Medium
Chapramari-Kalimpong	1	2	1	3	2	1	2	12	Medium
Rethi – Central Diana	1	2	1	3	1	1	1	10	Medium
Rethi- Moraghat	1	2	1	3	1	1	1	10	Medium
Dumchi - Rethi	1	2	1	2	2	2	2	12	Medium
Titi- Dumchi	1	2	1	2	2	2	2	12	Medium
Buxa- Titi (Via Torsa)	3	2	1	2	1	1	2	12	Medium
Buxa- Titi (Via Beech & Bambari)	3	2	1	3	1	1	2	13	Medium
Nimati – Chilapata	3	1	1	2	2	1	2	12	Medium
Buxa- Ripu At Sankosh	3	3	1	3	2	3	2	17	High
North-east India									
Pakke-Doimara At Tipi	3	2	2	3	1	2	2	15	High
Pakke-Doimara At Dezling	3	3	2	3	1	2	2	16	High
Pakke – Papum At Seijosa Nullah	3	1	1	3	1	2	2	13	Medium
Pakke – Papum At Longka Nullah	3	3	1	3	1	2	2	15	High
Durpong – Doimukh at Khundakhuwa	2	1	1	2	2	1	2	11	Medium
Dulung-Subansiri	3	2	1	2	2	2	2	14	Medium
D'ering – Mebo At Sigar Nalah	2	1	1	3	1	2	2	12	Medium
D'ering – Mebo At Kongkul	1	1	1	3	1	2	2	11	Medium
Kotha-Burhidihing	1	1	1	3	2	2	2	12	Medium
Upper Dihing East - Upper Dihing West Block At Bogapani	2	2	1	3	1	1	1	11	Medium
Upper Dihing East - Upper Dihing West Block between Golai – Pawai	2	1	1	3	1	1	1	10	Medium
Kalapahar –Daigurung	1	3	2	3	2	2	2	15	High
Kaziranga- Karbi Anglong At Panbari	3	2	3	3	1	1	2	15	High
Kaziranga – Karbi Anglong At Kanchanjuri	3	2	3	3	1	1	2	15	High

	A	B	C	D	E	F	G	H	I
Kukurakata - Bagser At Amguri	3	1	3	3	1	1	2	14	Medium
Charduar – Singri Hill	2	1	2	3	1	1	1	11	Medium
Saipung -Narpuh	1	1	1	2	1	2	2	10	Low
Baghmara-Balpakram	3	2	2	3	2	2	2	16	High
Siju-Rewak	3	2	1	3	2	2	2	15	High
Rewak - Imangiri	2	1	1	3	1	2	2	12	Medium
Nokrek - Imangiri	2	1	1	3	1	2	2	12	Medium
Ranggira -Nokrek	1	1	1	3	2	1	2	11	Medium
Southern India									
Karadikkal-Madeswara	1	3	1	3	2	2	2	14	Medium
Tali	2	2	1	3	2	2	2	14	Medium
Edayarhalli – Doddasampige	3	2	3	3	2	1	2	16	High
Chamrajnagar-Talamalai At Punjur	3	1	3	3	1	1	2	14	Medium
Chamrajnagar –Talamalai At Muddahalli	3	2	3	3	1	1	2	15	High
Talamalai- Guttiyalattur	2	2	2	3	2	1	2	14	Medium
Avarahalla - Sigur	3	1	3	2	1	2	2	14	Medium
Kalhatti-Sigur At Glen Corin	2	2	1	3	1	2	2	13	Medium
Kaniyanpura - Moyar	3	3	3	3	2	3	2	19	High
Moyar - Avarahalla	2	3	3	3	2	2	2	17	High
Kalmalai – Singara & Avarahalla	3	3	3	3	1	2	2	17	High
Nilambur Kovilakam - New Amarambalam	2	2	2	1	1	2	2	12	Medium
Periya At Pakranthalam	1	2	1	3	2	2	2	13	Medium
Tirunelli- Kudrakote	3	2	2	3	2	2	2	16	High
Kottiyur - Periya	1	3	2	2	2	2	2	14	Medium
Kallar At Gandhapallayam	3	1	1	2	2	1	1	11	Medium
Boolavampatti-Attapadi	3	3	2	3	2	2	2	17	High
Anamalai At Punachi	3	3	3	3	1	2	2	17	High
Anaimalai At Waterfalls Estate	3	2	3	2	1	2	2	15	High
Anaimalai Between Siluvaimedu- Kadamparai	3	3	3	2	1	2	2	16	High

Area of habitat being connected: 3 (250 km²each or more than 500 km² combining both), 2 (Less than 250- 150 km²each or 300-500 km² combing both), 1(less than 150 km² each or below 300 km² combing both)

Population connected: 3 (above 400), 2(200-400), 1(below 200)

Major Land Use: 3 (Forest), 2(Forest and agriculture; Forest and plantation; Forest and settlement), 1(Forest, agriculture and settlements; Forest, plantation and settlements)

Usage of the corridor: 3 (Regular), 2(Occasional), 1 (Rare)

Presence of alternative route: 2(No), 1(Yes)

Presence of road: 3(Not present), 2(other roads), 1(National Highway)

Presence of rail line: 2(Absent), 1(Present)

Final Priority of corridor: High (19-15), Medium (14-10), Low (below 10)

APPENDIX II

Conservation feasibility of identified corridors

	Status of corridor land	Major land use	No. of settlements	Area of corridor	Artefacts	Total Points	Ranking
	A	B	C	D	E	F	G
Northern India							
Kansrau-Barkote	3	3	3	1	1	11	Medium
Chilla-Motichur	2	1	2	2	1	8	Medium
Motichur – Gohri	2	1	2	2	1	8	Medium
Rawasan-Sonanadi (Via Landsdown FD)	3	2	2	1	2	10	Medium
Rawasan-Sonanadi (Via Bijnor FD)	3	2	2	1	1	9	Medium
South Patlidun-Chilkiya	3	2	2	1	2	10	Medium
Chilkiya-Kota	3	2	2	3	2	12	High
Malani-Kota	3	1	2	2	1	9	Medium
Fathehpur - Gadgadia	3	2	3	2	2	12	High
Gola Rankhu and Gorai- Tanda	3	2	1	1	1	8	Medium
Kilpura-Khatima-Surai	2	1	1	1	1	6	Low
Lagga Bagga-Kishanpur	2	2	2	1	1	8	Medium
Central India							
Mahilong – Kalimati	1	1	1	1	1	5	Low
Chandil – Matha	1	1	1	1	2	6	Low
Dalma-Chandil	1	1	1	1	1	5	Low
Dalma- Rugai	2	1	2	2	2	9	Medium
Jhunjhaka- Banduan	2	1	1	1	1	6	Low
Dalapani- Kankrajhor	2	1	2	2	2	9	Medium
Dumriya-Nayagram	2	1	1	1	2	7	Low
Dumriya- Kundaluka and Murakanjiya	1	1	1	1	2	6	Low
Leda – Bera	3	2	2	3	2	12	High
Ankua – Ambia	3	3	3	2	2	13	High
Anjadbera- Bichaburu	2	1	2	1	1	7	Low
Karo - Karampada	3	3	3	1	2	12	High
Badampahar- Dhobadhobin	2	1	1	1	3	8	Medium
Badampahar – Karida East	1	1	1	1	2	6	Low
Similipal-Satkosia	2	2	1	1	2	8	Medium
Baula – Kuldiha	2	1	1	1	1	6	Low
Kahneijena - Anantapur	2	1	2	1	1	7	Low
Tal - Kholgarh	2	1	2	2	1	8	Medium
Nuagaon – Baruni	2	1	2	2	2	9	Medium
Kotgarh – Chandrapur	2	1	2	1	2	8	Medium

	A	B	C	D	E	F	G
Northern West Bengal							
Mahananda – Kolbari and Tukriajhar	1	2	1	1	2	7	Low
Apalchand- Mahananda	2	1	2	1	2	8	Medium
Apalchand- Gorumara	2	1	1	1	2	7	Low
Apalchand-Kalimpong At Mal Block (Via Sylee)	2	2	1	1	1	7	Low
Apalchand-Kalimpong At Mal Block (Via Meenglass)	2	2	2	1	1	8	Medium
Chapramari-Kalimpong	2	2	1	1	2	8	Medium
Rethi – Central Diana	2	2	1	1	1	7	Low
Rethi- Moraghat	2	1	2	1	1	7	Low
Dumchi - Rethi	2	2	1	1	2	8	Medium
Titi- Dumchi	2	2	2	1	1	8	Medium
Buxa- Titi (Via Torsa)	2	1	2	1	2	8	Medium
Buxa- Titi (Via Beech & Barnbari)	2	2	2	2	2	10	Medium
Nimati – Chilapata	2	1	2	1	2	8	Medium
Buxa- Ripu At Sankosh	2	2	2	2	3	11	Medium
North east India							
Pakke-Doimara At Tipi	3	2	2	3	1	11	Medium
Pakke-Doimara At Dezling	3	3	3	3	2	14	High
Pakke – Papum At Seijosa Nullah	3	1	2	3	2	11	Medium
Pakke – Papum At Longka Nullah	3	3	2	3	2	13	High
Durpong – Doimukh at Khundakhuwa	3	1	2	2	2	10	Medium
Dulung-Subansiri	3	2	2	2	1	10	Medium
D'ering – Mebo At Sigar Nalah	2	1	2	2	3	10	Medium
D'ering – Mebo At Kongkul	2	1	2	2	2	9	Medium
Kotha-Burhidihing	1	1	2	1	1	6	Low
Upper Dihing East - Upper Dihing West Block At Bogapani	1	1	2	2	1	7	Low
Upper Dihing East - Upper Dihing West Block between Golai – Pawai	1	1	2	2	2	8	Medium
Kalapahar –Daigurung	2	3	3	2	2	12	High
Kaziranga- Karbi Anglong At Panbari	2	2	3	3	2	12	High
Kaziranga – Karbi Anglong At Kanchanjuri	2	2	3	3	2	12	High

	A	B	C	D	E	F	G
Kukurakata - Bagser At Amguri	2	1	2	3	2	10	Medium
Charduar – Singri Hill	1	1	1	1	1	5	Low
Saipung -Narpuh	2	2	2	1	3	10	Medium
Baghmara-Balpakram	2	1	2	1	2	8	Medium
Siju-Rewak	2	2	2	1	2	9	Medium
Rewak- Imangiri	2	1	1	1	3	8	Medium
Nokrek -Imangiri	2	1	1	1	2	7	Low
Ranggira-Nokrek	2	1	1	1	1	6	Low
Southern India							
Karadikkal-Madeswara	3	3	3	3	3	15	High
Tali	3	2	2	2	3	12	High
Edayarhalli – Doddasampige	2	2	3	3	2	12	High
Chamrajnagar-Talamalai At Punjur	3	1	2	2	2	10	Medium
Chamrajnagar –Talamalai At Muddahalli	3	2	2	2	2	11	Medium
Talamalai- Guttiyalattur	3	1	2	1	2	9	Medium
Avarahalla - Sigur	1	2	2	3	2	10	Medium
Kalhatti-Sigur At Glen Corin	2	1	2	3	3	11	Medium
Kaniyanpura - Moyar	3	3	2	3	3	14	High
Moyar - Avarahalla	3	3	2	2	1	11	Medium
Kalmalai – Singara & Avarahalla	1	3	3	2	2	11	Medium
Nilambur Kovilakam - New Amarambalam	3	2	3	3	2	13	High
Periya At Pakranthalam	3	1	2	3	2	11	Medium
Tirunelli- Kudrakote	2	1	2	1	2	8	Medium
Kottiyur - Periya	3	2	1	3	2	11	Medium
Kallar At Gandhapallayam	2	1	2	1	1	7	Low
Boolavampatti-Attapadi	3	2	1	3	2	11	Medium
Anamalai At Punachi	1	3	3	3	2	12	High
Anaimalai At Waterfalls Estate	1	2	2	3	2	10	Medium
Anaimalai Between Siluvaimedu-Kadamparai	3	3	3	3	2	14	High

Status of the land: 3 (completely PF/RF), 2 (PF and Revenue Land or Community forest or RF & Revenue Land/lease land to tea garden), 1(RF and patta land or Revenue and patta land or lease land and patta land)

Major Land Use: 3 (Forest), 2(Forest and agriculture; Forest and plantation; Forest and settlement), 1(Forest, agriculture and settlements; Forest, plantation and settlements)

Number of settlements: 3 (Nil), 2(1-3 settlements), 1(more than 3 settlements)

Area of corridor: 3(1 km² or below), 2(>1-4 km²), 1(>4 km²)

Artefacts: 3 (Nil), 2(rail/road or small units), 1(Rail and road or industry, etc)

Conservation feasibility: High (15-12), Medium (11-8), Low (7 and below)



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RIGHT OF PASSAGE



Elephants are large-bodied nomads. Surviving in the fragmented habitat that they have at their disposal in India today would necessitate crossing human-dominated landscapes. This publication brings together, for the first time, a comprehensive listing of India's elephant corridors as listed and mapped by elephant experts and certified by all state forest departments that are part of the elephant range in the country. Securing these corridors so that elephants and other species can locally migrate between habitats is crucial to their survival. Developmental plans in these regions must take the elephants also into consideration. This will ensure species survival, lessen conflict and ensure holistic conservation.



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