

6. TRANSPORT DEVELOPMENT IN THE NORTH EAST





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6. TRANSPORT DEVELOPMENT IN THE NORTH EAST

It is now well acknowledged that the economic and human potential of India's North East region (NER) is severely constrained due to its transport infrastructure deficiency. The Central and state governments are now jointly focused to build infrastructure in the region.

INTRODUCTION

Certain key initiatives of the government, such as the 'Look East Policy' and the North East Industrial and Investment Promotion Policy (NEIIPP), 2007, and the NER Vision 2020 released in 2008, are efforts in the right direction but these will have to be shored up by concerted efforts. Despite Plan investments in the past, infrastructure development in the North East has been poor, which has also been noted by the NER Vision document as the single biggest constraint to accelerated growth. The region is characterised by grossly underdeveloped transport linkages that have sequestered and isolated the region not only from the rest of the country and the world, but also within itself.

NTDPC is placing a special focus on transportation in the North East in view of its unique problems of isolation from the rest of the country, which arose as a consequence of the Partition in 1947. Prior to Independence, the North East was organically connected with the rest of India through what is now Bangladesh, and to the East to Burma (now Myanmar). Even then, the state of both road and rail infrastructure left much to be desired, but the situation was much better than it is now, with the land connection with the rest of India only through the slender 27-km wide Siliguri 'chicken's neck' corridor. With the closing of borders, access to Chittagong port also got severed, cutting the region off from sea routes.

In effect, the market and centres of productivity in the North East got separated by a political dividing line, which has had severe repercussions on the livelihood of people in the whole region.

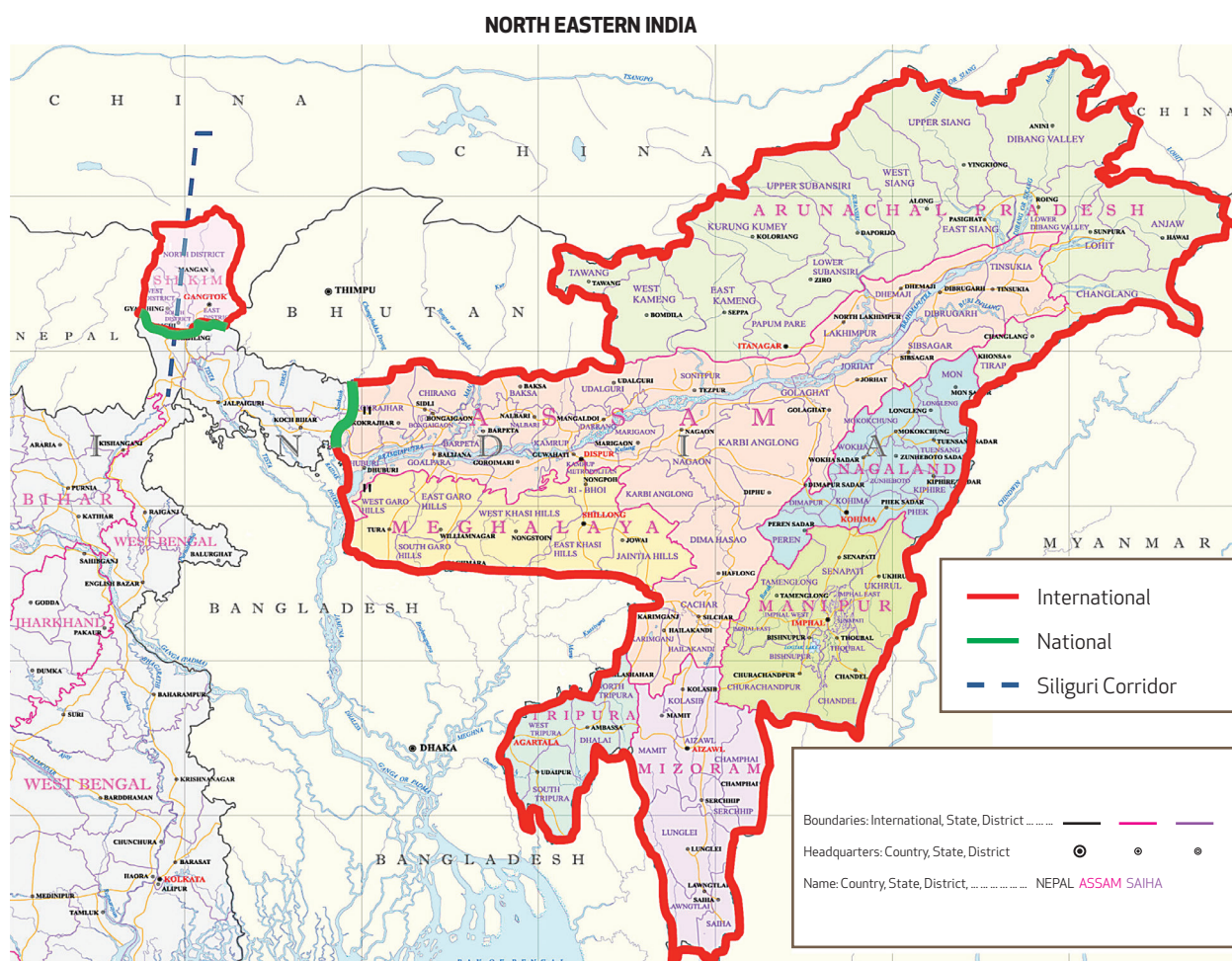
Today, the entire boundary of NER (96 per cent) is an international border shared with China and Bhutan in the north, Myanmar in the east, Bangladesh in the south and west, and Nepal to the west of Sikkim. The geopolitical distancing of the region from its main markets and trade gateways led to economic insulation and caused immense structural damage to the NER economy.

Figure 6.1 and Table 6.1 show the international boundary that the NER shares with neighbouring countries.

Historically, undivided Bengal and the NER were an integrated market with active roads, railway tracks and waterways crisscrossing the region. Global trade was conducted through the sea route, a network of inland waterways, and land transportation through road and railways. In fact, the network between Dibrugarh and Chittagong was one of the earliest railway projects in India (commenced in 1884) implemented by the British (Figures 6.2 and 6.3).

Some of the more important commodities were tea and timber. The tea industry in Assam depended on Chittagong port to export its produce and import raw materials such as coal used as fuel to dry tea leaves. As the tea industry grew, these rivers became important

Figure 6.1
The North East



Source: NTDP (Base Map: Ministry of Development of NER).

carriers of trade. With Partition, the industry was severely hit as Chittagong became a part of East Pakistan. Railway links with places presently in Bangladesh upto Akhaura, Belonia, Mahisashan were also snapped. The lines connecting Siliguri in North Bengal to Kolkata and Assam to Chittagong were severed. The whole Assam Railway was cut off from the rest of the Indian system. These lines carried almost all freight traffic from these regions.

By 1950, India reconnected Assam to the rest of the country's rail network by building a more than 200 km metre-gauge rail link through the Siliguri corridor. However, the tea chests from Assam's gardens were now required to be carried over a much longer distance to reach Kolkata port. Any possible option of exporting tea via nearby Chittagong was completely eliminated after India's 1965 war with Pakistan.

The North East, which has been innately rich in natural resources, was doing well economically till Partition. In fact, on the eve of Independence, per capita income of the state of Assam was higher than the country's average. This remained so even during the 1950s and 1960s, perhaps since India and Pakistan initially agreed to allow cross-border traffic that kept

transportation routes alive. The trend started showing a reversal in the 1980s as an after effect of the 1965 Indo-Pak war that completely snapped the links, and the variance has only grown deeper thereafter.

It is for all these reasons that NTDP decided to commission a special Working Group on the North East as part of its overall strategy for transport development in the country. Moreover, given the terrain of the North East, and the special role of inland waterways, it is essential that a more organised strategic, long term intermodal view be taken for developing transport in the region. Recent political developments leading to the opening of Myanmar, and renewed discussions with Bangladesh, also suggest that a long-term strategic view be taken to intensify international transport linkages from the region. Volume II, Chapter 13 on Promoting International Transport Connectivity between India and the South and South East Asia Regions further emphasises the importance of opening these intra-regional transport connections.

THE NER TODAY: DISTANT AND REMOTE

The NER today is relatively disconnected with the progress made by the country in the last several

Table 6.1
State-wise Length of International Border of NER
[in Km]

STATE	BANGLADESH	BHUTAN	CHINA	MYANMAR	NEPAL	TOTAL
Arunachal Pradesh	0	217	1,080	520	0	1,817
Assam	263	267	0	0	0	530
Manipur	0	0	0	398	0	398
Meghalaya	443	0	0	0	0	443
Mizoram	318	0	0	510	0	828
Nagaland	0	0	0	215	0	215
Sikkim	0	32	220	0	97.80	350
Tripura	856	0	0	0	0	856
Total	1,880	516	1,300	1,643	98	5,437

Source: Ministry of Development of NER (MDoNER).

decades. The region's economy is generally characterised by low per capita income, limited industrialisation, inadequate infrastructure facilities, geographical isolation and communication bottlenecks, lack of private and foreign direct investment and a high unemployment rate among the relatively better educated people. However, the literacy rate in the region at 68.5 per cent, with a female literacy rate at 61.5 per cent, is higher than the country's average of 64.8 per cent and 53.7 per cent, respectively¹.

Income levels in the region are now lower than the national average by over 30 per cent. A quick comparison between the NER states and India (see Figure 6.2) in terms of compounded annual growth rate of Gross State Domestic Product (GSDP) during 2004-05 to 2010-11, shows that while India grew at greater than 8 per cent, NER grew far less rapidly.

While the economy of the region is a matter of overall concern, its sectoral composition may also need to be examined carefully. As in the rest of India, there has been a decrease in the contribution of the primary sector and its subsectors in NER, which has largely been compensated by an increase in the tertiary sector. The contribution of the secondary sector has remained more or less constant. The region exhibits a trend of transformation where primary is not replaced by the secondary but by the tertiary (see Figure 6.3). Understandably, the region has to depend more on the tertiary (or services) sector due to lack of industrialisation/ manufacturing. One of the important reasons for limited industrialisation is the region's acutely constrained transport linkages which in turn negatively impact market access and trade.

In fact, even for the tertiary sector to continue playing the important role that it plays today, strengthening infrastructure will be vital, as tourism, which is an integral sub-sector, is largely driven by the quality of infrastructure. The infrastructure deficit is

today one of the biggest constraints to the economic growth of the region. Poor density of road in most states in the NER (Figure 6.4) and scant rail transportation within the region has not only hampered mobility but also hindered the development of markets. The traditional transportation routes through inland waterways have become virtually non-functional after Partition and although the agreement with Bangladesh allows the transportation of goods, these routes have become inactive. The region is also poorly linked by air, and sea routes have been blocked.

Improving intra-regional transport links will promote links with the rest of India, enabling movement of people and commodities. It will establish national reassurance that would help break mental barriers and encourage people from rest of India to travel and invest.

The development strategy for the NER will have to be built specifically around the primary and service sector. Inherent potential for horticulture, floriculture and plantation crops needs to be exploited, while facilitating tourism in the hilly areas can unlock further potential. Undoubtedly, transport infrastructure for faster and efficient evacuation of primary goods such as tea, jute, bamboo, minerals, oil etc is urgently required. Providing this will give the people a sense of participation in the Indian growth story.

Whereas a series of measures and infrastructure projects have been initiated to improve transport linkages with the NER and to plug it back into the mainland India, the problems of poor governance and limited institutional capacity remain a grave concern. The uneasy relationship with most of the neighbouring countries has also not helped the cause of development of the region. With a large part of the boundary forming difficult international borders, private investment has shied away. Further, the

1. Census of India (2011).

Figure 6.2
India Railways Map 1889: Assam, Bengal, Bihar



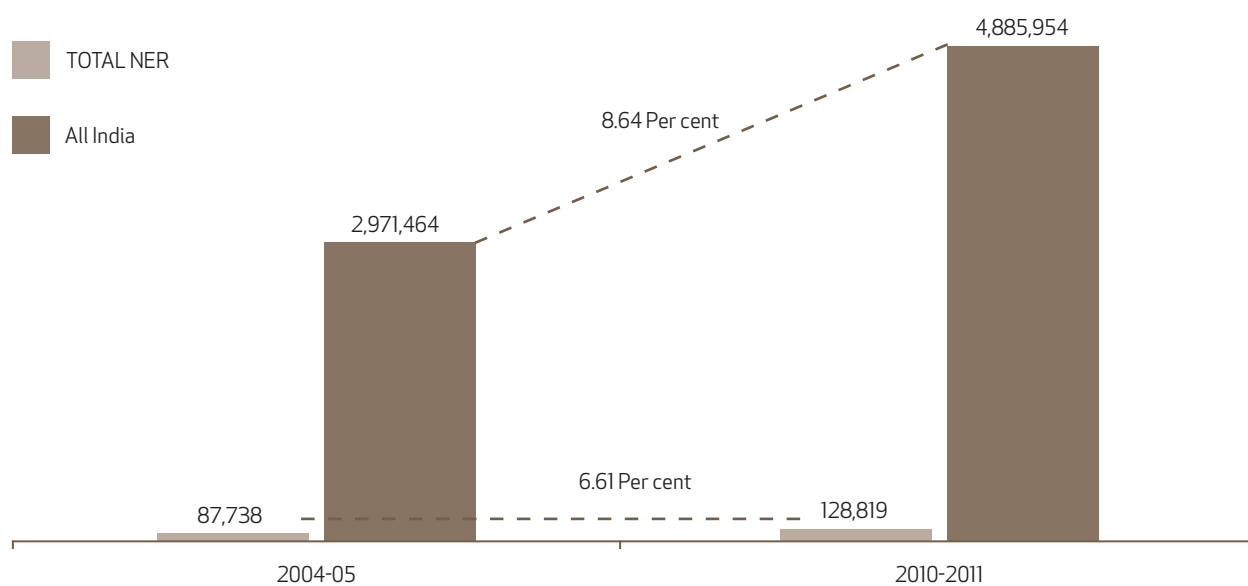
Source: Ministry of Railways.
 Taken from a book, *Indian Railways—The final frontier*, published by Northeast Frontier Railways in 2002.

Figure 6.3
India Railways Map 1912: Assam, Bengal, Bihar



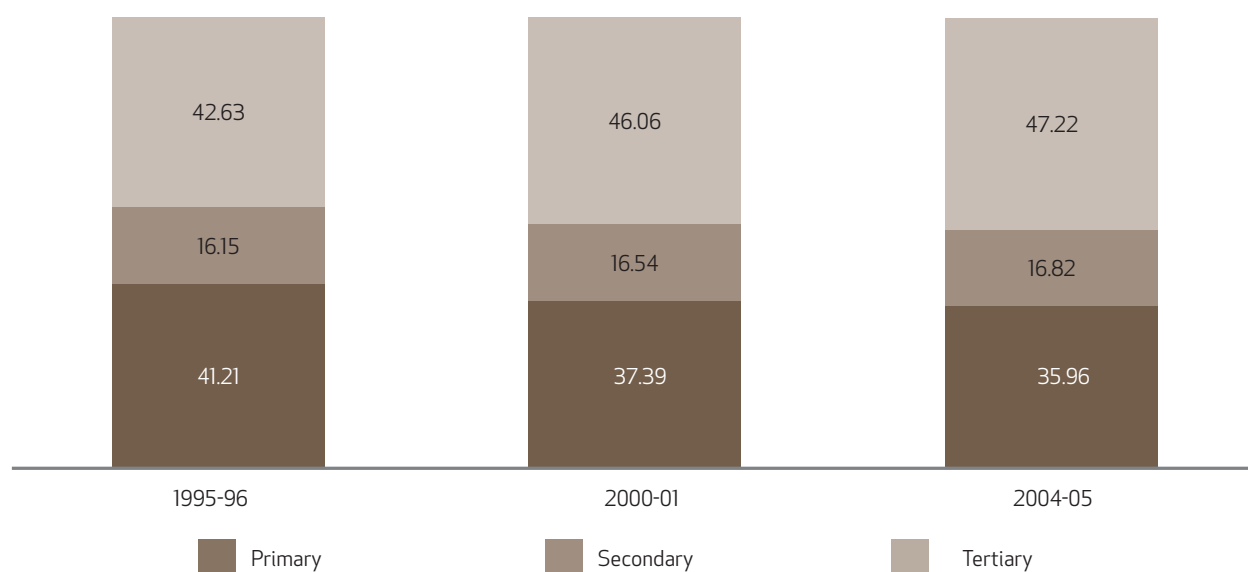
Source: Ministry of Railways.
 Taken from a book, *Indian Railways—The final frontier*, published by Northeast Frontier Railways in 2002.

Figure 6.4
Comparative Economic Growth (GSDP): NER and India (2005-11)



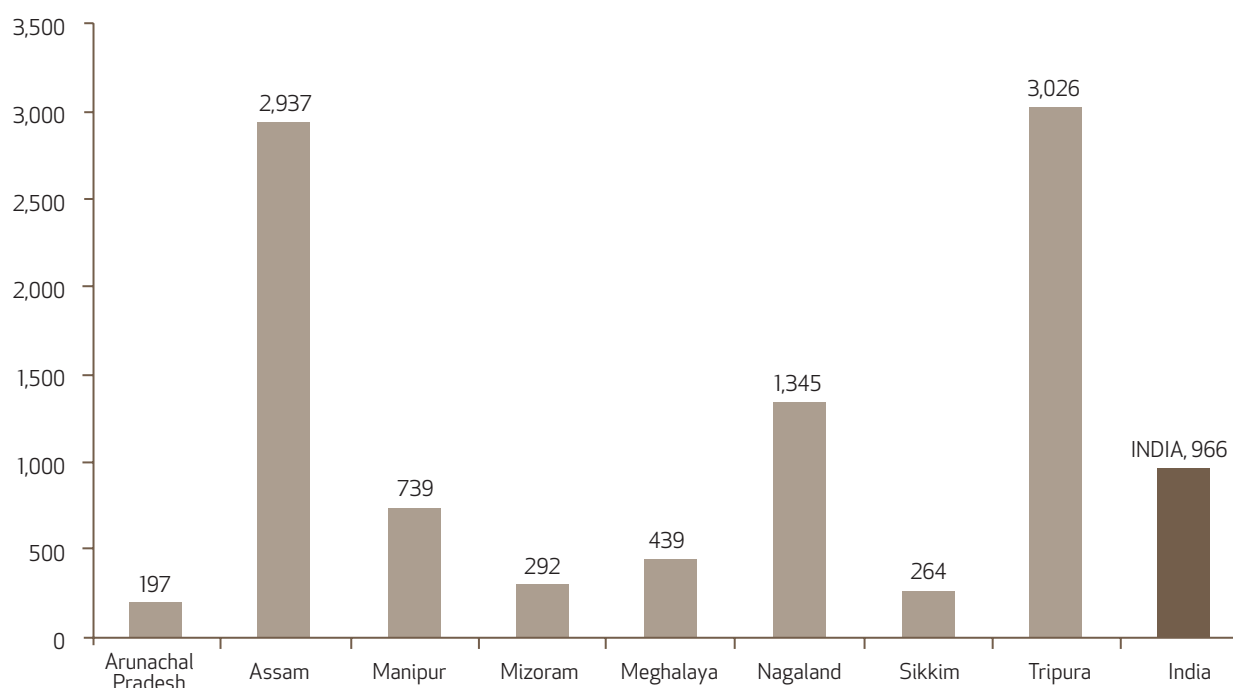
Source: Ministry of Development of NER (MDoNER).

Figure 6.5
Structural Change in the NER Economy: Sectoral Composition of GSDP
 {Per cent}



Source: NER Vision 2020.

Figure 6.6
NER vs National Road Density, 2008
 (Route Km/'000 Sq. Km)



Source: PwC report of Jan. 2013, 'India's North-East Diversifying Growth Opportunities (data provided by TRW, Ministry of Road Transport & Highways).
 * Excludes roads constructed under JRY and PMGSY.

quest for ethnic and regional identity led to numerous insurgencies. Needless to say, the long historic turmoil and the consequent socio-economic repercussions have had a deep impact on the psychology of the people of NER.

THE IMPORTANCE OF NER

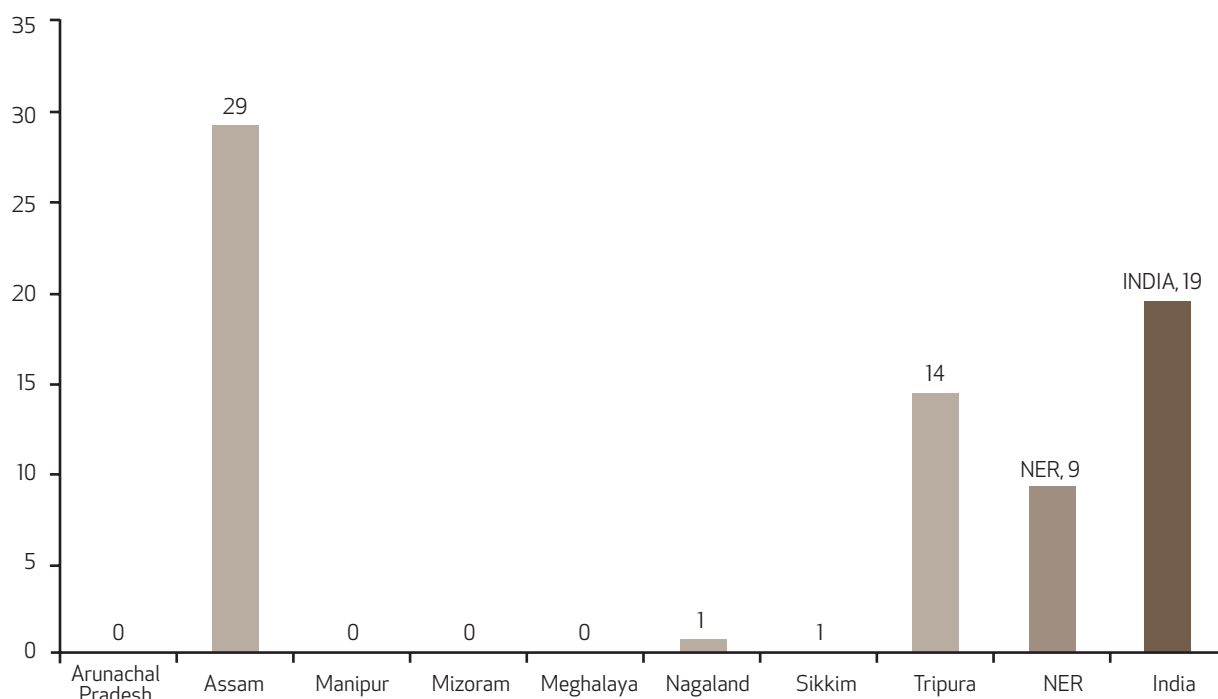
The world is looking to engage with the emerging economic hotspot, the East, and it is in North East India that South-East Asia begins. Most urgent and strategic interventions are required for the NER to play the arrowhead role for India. Transport infrastructure will be vital to strengthen integration within the region, and with the rest of the country, and also for India's increased integration with the South East in the future. Improving transport connectivity shall have to be the foremost priority for social and economic mobility and market integration. Whereas inter-regional, intra-regional and regional connectivity to mainland India is necessary, critical to improving connectivity are issues of diplomacy and an improvement in border infrastructure and trade facilitation with neighbouring countries.

The NER needs to be integrated back to the national mainstream to prepare it for the strategic role it is expected to play going forward and the region has the potential for generating quick economic returns.

Improving connectivity is the most important measure for the resurgence of the NER. Transport links shall help development of markets, reduce exploitation by middlemen, and in the process improve livelihoods of people in remote areas by enabling them to market their products at higher prices, while also promoting awareness and harmony among states. The economy of the region is still primarily agrarian with the industrial sector having mainly grown around tea, petroleum [crude], natural gas, mining and steel fabrication, but not quite close to its full potential. Due to inadequate industrial growth, the vast resource base available remains unexploited and the pressure for employment is on the service sector. Transport links can help ease out the undesirable pressure by promoting more balanced growth.

The contribution of NTDPDC becomes all the more relevant as the NER presents natural characteristics that make it imperative for more organised inter-sectoral planning for transportation in the region. It is remote from the rest of India; several areas feature difficult hilly terrain; it also has many rivers, which can permit significant inland water transport options, but also contribute to difficulties in engineering transport infrastructure; it has a long border with neighbouring countries which increases the importance of transport infrastructure from a strategic and security viewpoint; and it consists of

Figure 6.7
State-wise Rail Density in the NER, 2009
 (Route Km/'000 Sq Km)



Source: PwC report of Jan. 2013, 'India's North-East Diversifying Growth Opportunities (Rajya Sabha unstarred Question No. 1467, dated 06.08.2010).

eight states, each of which has its own requirements and priorities.

THE LOOK EAST POLICY

The broad strategy should be to promote ties of the NER with its immediate neighbours in the short term, while looking beyond its borders to tap into the benefits of India's burgeoning trade with the ASEAN bloc in the longer run. Myanmar, now a member of ASEAN, has become a crucial link between India and ASEAN countries. Political leaders from Bangladesh, USA, South Korea and Britain have already made their forays into Myanmar. India, despite having a geographic advantage, has been rather languid in its approach and certain initiatives have only begun to show recently. The North East, specifically Manipur, and the border town of Moreh in particular, can be the centre of a thriving and integrated economic space linking two dynamic regions with a network of highways, railways, pipelines, and transmission lines crisscrossing the region. Moreh has traditionally been the trading hub with Myanmar and presents vast potential to become a major export centre from India for the South-East Asian region. Another big project already under way is designed to turn the Kaladan River into a shipping route, linking Mizoram to Myanmar's port of Sittwe, which India is helping develop. Expediting the same while systematically creating economic opportunities by bringing together industry

and people in well-planned localised areas, with adequate enabling infrastructure, is the need of the hour.

Bangladesh, again, has to be an integral part of any transport strategy for the NER. Ingress to Chittagong port and opening up of the inland water route could lead to economic resurgence of the region. In fact, Tripura in the NER is just about 75 km from the Chittagong and could therefore become an important gateway for India to East Asian countries. Such unblocking of trade routes would be in mutual interest and boost confidence on either side. The existing high tariffs on Bangladesh imports and the lack of border trade infrastructure that has limited trade to the informal variety could also then potentially convert to formal border trade between the NER and Bangladesh. At the same time, Bangladesh could have access to Indian markets by enabling free trade in the land routes, which would mitigate its unfavourable balance of trade with India considerably.

Similarly, India needs to leverage on the ambitious Trilateral Highway Project which is an example of triangular road diplomacy between India, Myanmar and Thailand; inter-linking the Indian Ocean with the South China Sea. While the Asian Highway is being built along planned routes to cover a wide spectrum of road network in the NER, much more needs to be done by the Indian government to make the road functional. The Asian Highway needs to be integrated with other critical projects that are

envisaged to be completed as part of the Look East Policy such as the Kaladan Multimodal Transit Project and Trans-Asian Railways. *It is with this backdrop, to unlock NER's economic and human potential and make it an integral partner in India's economic development that provision of integrated and robust transport infrastructure within, to and from NER becomes very significant. This coupled with the strategic implications and the need to reduce physical and mental distances, a separate discussion on transportation issues and strategy for the NER becomes indispensable.*

OVERARCHING TRANSPORTATION ISSUES FOR THE NER

Most of the area in the region is hilly and undulating with low population densities except the plains of Assam, parts of Tripura and valley areas of Manipur. Rail connectivity in such terrain is not only time-consuming but would need huge investments. It is road connectivity which would play a dominant role in fulfilling the transportation needs of the public. Air and inland water transport will play a role for a limited segment of people and goods. Before analysing the four transportation sectors, some common issues cutting across different sectors are discussed here.

NORTH EAST IS A COMPACT REGION

Transport planning has to be done at three levels— intra-regional, with the rest of India and connectivity with the international neighbours and beyond for South Asia, South East Asia and China.

MULTI-MODAL TRANSPORT PLANNING

Regional solutions for intra-regional movement of goods and passengers, connectivity with the rest of India and international connectivity have to be planned in an integrated manner. At present, there is hardly any inter-sectoral planning amongst the four transport infrastructure sectors—road, civil aviation, rail and inland waterways. Even at the beginning of the 12th Plan, such an approach has not been undertaken.

INSTITUTIONAL SUPPORT

Institutional support for multimodal planning of transport and to give implementation and technical support, particularly to the road sector, is necessary after discussions with key stakeholders.

CROSSING THE BRAHMAPUTRA

The 890-km length of Brahmaputra from Dhubri to Sadia has at present only three bridges across it to connect areas on its either side. Two more are under construction. The three existing ones are the Saraighat road-cum-rail bridge at Guwahati; the Tezpur-Kolia Bormora Setu, connecting Sonitpur with Nagaon district; and the Jogighopa-Naranarayana rail-cum-road Setu. The two bridges under construction are the Bogibeel rail-cum-road bridge; and

the Dhola-Sadia road bridge, both of which will facilitate connectivity between Assam and Arunachal Pradesh. These five bridges are grossly inadequate both from a security standpoint as well as to serve general commutation.

CONNECTIVITY BETWEEN STATE CAPITALS AND THE REST OF INDIA

Various state capitals are at present connected only by one road (rail connectivity for five of them has yet not become operational) which often leads to bottlenecks, both man-made and natural. The land connectivity of the NER with the rest of India is through a 27-km-wide corridor (21 km at its narrowest) often referred to as the Chicken's Neck. This poses serious bottleneck to capacity creation in the region.

INFRASTRUCTURE FOR INFRASTRUCTURE

Investments in infrastructure in the NER has increased exponentially since the 10th Plan and is likely to continue in the 12th Plan. But all construction agencies are beset with problems of accessing construction material, poor quality of roads and unavailability of rail links. A well-thought-out strategy to sort out the problem is imperative.

USE OF APPROPRIATE TECHNOLOGY

building of quality infrastructure has undergone tremendous change across the globe. Better standards of road building to match those in the neighbouring Malay Peninsula which receives equal or even higher volume of rainfall need to be introduced while also exploring/ developing innovative construction techniques.

MAINTENANCE OF TRANSPORT ASSETS

Heavy and incessant rainfall over six to eight months, and lack of generation of resources by state governments cause poor maintenance of assets. Expansion in the road network would further require greater share of states' resources for maintenance.

PUBLIC INITIATIVES FOR THE NER

Public investment in the transport sector has to be seen within the overall perspective of the Union Government with respect to the NER. The North Eastern states receive special consideration in terms of allocation of Plan funds and other facilitating interventions:

SPECIAL CATEGORY STATES

Recognising the special requirements of the region and the need for significant levels of government investment, the North Eastern states have been categorised as Special Category states and Central Plan assistance to these states is provided on liberal terms. For the NER, the per capita level of Central assistance is amongst the highest in the country.

Table 6.2
Flow of Plan Funds to NER: 11th Plan Period
(Rs billion)

(Annual Plan / Revised Estimates)

SOURCE OF FUNDING	2007-08	2008-09	2009-10	2010-11	2011-12	TOTAL
From Planning Commission (State Sector approved outlays of NE States including ACA/SPA)	113	147	177	210	250	897 (49.3)
From NEC	6	6	6	7	7	32 (1.78)
From Ministry of DoNER (NLCPR Scheme)	6	6	7	8	8	35 (1.95)
Central Ministries / Departments	129	148	162	198	217	855 (46.98)
Total	254	309	352	423	482	1818

Source: Ministry of Development of NER (MDoNER).
Figures in () are Percentage.

10 PER CENT MANDATORY EARMARKING OF FUNDS FOR NER

In order to mobilise financial resources, a policy decision was taken in 1996 to earmark at least 10 per cent of the Plan Budget(s) of the Central ministries/departments for development of the North Eastern states. Now, 52 ministries/departments earmark 10 per cent of their Gross Budgetary Support (GBS) for the NER.

NON-LAPSABLE CENTRAL POOL OF RESOURCES

The Non-Lapsable Central Pool of Resources (NLCPR) created in 1997-98 (operationalised in 1998-99) is the accrual of the unspent balance of the mandatory 10 per cent budgetary allocation of the ministries/departments. The broad objectives of the NLCPR Scheme is to ensure speedy development of infrastructure by way of filling the existing infrastructural gaps (economic and social) in the region by making funds available from the pool.

LIBERAL PLAN FUNDING NORMS

NER States have a weak financial base and limited scope to raise additional resources due to their small size, remoteness, terrain and internal fund raising constraints. They are, therefore, unable to contribute the states' share as per the norms of the Centrally Sponsored Plan Schemes of the ministries/departments of the Union Government. Hence, funding norms of Centrally Sponsored Schemes have been progressively liberalised for the North Eastern states. The states' contribution to Centrally Sponsored Schemes now range generally between 10 and

20 per cent, whereas for other states it is between 20 and 50 per cent.

LIBERAL NORMS FOR EXTERNALLY AIDED PROJECTS

Being special category states, the loan burden from externally aided projects is shared by the Central Government and Special Category States in the ratio of 90:10.

SETTING UP OF MINISTRY OF DONER

The Department of Development of North Eastern Region (DoNER) was set up in 2001 to coordinate and give impetus to the Centre's development efforts pertaining to socio-economic development of the region. It was converted into a Ministry in 2004.

The North Eastern Council, Shillong, set up in 1971, is under the administrative control of the Ministry of DONER.

SPECIAL PACKAGES FOR NER

The Central Government has also been announcing special packages for socio-economic development of the NER from time to time.

TAX CONCESSION IN NER

Including Direct Tax The Income Tax Act has special concessional provisions for NER.

Apart from these special provisions, heavy public investment is being made in the NER for infrastructure. Table 6.2 provides a snapshot of investments

made in the NER by the Union Government in the 11th Plan period.

Overall, a steady flow of funds and a facilitating infrastructure of policies and schemes have been created for the NER by the Union Government. While these efforts may certainly be praiseworthy and helpful, a broad review of specific transport infrastructure challenges that the region presents is necessary to appreciate the need for still greater and incisive interventions. Detailed sectoral discussion is taken up in the subsequent section.

ROADS

Roadways are the backbone of transport and communication in the NER, primarily due to terrain and sparse distribution of population. In fact, water and road transport have always been the primary modes to move people and freight. Rail and air are rather recent phenomena.

Initially, there were just unmetalled mud roads while the only wheeled means of transport was the bullock cart. People covered distances mostly on foot. Rivers like the Brahmaputra, the Barak, the Gomati, the Haora and the Manu were navigable by boats. Around the 16th century, King Nar Narayana of Koch Bihar got an embanked road constructed from the capital in Koch Bihar to Narayanpur near Lakimpur in Assam which was a distance of nearly 350 miles. Later, reasonably extensive economic infrastructure was built up during the Ahom rule in the forms of embankments around the Brahmaputra and its tributaries. The embanked road built on the south bank of river Brahmaputra linking upper and lower Assam facilitated movement of troops, people and transportation of goods. It also protected rice fields from floods. Unfortunately, many of such vital public works were damaged, and even destroyed during the Burmese invasion in the early 19th century.

Around 1833, an important road was constructed linking Imphal, capital of Manipur, with Silchar in British India. The construction was a joint venture of the British and Manipuri government. The road became the vital channel of flow of goods and movement of people and livestock between Cachar (in Assam) and Manipur. In 1868, the department of Public Works was established. A road board was constituted in 1926-27. By 1929, the length of metallic roads went up to 565 miles while kaccha (earth) roads measured more than 4,000 miles. By 1937-38, the length of metallic roads increased to more than 700 miles while the total road length went beyond 5,000 miles. The construction and maintenance of roads achieved great significance during the Second World War, following the advance of Japanese forces near Assam.

However, a majority of important road links which had become the lifelines for the region were suddenly rendered inactive with Partition in 1947. During the last 60 years of Indian independence, while roads have been built in the region, road transport connectivity is still wanting. The inadequate pace of road development in the NER, exacerbated with even lesser focus on planned development, has been an area of concern for the government. In 2005, a mega road programme, titled Special Accelerated Road Development Programme in North East (SARDP-NE) was initiated. The main objective is to link the state capitals and district headquarters in the NER with double lane National Highways (NH) or State Roads to the existing NH network. The programme thus includes improvement, upgradation or construction of National Highways and State Roads. In order to expedite the process of sanctioning of projects, a fast track procedure through a high powered committee under the chairmanship of Secretary, Road Transport and Highways, has been set up with special powers.

Some of the key projects/schemes initiated for planned development of roads across the NER are discussed below.

MAJOR PROJECTS/SCHEMES UNDERWAY

The political leadership and public have long recognised an increasing need to build adequate and quality roads connecting the NER internally and to mainland India. However, the overall road density of the region still remains below national average.

SPECIAL ACCELERATED ROAD DEVELOPMENT PROGRAMME FOR NORTH EAST (SARDP-NE)

This programme envisages providing road connectivity to all the district headquarters in the NER by minimum two-lane highway standards apart from providing road connectivity to backward and remote areas, areas of strategic importance and neighbouring countries. The programme is planned in two phases, including the Arunachal Package covering about 10,141 km.

This is by far the most ambitious road development programme for the NER. NHAI, state PWDs and the Border Roads Organisation (BRO) are the implementing agencies. The objectives are as follows:

- Upgrade National Highways connecting state capitals to two/four-lane
- To provide connectivity of all 88 district headquarter towns of the NER by at least two-lane road
- Provide road connectivity to backward and remote areas of the NER
- Improve roads of strategic importance in the border area
- Improve connectivity to neighbouring countries

Table 6.3
SARDP-NE

PHASE A	ARUNACHAL PRADESH PACKAGE	PHASE B	TOTAL
4,099 km	2,319 KM	3,723 KM	10,141 Km • National Highways 4,798 Km (47 per cent) • State Roads 5,343 Km (53 per cent)

Source: Ministry of Development of NER (MDoNER).

Table 6.4
Progress of SARDP-NE, February 2013

ITEM	PHASE A	ARUNACHAL PACKAGE	TOTAL
Total Length	4,099 km	2,319 km	6,418 km
Works Sanctioned/ Awarded	3,771 km	1,332 km	5,103 km
Works Under Tendering/ Approval	388 km	79 km	467 km
Works Under Tendering/ Approval	388 km	79 km	467 km
Roads Completed	1,062 km	40km	1,102 km
Target for Completion	March 2015 (for ongoing works)	June 2016 (for awarded length)	

Source: MDoNER.

The lengths to be constructed /upgraded and their coverage in phases have repeatedly undergone changes due to intermittent request from state governments and other quarters. Table 6.3 and 6.4 show the components and the progress of SARDP-NE as of February 2013.

The development status as per the most recent update is,

- Detailed Project Reports (DPR) are under preparation for about 13 per cent of the proposed roads for Phase A and the Arunachal Package.
- About 10 per cent (1,102km) of the total length has been completed
- Phase B is approved only for DPR preparation and not investment.
- In 2012-13, 300 km expected to be constructed and 1,980 km awarded.

Overall progress has been quite slow, with largely pre-construction activities being undertaken as of now. Given the pace, SARDP-NE is expected to be completed not earlier than 2020. Figures 6.6 and 6.7 show roads under SARDP-NE for Arunachal Pradesh and the East West Corridor respectively.

EAST WEST CORRIDOR

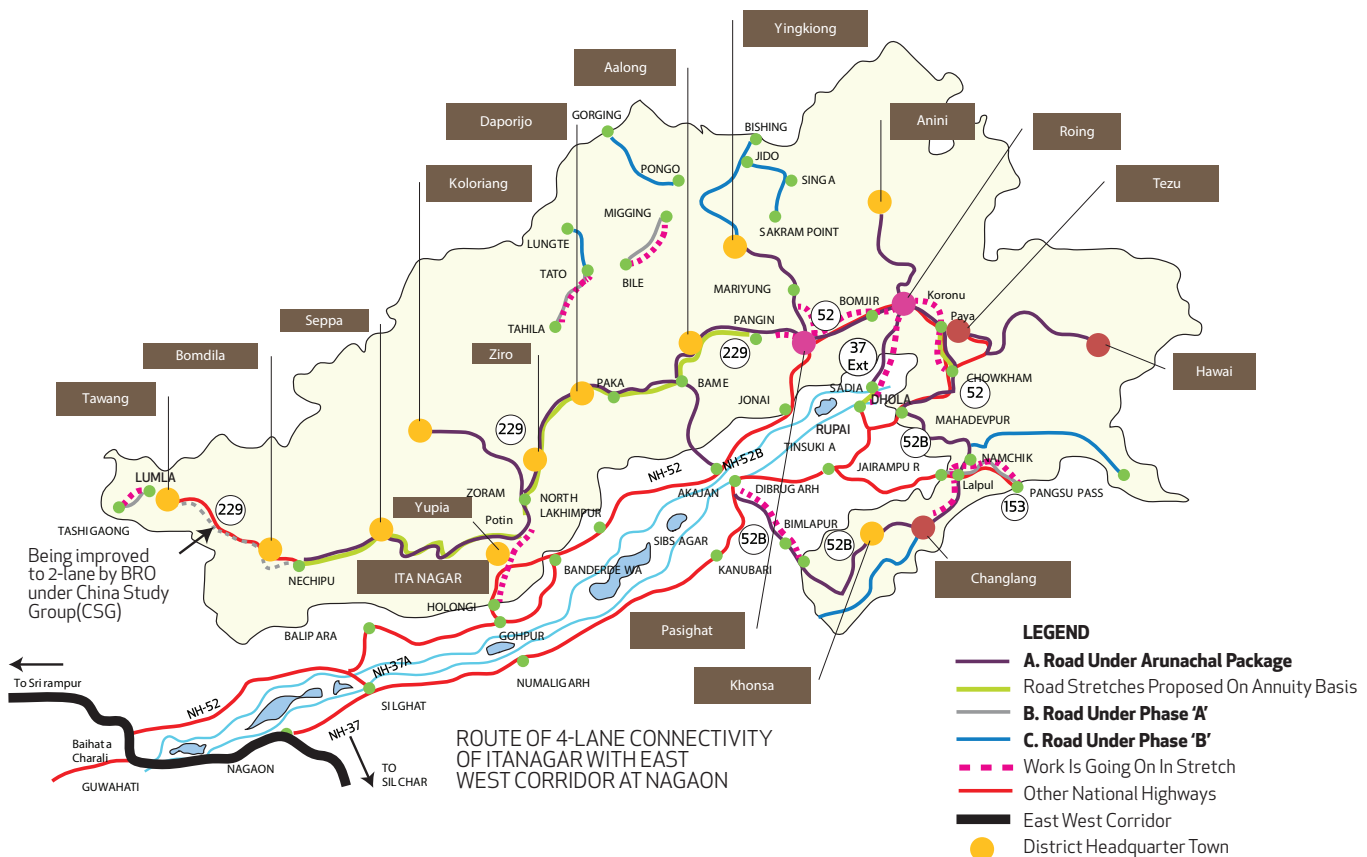
Apart from SARDP-NE, the NHAI is implementing the four-laning of 672 km of the East West Corridor from Srirampur (Assam/West Bengal border) to Silchar in Assam, and the two-laning with paved shoulders from Jowai to Rattecheria (104 km) in Meghalaya under NHDP-III. The corridor is estimated to be completed by December 2014.

PRADHAN MANTRI GRAM SADAK YOJANA (PMGSY)

PMGSY, a flagship programme of the government being implemented and monitored by the Ministry of Rural Development, takes care of rural connectivity and has specific provisions to take care of the sparse population and hilly terrain of the NER and border blocks. For the in-between roads, Major District Roads (MDR), Other District Roads (ODR), inter-state roads and other urban roads, there are funding windows through different ministries.

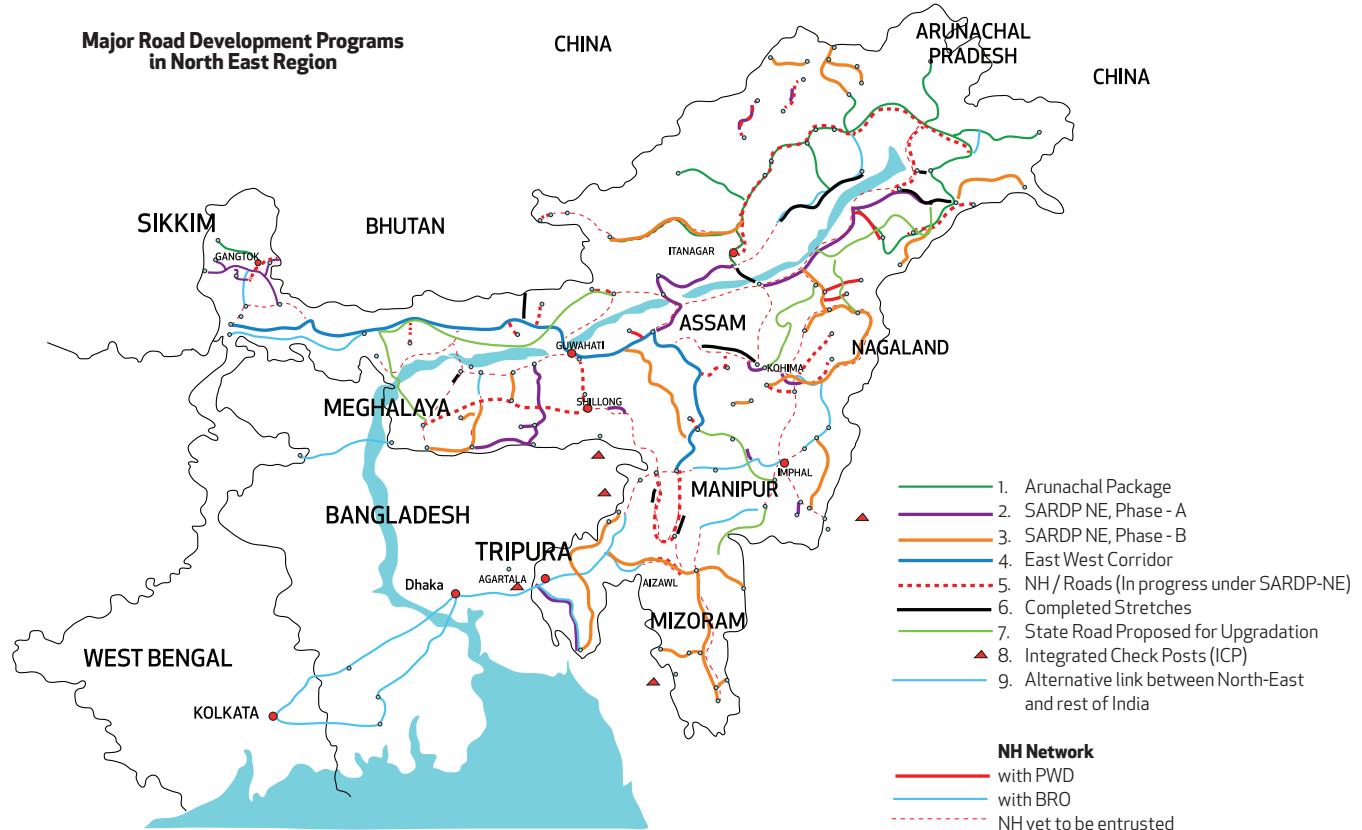
Table 6.5 presents the progress as of February 2013. By February 2013, 11,996 habitations out of the total 17,486 eligible have reportedly been sanctioned, while 9,511 (54 per cent) of the habitations have been

Figure 6.8
Roads Covered for Improvement in Arunachal Pradesh under SARDP-NE



Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Figure 6.9
East West Corridor: Existing Roads Being Upgraded to 2-Lane or 4-Lane



Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Table 6.5
Pradhan Mantri Gram Sadak Yojana in the North East, February 2013

	ELIGIBLE	DPRs CLEARED	CONNECTED
No. of Habitations	17,486	11,996	9,511 (54 per cent)
		SANCTIONED (UPTO FEB 2013)	COMPLETED (UPTO FEB 2013)
No. of Road Works		9,401	6,679 (71 per cent)
Length of Road Works (in km)		39,674 Km	31,236 Km (79 per cent)

Source: MDoNER.

connected. PMGSY is expected to connect all the remaining eligible habitations by 2020.

DEVELOPMENT STATUS

The road network per capita is significantly higher in the NER relative to the rest of the country, given the hilly terrain and the low density of population. However, a more accurate indicator of the ease of movement of passenger and freight traffic, the road length per unit area, is higher only in Assam, Nagaland and Tripura, and not in the other hill states. It is again easy to conclude that road infrastructure is still relatively deficient in the NER states.

NATIONAL HIGHWAYS

While overall road density (km/100 sq km) of the region may be lower than the national average, the length of National Highways in the NER for a given area as well as population, is much better than rest of India (Table 6.6).

The progress and latest available status for some of the major programmes for NH development is placed in Table 6.7.

STATE HIGHWAYS, INTER-STATE ROADS, MDRS & ODRS

These are financed from a wide variety of projects and schemes of different ministries/ departments and the states' Plan funds. Many of these roads are not new alignments but existing roads that have deteriorated, requiring necessary maintenance and upgradation. As availability of funds for maintenance is considerably poor, maintenance being a non-Plan activity, existing roads are improved under Plan funds. This issue has been discussed later in the chapter.

STRATEGIC AND BORDER ROADS BY BRO AND OTHER AGENCIES

The Government of India has also embarked on an ambitious plan to construct strategic roads in border

areas on the Bangladesh, Bhutan, China and Myanmar border in the About 9,302 km of roads are being constructed for strategic reasons by Department of Border Management.

This will greatly add to the stock of roads in the NER and serve the needs of the local population in addition to strategic needs. For obvious reasons, the details are not discussed here. However, it is recommended that the present organisational shortcomings afflicting the Border Roads Organisation which plays a very major role in the NER should be addressed by the Government at the earliest.

Overall, while major road programmes are being undertaken in the NER, the pace is a concern. The completion of these, particularly SARDP-NE and the East West Corridor, will significantly improve the quality of road connectivity. At the same time, PMGSY implementation needs a significant push.

KEY ISSUES

While substantial investments for roads have flowed into the region, issues such as road network planning, maintenance, creation of human capital, augmenting machinery, and process improvement have not received required attention. The emphasis has largely been on sanctioning new roads, neglecting maintenance of the existing ones, an undesirable situation further exacerbated by the languid approach often leading to serious time and cost overruns.

The need to establish a connection with the rest of India following Partition, the Chinese aggression, economic development, and trans-border connectivity are some of the main drivers which have been impelling the Central Government to construct roads in the region since Independence. However, impediments such as terrain and climatic conditions, insurgency, and mismanagement of resources have been key constraints.

Table 6.6
National Highways: The North East and All-India

TOTAL NH LENGTH	76,818 KM	
IN NE STATES	9,525 KM (12.40 PER CENT)	
	ALL INDIA	NE REGION
Km / 1000 sq.km	23	39
Km / Million population	75	600

Source: Ministry of Development of NE (MDoNER).

Table 6.7
National Highway Development Programme (NHDP)-I, & III

PROGRAMME	STRETCH	LENGTH	STATUS
NHDP-II (NHAI)	East-West Corridor (only in As-sam, from Shrirampur to Silchar)	670 Km	Completion likely by March, 2014 after many missed deadlines
NHDP-III (NHAI)	Jowai (Meghalaya)/Ratachhera (Assam Border)	102 Km	Work awarded in March, 2012

Source: Ministry of Development of NE (MDoNER).

RECOMMENDATIONS

Road connectivity has to be essentially planned at four levels:

- Connectivity within each state
- Intra-regional connectivity
- Connectivity to rest of India
- Connectivity to neighbouring countries

The section attempts to make recommendations with that broad objective while drawing on the existing gaps and prevalent issues in the NE.

INFRASTRUCTURE

A. Strategic

- With the expectation of continuing containerisation in the country, it is advisable to upgrade all district headquarters in the plains areas to become container transport-compatible. In addition, all points of international access in Arunachal Pradesh (Pangsau Pass), Manipur (Tamu-Moreh), Mizoram, (new point at Zorinpui), Agartala (Sabroom and Akhaura) and Meghalaya (Dawki and Mahendraganj) should also become container-compatible.
- Four-lane access to all state capitals in the North East needs to be ensured.
- Development of an alternative highway alignment linking West Bengal and Bangladesh through the Hili-Mahendraganj Corridor and the Kolkata-Bashirhat-Khulna Corridor needs to be undertaken.

- Development of modern highways using tunneling and bridging techniques to connect Gangtok with Siliguri and Imphal with Kohima and Silchar so as to reduce transit time and minimise environment damage.

B. State Connectivity

- Upgradation of Standards for State Highway and District Headquarter Link Roads

The standard of roads being built to link the district headquarters under the SARDP-NE should be gradually raised so that the container load can be carried in the plains districts of Assam and also to important transit points like Dimapur in Nagaland and Itanagar in Arunachal Pradesh. For these main state highways, standards similar to National Highways should be prescribed, viz. the formation width of 12 mt with carriageway of 10 mt. and radius of curvature of 12 mt to facilitate movement of large containers.

- Connectivity between State Capitals and the NHDP

As a first step, each of the state capitals needs to be linked to the expanding highway network being developed under the NHDP. At present, only Guwahati is linked to the East West Phase-II of the NHDP, and Kohima is

being linked by four-lane highway too. It will be built from Daboka, on the East West Highway as a spur to Dimapur and then upto Kohima. Shillong will have four-laning access only from Barapani while district headquarter Jowai in Meghalaya will have a full four-lane highway linking it to the main National Highway. Similarly, the three southern states of the North East will have problems of last-mile connectivity. The closest four-lane highway for Imphal will be in Aizawl, Kohima and Siliguri. For Mizoram, it is through the proposed four-laning of the Siliguri-Kolasib highway which has not yet been sanctioned. There is no planning for any four-laning in the ghat sections of Mizoram. Similarly, Agartala will have a four-lane highway upto Silchar/Karimganj and thereafter traffic will run on a two-lane highway. Itanagar is being connected by a four-lane spur.

iii. Connectivity to and from the States

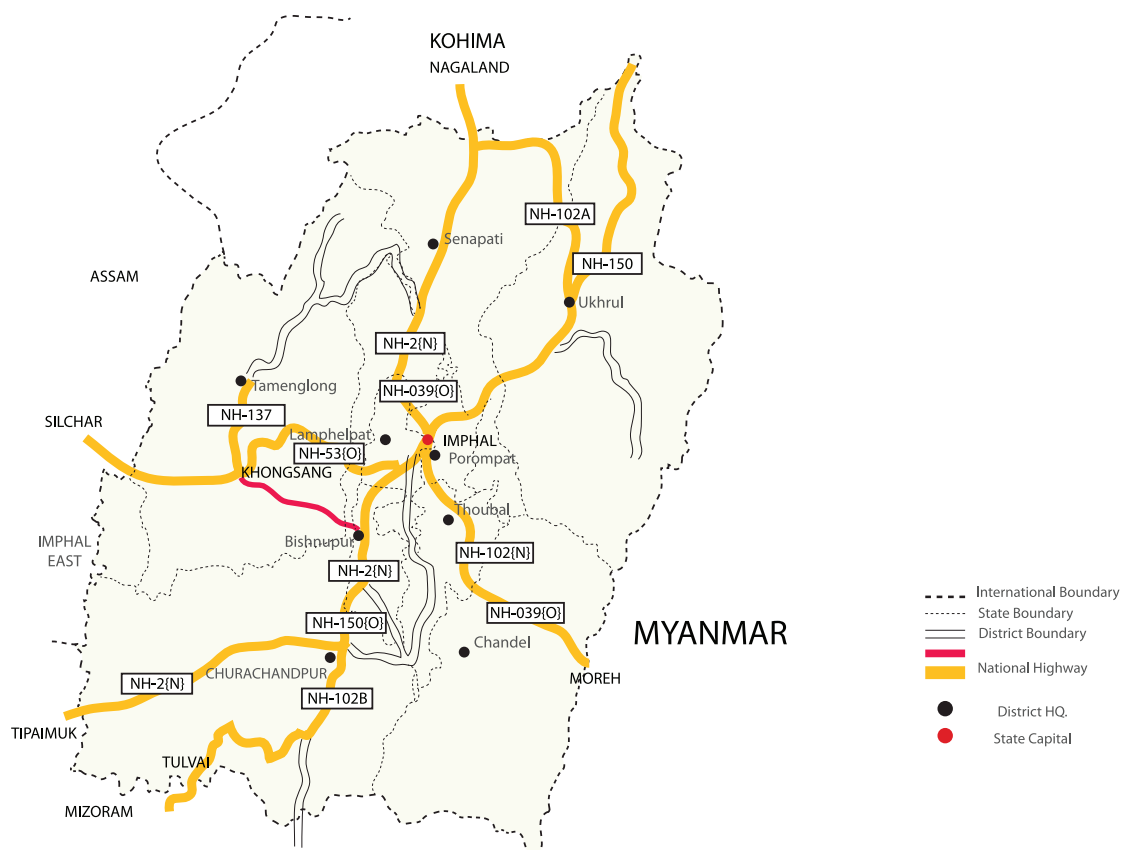
Manipur

At the moment, Manipur deserves the highest priority for four-laning since it is a major security area and it has the worst road connectivity on account of frequent blockages on the approaches to the National Highway.

Four-laning is necessary to ensure that goods can reach cheaply, quickly and safely and the exorbitant flight tariffs being charged come down to a reasonable level. In view of the special problems of Manipur, we suggest that four-laning be done in two phases; firstly the Kohima-Imphal route () which plies through districts inhabited by Naga tribes and secondly the Silchar-Imphal route. The Silchar-Imphal route involves crossing of six bridges and five valleys and low-altitude hill ridges. In view of the strategic importance of Imphal, we recommend that the MoRTH construct a four-lane highway using the method of tunneling through the ridges and building bridges across the valley. Similarly, a tunnel through the main Kohima peak would ensure spur access from the Dimapur-Kohima highway to the Manipur Valley. The highway from Imphal upto the border at Moreh-Tamualso needs to be four-laned since this is part of the Asian Highway No 1 proposed by UNESCAP and ADB and to which India is a signatory. The Tamu-Moreh border will be the main entry point for all roadborne traffic entering India from the ASEAN countries and we should aim that the goal of the Asian Highway No 1 needs to be an international standard (see Figure 6.10).

Figure 6.10

Road Map of Manipur: Select National Highways



Source: MoRTH.

Nagaland

While at the present moment international trade through Nagaland might be negligible, but bearing the latent potential in mind, the MoRTH should prepare project reports for any future border crossing which the Nagaland Government may wish to pursue.

Mizoram

For Mizoram, four-laning upto Aizwal is both commercially and politically necessary. It is also recommended that four-laning of the highway upto the Indo-Myanmar border at Zorinpui (see Figure 6.11) is necessary to have seamless linkages to the Kaladan Multimodal Project. This will provide a secondary access to India from the Myanmar side and will enable better utilisation of our existing investment in Kaladan. Mizoram should be considered as being a gateway state along with Manipur as far as international trade is concerned.

Tripura

The third gateway state for the North East could be Tripura which rests upon the success that we can achieve in our negotiations with Bangladesh on access to Chittagong. Four-laning is needed right from Sabroom on the southern tip of Tripura to the main East West Highway in Silchar. Such a strategic link could enable the North East to avail of entry points in Myanmar and Bangladesh depending on prevailing political relations.

Sikkim

Sikkim suffers from relative geographical isolation. We recommend that the main highway from Siliguri to Gangtok be reconstructed on a new alignment using modern method of tunneling and bridging of valleys in contrast to the trans-alignment with hill hugging routes. We should aim to reduce the transit time between Gangtok and Siliguri to about three hours by road. A road built using tunnels and bridges will provide all-weather access

Table 6.8 is a listing of roads essential for inter-state connectivity in the NER.

C. NER-India linkage

i. Importance of Proposed NH 31D (Salsalabari-Ghoshpukur near Siliguri)

A discussion on the road network in the North East inevitably requires attention to the delays in constructing National Highway 31D. This alignment is from Salsalabari to Ghoshpukur (near Siliguri) on the Assam-

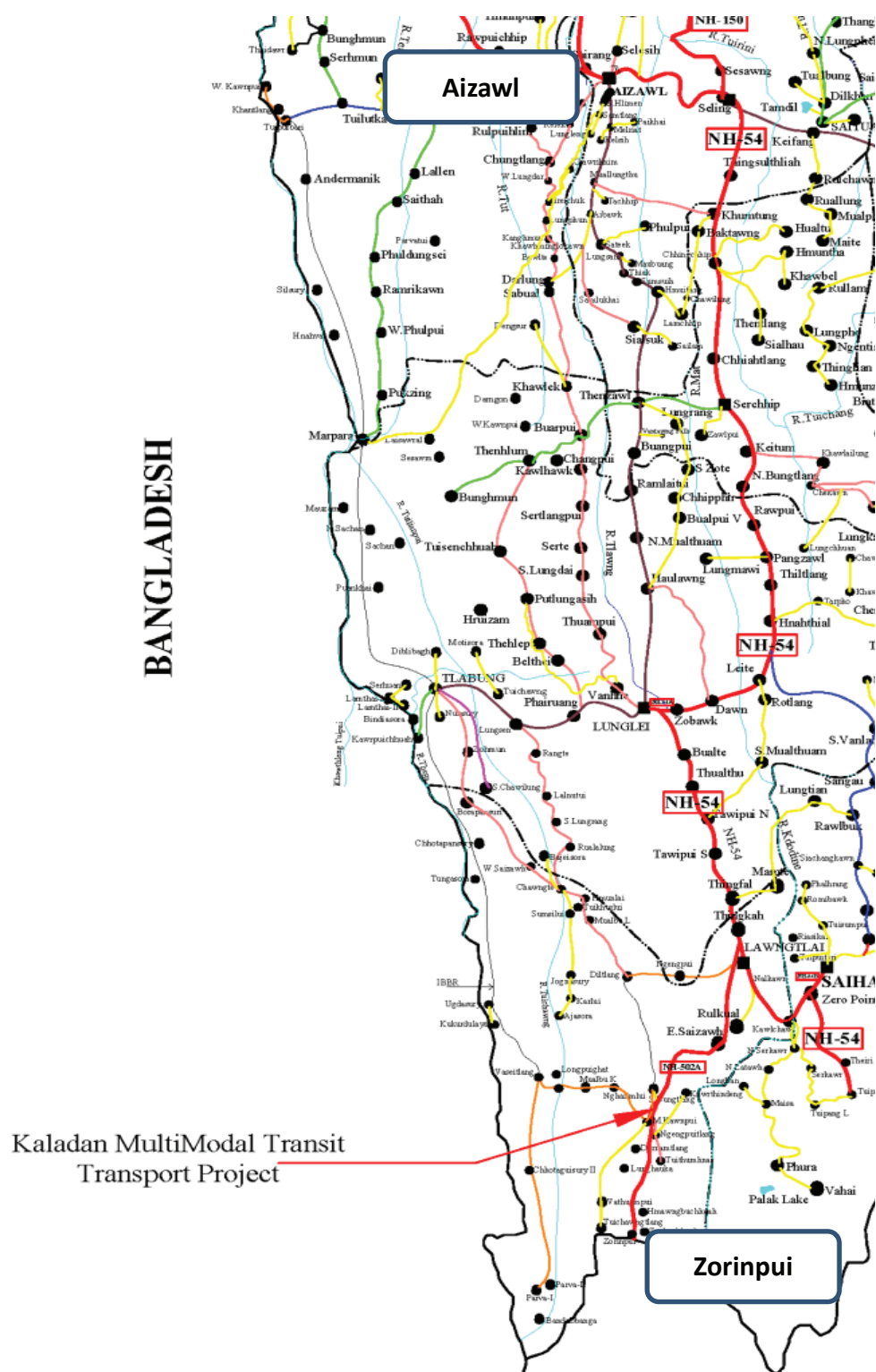
West Bengal border. For a length of 163 km, the new alignment is on the southern side of the North Bengal Corridor. In view of the anticipated growth of trade in the North East, it is possible that this strategic highway will have to be six-laned in the near future. As it stands now, it is understood that strong support of the government of West Bengal shall be required for acquiring the land in North Bengal. Since this is a project of national importance which links the entire North East with the rest of the National Highway network, special effort has to be made at the political level to ensure that this vital link is created and maintained.

ii. Alternative link between North East and Rest of India

At the same time, development of alternative routes from the North East to West Bengal should be encouraged so that the NER cannot be isolated during any future hostility or adverse weather conditions. Asian Highway No 1 enters Bangladesh from Dawki on the Meghalaya-Bangladesh border. However, the closest approach from Meghalaya to West Bengal is on the alignment Mahendraganj to Hili which is slightly over 100 km. It is possible that the Bangladesh government might permit India to access this route by linking it to the job of connecting Sylhet with Rangpur in Bangladesh. Such an action will be possible only with a major bridge over Padma (probably Sirajganj) and Brahmaputra. This bridge could simultaneously be used for development of Hili to Mahendraganj route to Meghalaya. The development of the project report for this is strongly recommended.

The third possible route would be through southern Bangladesh from Dhaka to Kolkata. The present trans-border arrangement is a long NH35 through the Benapole-Petrapole border crossing connecting Jessore with Kolkata. However, there have been requests from Bangladesh Chambers of Commerce for a connection from Khulna to Kolkata on the South Eastern side of Kolkata through the India-Bangladesh border near Bashirhat. Such a connection would also enable industry and commerce to benefit from an alternative port in Mongla, Bangladesh, which lies the south of Khulna. This would help to boost trade in the Greater Kolkata area. Bangladesh might also be persuaded to extend Agartala-Dhaka-Kolkata connectivity through Jessore or Khulna if India undertook major highway construction in the southern part of Bangladesh.

Figure 6.11
Aizawl-Zorinpui [on Mizoram-Myanmar Border at the Tip of Kaladan Project]



Source: MoRTH.

Table 6.8

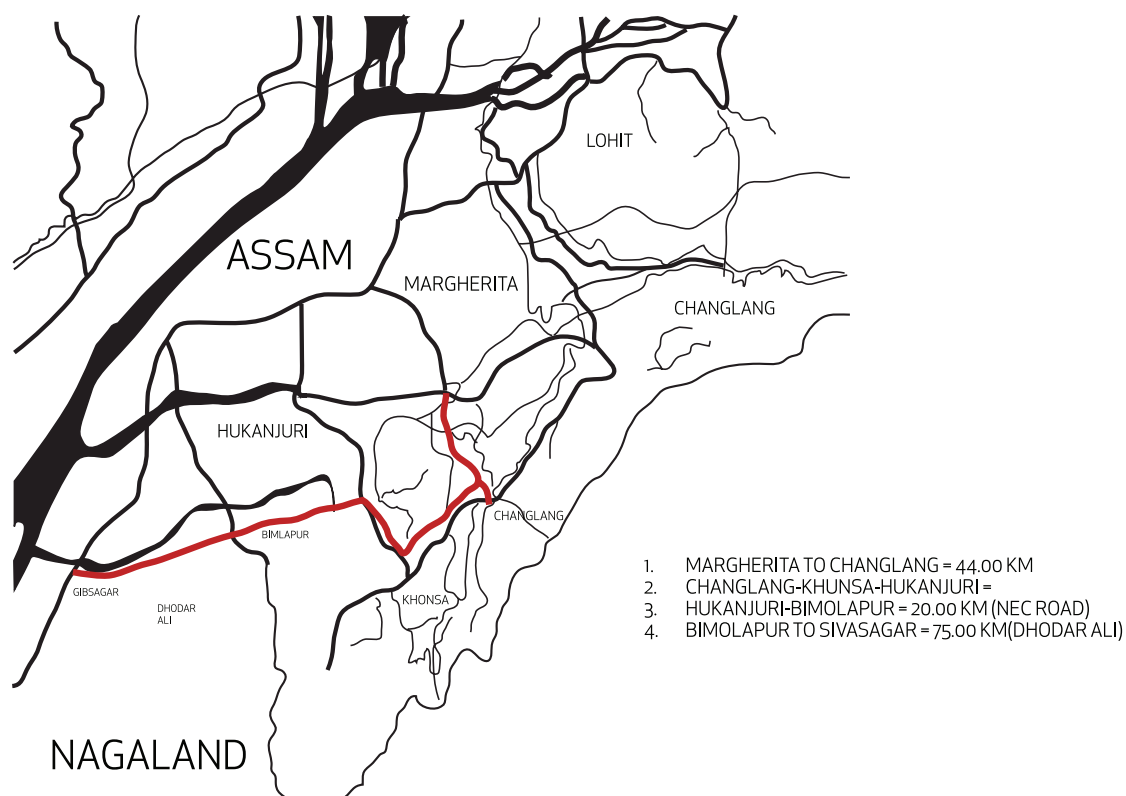
Roads Essential to Provide Inter-state Connectivity and Connectivity to Backward and Border Areas

STATE ROAD PROPOSED FOR UPGRADATION	STATE	LENGTH (KM)
Margherita-Changlang-Khonsa-Hukanjuri-Sibsagar (see Figure 6.12)	Arunachal Pradesh and Assam	130
Rowta (NH-52)-Udalgiri-Tamulpur-Jala-Goverdhan-Kajolgaon (NH-31)-Srirampur	Assam	406
Chumukedima-Shedhumi-Niuland-Ralan-Sanis-Bhandari (Merapani) - Longtho-Longehem-Tuli (foothill road)	Nagaland and Assam	250
Tenglong to Sesenpur, via Khongsang and Rengpang	Manipur	133
Churachandpur-Singhat-Sinzawl-Tuivai Road-Mizoram border, via Ngopa (see Figure 6.3)	Manipur and Mizoram	340
	Total length	1,804

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

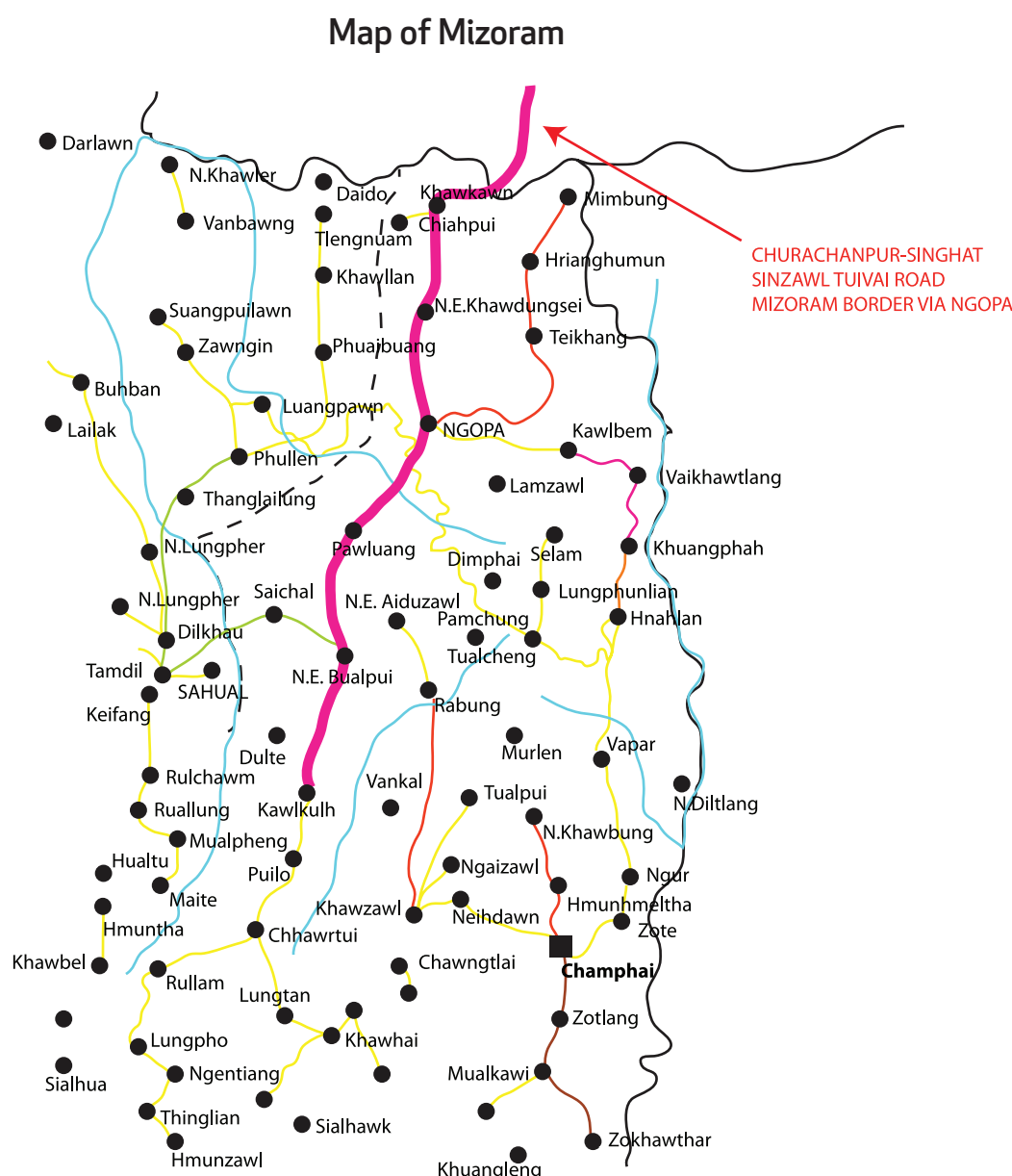
Figure 6.12

Margherita to Sivasagar



Source: MoRTH.

Figure 6.13
Churachanpur to Mizoram Border via Ngopa



Source: MoRTH.

D. Roads for Diverse Objectives

Development of roadwork for the following purposes needs more attention than is being given:

- i. For evacuation of agricultural and horticulture products and other natural resources. The economic development of the NER will come from the growth in the agriculture sector (particularly horticulture, floriculture, bamboo), services sector and the natural resources of hydropower, tea, oil, limestone and coal. Evacuation of these products from their source of origin/ manufacture/ cultivation has to be planned by road or rail and inland waterways (air for highly perishable flowers).
- ii. For evacuation of commodities, the development of the railway sector and inland waterways is critical. As there is intense pressure for road development to connect human habitations that are sparsely distributed in the region, agriculture link roads to evacuate agro-products to the nearest market does not get the required importance.
- iii. It is recommended that serious thought be given to developing network of agriculture link roads to the nearest mandi/ market for movement of agriculture/ horticulture produce. Area under horticulture has increased in the NER due to the interventions made under the Horticulture Mission of the Minis-

try of Agriculture. Production of cereals has also increased in recent times in the plains areas of Assam. For the creation of a robust market economy, a network of roads to carry agriculture produce is essential. As road projects are generally selected on the basis of pressure from different sections, agriculture link roads do not have any constituency and hence are not pushed.

E. New Technology: Bridges, Tunnels, Geo-textiles, Bio-engineering

- i. **Bridges** are numerous in the North East. There is a large requirement for semi-permanent timber bridges to be converted to brick and mortar or iron and steel bridges. Technology for laying bridges quickly and at a low cost has to be promoted. Technology of Bailey bridges has improved recently; this should be used for North East. For interior areas, suspension bridges should be promoted. These are low-cost and can be installed quickly. Steel girder bridges can also be promoted. They are also earthquake resistant.
- ii. **Tunneling:** Emphasis is needed on tunneling to reduce the length of roads. In snow-covered areas, tunneling should be used to reduce the length of the road exposed to the elements. Tunneling will also result in generation of gravel of which there is a shortage in North East. More tunneling will reduce cost and distances, and be environment-friendly.
- iii. **Two-lane roads:** In place of four-lane roads, preference may be given for construction of two-lane roads suitably located on either side of the hill slopes. This is preferable because in hilly areas, two-lane roads will involve less earth-cutting and these two roads could be used separately for two directions.
- iv. **New Materials:** The terrain and topography of the North East lends itself to increased use of new material such as geo-textiles and innovative methods to use local material such as bamboo through bio-engineering. The Ministry of Textiles is trying to promote the use of geo-textiles in the NER. The state governments and MoRTH should take up visible pilot projects to promote the use of new materials such as geo-textiles. The World Bank road project in Mizoram has effectively displayed use of bio-engineering using bamboo to prevent landslides. These efforts can be expanded in other areas as well. Further, use of appropriate technology for the construction in heavy rainfall area needs to be introduced in the field. The introduction of new technology could involve additional cost than traditional

methods therefore decision on financing such technologies needs to be taken at appropriate level.

- v. **Suspension Bridges:** Under PMGSY, there is no provision for rope bridges/ suspension bridges that are suitable for a region with scattered rivulets. We strongly recommend that rope bridges and Bailey bridges be included in PMGSY guidelines for the NER.

F. Maintenance

Maintenance is a major bugbear in the NER. It is cost-intensive due to heavy rainfall and nature of terrain, and availability of non-Plan funds is never sufficient for maintenance. The general tendency is to build – neglect – rebuild in the garb of expansion. Unfortunately, the cost of poor maintenance is borne by the user and the people, reflected in the high rates of accidents and the low user life of vehicles in the NER. Due to poor conditions of roads, buses and trucks are rendered unusable after four years, whereas in the rest of the country, heavy vehicles and trucks can be used for at least 10 years. In short, while maintenance cost of vehicles is high, commercial lives are much shorter. Multi-axle vehicles cannot ply beyond Guwahati due to inadequate road capacity. While these conundrums exist, growth in the number of commercial vehicles in the North East has been much (about 50 per cent) higher than other parts of India even with the current slowdown. Thus, maintenance and improvement of roads acquires immense importance. The following is recommended to address the issue:

- i. Use higher quality standards for construction of roads, so that maintenance needs are lower.
- ii. Much higher allocation for maintenance and professional management of maintenance.
- iii. A policy decision to cover maintenance expenditure under the plan needs to be taken.
- iv. Maintenance by contractors for first five years after the construction should be in-built into the road contracts. Subsequently, the state government should prepare a master plan for maintenance, based on which funds shall be allocated and released by the agencies for blocks of five years. Overall accountability should be with the PWD for general maintenance and they have to be equipped financially and operationally to do so.
- v. Promote concept of Performance Based Maintenance Contracts for three to five years. Start with roads receiving WB/ ADB or GOI assistance under SARDP-NE programmes.
- vi. Establishment and management of a dedicated Road Maintenance Fund.

The rainy season in the North East ranges from six to eight months. Engineering and project management strategies have to be created around the difficulties that Nature presents.

INSTITUTIONAL STRENGTHENING

A. New organisational structure

In the hierarchy of roads, National Highways are at the top and PMGSY is at bottom of the pyramid. There are village roads, forest roads, roads in small towns which are the responsibility of the panchayats/ local bodies/ forest department / nagarpalikas etc. In between are a slew of state highways, MDRs, ODRs which form the backbone of the transportation sector. Many of the MDRs are also inter-state and inter-district roads. These are funded by various agencies of the Central Government under different schemes, untied funds and also Special Plan Assistance (SPA)/ Additional Central Assistance (ACA) from the Planning Commission. The implementing agencies are NHAI, BRO and state PWDs and local bodies.

BRO is beset with several organisational issues and its performance on critical roads draws the displeasure of state governments at times. BRO works in the most difficult conditions and has very little autonomy. As BRO is entrusted with many important roads other than strategic GS roads, issues afflicting BRO should be addressed to enable the organisation to perform its role.

There is an urgent need to strengthen the capacity of the state construction agencies. At the same time, the quality of roads in the NER and their timely implementation cannot be allowed to suffer while the capacities of state PWDs and other agencies are built. Roads are the backbone of this region. The whole process of building them right from the stage of conceptualisation to preparation of DPR till maintenance needs overhaul.

In order to address the constraints, a new institutional structure for the road sector for the NER is recommended, which would provide technical support and guidance to the state governments without impinging on the autonomy of the states.

Two models that appear appropriate for such an institution to draw on are:

a. Pradhan Mantri Gram Sadak Yojana (PMGSY)

The PMGSY implementation model is working well in creating good quality roads in rural and interior areas. Another body to assist the state governments in the road sector (apart from the PMGSY roads) covering state highways, MDRs, ODRs, inter-state roads, etc, with technical and managerial inputs should be set up whose structure could be drawn on lines of

the PMGSY arrangements. The advantage of the PMGSY model is that of clear demarcation of roads under the Centre and state, together with strict standards of DPR preparation, bid documents, bidding transparency and robust MIS.

b. Joint Assistance to Support Projects in European Regions (JASPERS) in the European Union.

JASPERS provides technical expertise to the 12 Central and Eastern EU Member States: Greece, Croatia, Serbia, Montenegro and former Yugoslav Republic of Macedonia, for any stage of the project cycle from the early stages of project conception through to the final application for EU funding. The assistance is provided free of charge and is geared towards accelerating the absorption of the available funds. A JASPERS-like organisation should be made available for providing technical assistance to the NE States. It will work in close cooperation with the states to produce accomplished project proposals which will meet parameters required for funding by different sources. Manned by technical experts, it will provide assistance for any stage of the project cycle from the early stages of conception through to implementation and maintenance.

Such institutional structure may be established under the administrative control of Ministry of DONER. This model, combined with the GIS database that has also been proposed, has the potential of vastly improving the way roads are conceptualised, designed, plans prepared, bid evaluated and awarded and finally maintained. This organisation can be christened as NER Road Development Authority (NERRDA).

B. Capacity building

Investments in roads are increasing but there has been no corresponding assessment of the capacities of the PWD, BRO or other agencies to cope with the increasing burden. It is of urgent importance to build capacity of state PWDs, central agencies and contractors.

Training

- **Capacity building of Road Building Organisations** State PWDs possess a wealth of good engineers having local knowledge base. However, their exposure to good national/international practices is weak. DONER, with support from MoRTH and Indian Academy of Highway Engineers, has taken some initiatives to provide training to staff at various levels and in various aspects of planning, design, project management, maintenance,

dispute resolution, quality assurance. These initiatives need to be strengthened considerably and training programmes be designed to upgrade existing capacity over the next 10 years.

- **Central Research Institutions:** Institutions such as Central Road Research Institute (CRRI) under CSIR and Indian Academy of Highway Engineers should take more interest in the NER and evolve technology and management solutions for the region. They should design a programme for regular interaction with the State PWDs.

Further, the CRRI and CSIR should set up a dedicated road research and development institute in the North East to deal with NER-specific technology issues.

- **Contractors' Associations:** Supporting the contractors' associations in establishment of an academy of construction on the lines of National Academy of Constructions (NAC), Hyderabad, in the NER, for delivery of training to construction workers and equipment operators. Linkage with ITIs and polytechnics should prove helpful for geographic spread in the region.
- **Engineering Colleges:** The capacity of engineering colleges in the region to train civil engineers needs to be enhanced. Besides the IIT at Guwahati, there are two state engineering colleges in Assam (Guwahati and Jorhat), and National Institutes of Technology in Agartala, Silchar and Dimapur. There is also NERIST in Itanagar. In the interest of the region, an assessment of the number of civil engineers that the region needs should be done, and consequent action taken to ensure a quality supply of engineers.
- **Training & capacity building at levels below Junior Engineers.** Start courses on road technology in polytechnics which will create a steady supply of trained manpower.
- **Project development and Bid Process Management**
 - Preparation of DPRs (often project costs have to be enhanced as DPRs are not prepared properly). Ideally, preparation of quality DPRs can mitigate problems in implementation. If DPRs are made correctly and pre-construction activities duly completed, the project completion time will be certainly reduced.
- There is a need for improvement and standardisation of:
 - Bid documents
 - Evaluation of bids
 - Drawing up of contracts
 - Implementation, supervision
 - Quality control (lack of laboratories for quality control)
 - Transparency

Lack of equipment Presently it appears that there is no major dearth of equipment for bigger road contracts for NHAI or SARDP-NE roads. Big contractors are attracted towards the NER to the large contracts being awarded now on EPC basis by NHAI and MoRTH for SARDP-NE and East West Corridor. However, for the lower order roads, even state highways and PMGSY packages, local contractors still do not have adequate equipment available. Big contractors coming from outside into the NER are generally not interested in the smaller packages even if the few roads are bundled together in a single package.

A proposal for an Equipment Bank had been mooted few years ago by North Eastern Development Finance Corporation Ltd (under Ministry of DONER), Guwahati. The proposal could not go far due to lack of land. We suggest that state governments, NEDFi or any other agency (including private players) set up Equipment Banks at different locations in the NER.

Air connectivity can fill in to a significant extent the need for intra-state connectivity and the region's linkage to the mainland.

C. Strengthen Project Management

The rainy season ranges from six to eight months. Project management strategies have to be created around the difficulties that Nature presents. The high incidence of rain in the region is a fact of life, and engineering and project management solutions need to be developed to cope with this problem.

A vicious circle of delays and non-completion of projects is created in the following way:

- Due to large amounts being invested in the road sector, the number of projects being sanctioned by different central agencies and state governments is increasing.
- Owing to the internal weaknesses, projects are not completed in time. Utilisation certificates are not submitted in time. On the other hand, funding agencies sanction new projects more as a means to absorb their allocations rather than on pure merit. States are also happy to get new sanctions which appease various interests which espouse one road or the other. Ultimately, the bunch of incomplete projects gets inflated with large committed liabilities. Construction of roads is sometimes treated as a means of distributive justice and not as projects that need to be professionally managed. There is little effort to develop contracting capacities. In certain cases, construction of a 30-km road has taken as long as six years, with work having been divided in 25-30 parcels.

Table 6.9
Traffic Trends in the NER

	AIRCRAFT MOVEMENTS		PASSENGERS		FREIGHT (IN TONNES)	
YEAR	NO.	PER CENT CHANGE	NO. (IN MILLION)	PER CENT CHANGE	NO.	PER CENT CHANGE
2004-05	33,019	4.5	1.45	10.8	10,304	13.4
2005-06	34,036	3.1	1.62	12.0	11,006	6.8
2006-07	42,069	23.6	2.27	40.2	9,836	-10.6
2007-08	55,471	31.9	2.86	25.9	11,260	14.5
2008-09	58,843	6.1	2.98	4.1	13,346	18.5
2009-10	62,307	5.9	3.63	21.8	18,947	42.0
2010-11	67,393	8.2	4.51	26.5	24,087	27.1
2011-12 (Provisional)	70,576	4.7	5.45	18.6	23,748	-1.41

Source: DGCA's presentation for PSC, 18.4.12.

Therefore, annual capacity of state governments and implementing agencies should be assessed and combined with strict monitoring such as testing laboratories. Quality control facilities are also, at present, quite poor.

D. Leveraging Information Technology

GIS Database

Creation of centralised database of road assets accessible to the public based on GIS or any other suitable technology is a must. This will prevent duplication of proposals for upgradation/ maintenance of same roads to different agencies, create transparency and help in proper monitoring. All state governments and agencies must participate in the centralised database system. It will involve massive data entry as data is available at Executive Engineer or SDO, PWD level. However, such a database combined with a GIS map will be of immense help in policy planning and monitoring. It can and should be even made open to the public as a stakeholder.

It is recommended that DONER, Department of Information Technology, and MoRTH consider this proposal in right earnest. It might require some time, funding and concerted effort, but the outcome shall be worthwhile.

E-governance in State PWDs

None of the state governments including Assam have embarked on serious use of e-governance, e-tendering, e-procurement and comprehensive computerisation of the PWD to improve their project management. A quick survey of the websites of the

state PWDs shows that barring Arunachal Pradesh, Tripura and to some extent Manipur, none of the other states have a functioning up-to-date website. Use of e-governance will expand the purview of contractors taking up projects in the states. Several good models are already available which the NE States can use with their local modifications.

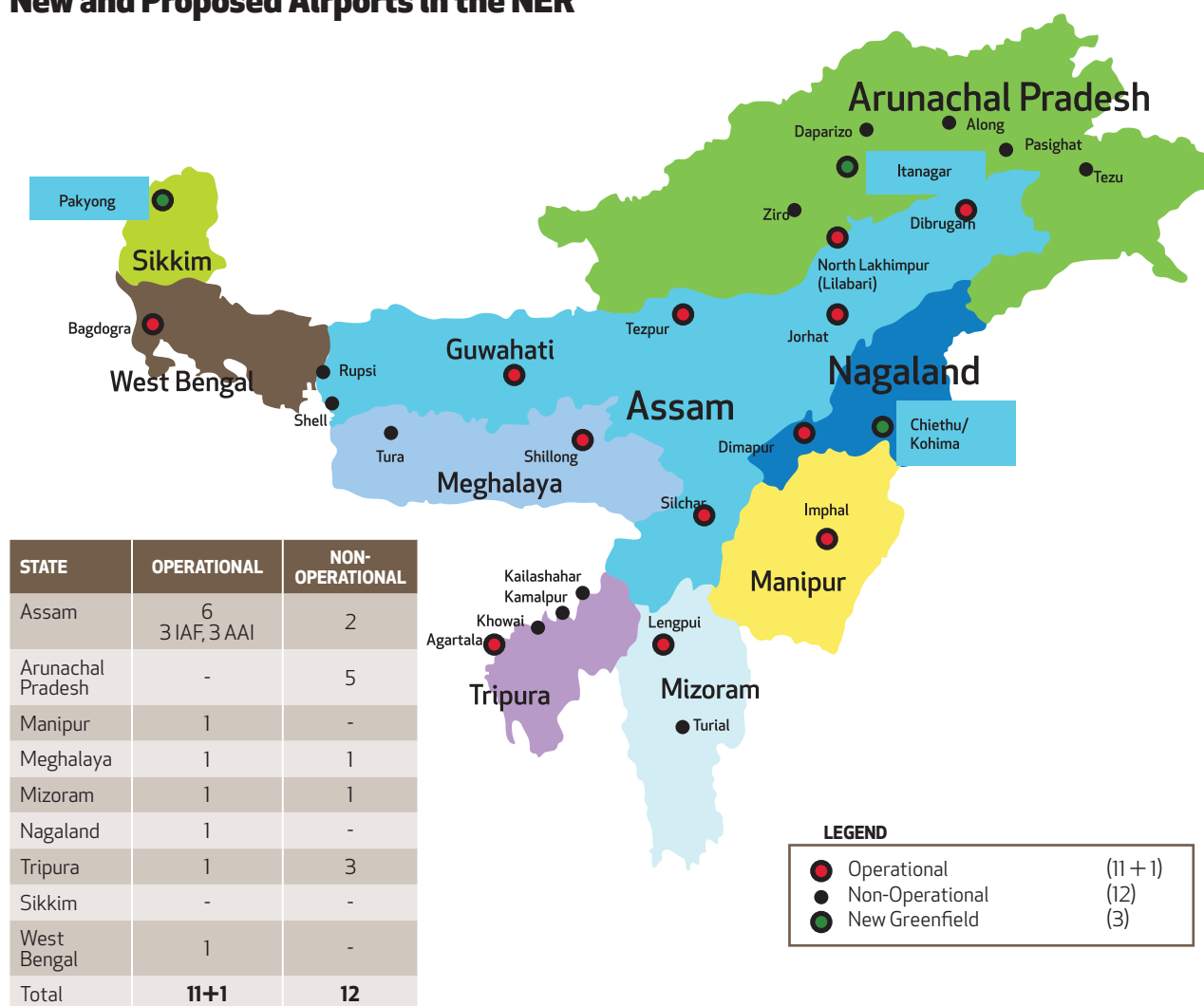
CIVIL AVIATION

Civil aviation plays a greater role in the NER than it does in other parts of the country due to inherent terrain and the physical spread. Civil aviation is more of a necessity than an option for transport needs of the NER given the topography which renders road and rail connectivity to be limited. Except Assam and Tripura, states do not have any rail connectivity. Even Tripura is too far for rail connectivity to be used for reaching the mainland. Inclusiveness of the NER with the rest of India is physically possible only through air services. Air connectivity can fill in to a significant extent the need for intra-state connectivity and the region's linkage to the mainland.

MAJOR DEVELOPMENT SCHEMES/POLICIES

The NER is dotted with airports. Some airfields are Second World War legacies reminding and reinforcing the strategic aspects of transport planning in the region. After Independence, the Ministry of Civil Aviation (MoCA) and North Eastern Council (NEC) have cooperated to develop a good infrastructure of airports. While more airports are being planned and

Figure 6.14
New and Proposed Airports in the NER



Source: Ministry of DoNER.

developed, there are areas that still need infrastructure for air connectivity.

The NER currently has 12 operational airports and the same number of non-operational airports. Efforts are being made at various levels to improve air penetration in the region. North Eastern Council, Shillong, provided Viability Gap Funding to Alliance Air, a subsidiary of Air India, from 2002 to 2011 to operate ATR-42 aircrafts in the NER to increase intra-NER connectivity, particularly to those stations where commercial services are inadequate. At present, Tezpur, Dimapur and Leelabari only have services of Air India/ Alliance Air. The funding has now been discontinued by North Eastern Council. The NEC has, in August 2013, offered viability gap funding for renewing services to these airports, along with Barapani.

ROUTE DISPERSAL GUIDELINES OF DGCA

The Route Dispersal Guidelines have been an important policy initiative of the Ministry of Civil Aviation

that has helped to increase the number of seats available in the North East. Table 6.9 shows the increase in air connectivity in the North East over the last decade after the civil aviation sector was liberalised.

SUPPORT FROM MINISTRY OF HOME AFFAIRS FOR HELICOPTER SERVICES

Ministry of Home Affairs provides assistance to NE state governments for helicopter services to facilitate transportation for general public in remote and hilly areas. It is presently given to all states except Assam and Manipur. The states have to follow a market-based price discovery system. Flying hours per annum are prescribed in the scheme. Not more than 20-25 per cent can be used by state governments for ministers and officials. The rest has to be essentially used for public transportation. MHA subsidises 75 per cent of the fare and the rest is paid by either the state government or the traveller.

Helicopter services will play an important role, especially for remote areas. These, however, are expensive. How they can be made viable is a crucial question.

c. New policy aimed at creating international and regional aviation hubs in the country²

The Government has recently cleared policy aimed at creating international and regional aviation hubs in the country. It has also approved the constitution of an Inter-Ministerial Committee under the leadership of Secretary, Civil Aviation, for suggesting various measures to overcome the bottlenecks in the development of aviation hubs at various airports in India.

The new policy not only focuses on developing global hubs in India but also on establishing domestic regional hubs to cater to the growing air traffic from non-metro destinations in remote areas, including the North East. The government is according high priority to provide air connectivity to remote, difficult and interior areas of the country, and focusing on building and modernising airports in Tier-II and Tier-III cities.

KEY ISSUES AND RECOMMENDATIONS

Air connectivity in the North Eastern States is hampered by difficult terrain and relatively low levels of economic development. Despite the important role that civil aviation can play in reducing the physical exclusion of the NER, certain issues have rendered its effectiveness to be limited. The key concerns have been with respect to:

- Need to for higher public investments for development and maintenance of airports
- Land acquisition
- Technological upgradation
- Lack of trained manpower
- Operational unviability of bigger aircrafts in some airports

As a function of one or more such issues, only 12 out of a total of 24 existing airports in the NER are operational.

Clearly, with more frequent flights in and out of this geographically difficult region, there may be considerable reduction in its physical exclusion. The development of existing airports and operationalisation of non-operational airports would not only make air links feasible between the state capitals but also with neighbouring countries. Multi-utility-based air services which enable the movement of high value cargo can also be instrumental in improving the economic vitality of the

region. Likewise, perishable agro commodities can find markets within and outside the region based on their quick and reliable evacuation through air transport. Similarly, a new policy centred around small aircraft is required to implement a hub-and-spoke model.

Supporting an active civil aviation sector in the NER shall also open up the region internationally, especially to the neighbouring countries and the ASEAN. Guwahati airport should be developed as a potential major gateway to South East Asia, both for passenger and freight traffic. However, in order to achieve the objective of uninterrupted and reliable air services and to prevent accidents, there is a need to develop state-of-art weather and navigation information systems and human resources together with the actual physical airport infrastructure.

DEVELOPMENT OF AIRPORTS

For the people of Mizoram or Tripura, travel by road upto Kolkata takes around three days for a one-way journey. Hence, civil aviation services are used more as a necessity than an option, even by common people of the NER. The situation warrants planned public investment in civil aviation to increase its reach, to deploy latest technology as well as to keep it affordable. The road sector has a fully publicly funded special road programme for NER–Special Accelerated Road Development Programme for the North East (SARDP-NE). Similarly, the national projects of the Railways are covered under the Plan funded Non-Lapsable North East Railway Development Fund of the Ministry of Railways. Therefore, it is strongly recommended that a publicly funded programme for the complete development of the airport infrastructure in the region is prepared and implemented in the 12th Plan

COST OF LAND ACQUISITION FOR AIRPORTS

In the case of road and rail sector, the cost of land acquisition is included in the project cost which essentially means that the state governments do not have to bear the cost. In contrast, the Airports Authority of India (AAI) insists on getting land from the state governments free of cost which imposes undue burden on NE States and affects the development of airports. It is recommended that land acquisition cost for civil aviation infrastructure in the NER should be borne by the Union Government.

PERIPHERAL DEVELOPMENT OF FACILITIES

Unexploited export potential of the NER is in part due to non-availability of warehouses and cold-storage facilities at airports, provision of which will attract more businesses and more traffic by commercial airline operators. Transport infrastructure investment in the North East should thus include provision of infrastructure facilities for movement of goods.

2. <http://www.thehindu.com/business/Industry/government-clears-new-aviation-policy-to-setup-aviation-hubs/article4702631>, accessed 12 May 2013.

Figure 6.15
Indicative Schematic of the Hub and Spoke Model proposed



Source: Ministry of DoNER.

AIRPORT DEVELOPMENT BY AIRPORTS AUTHORITY OF INDIA

Construction is on of airports at Tezu (Arunachal Pradesh) and Pakyong (Gangtok) along with various Advanced Landing Grounds and civilian enclaves. Developmental works in the operational airports are also being undertaken. The North Eastern Council has been assisting the AAI in development of airports in the region. This includes expansion of runways to accommodate bigger crafts, provision of night landing and instrument landing system, improvement of passenger terminals, expansion of aprons and development of city side wherever land is available. Figure 6.8 shows the operational, non-operational and new airports in the NER. The details are available in Annex 6.1.

NIGHT LANDING AND INSTRUMENT LANDING SYSTEMS (ILS)

AAI has drawn up a plan for full-scale development of civilian airports in the region. AAI should be assisted to start night landing facilities and Instrument Landing Systems (ILS) wherever technically feasible as it will increase the window of operations for these airports. In the absence of ILS and night landing (presently night landing is operational in Guwahati, Agartala and Imphal), the airports are

not optimally utilised. The IAF-owned airports of Tezpur, Silchar, Jorhat and Bagdogra will continue to support Sikkim till aircrafts are not be able to land in Pakyong. Moreover, Pakyong is not an all-weather airport. As Bagdogra airport operates as a civilian enclave, IAF should consider approving night landing with necessary security-related restrictions that it may find appropriate.

The advantage of early daybreak in the NER to start early morning flights is also not utilised as ATC hours are restricted due to non-availability of manpower. It is a chicken and egg situation as ATCs are not intensively manned as only a few flights land. Airlines can operate more flights if ATC hours are increased, and ILS and night landing facilities are made operational.

In the airports at Silchar, Tezpur and Bagdogra, IAF airports with civilian enclaves, the ATC is manned by the IAF. AAI should negotiate with IAF so that night landing facility for civilian aircrafts is allowed in these places with appropriate security restrictions.

HUB AND SPOKE MODEL FOR OPERATION AND USE OF SMALL AIRCRAFTS IN SPOKES

The position taken by operators and MoCA is that operations in the NER are commercially unvi-

NTDPC recommends that Guwahati Airport, which has received full international status in principle, be developed as a gateway to South East and East Asia, consistent with the overall Look East policy of the Government.

able and result in losses. The model presently operating is unsuitable as it does not account for the topography, sparse spread of population, tenuous physical links with the rest of India and huge distances. Given the specific features, a 'Hub and Spoke' model with Guwahati and also Agartala, Imphal and Dibrugarh as hubs and other destinations as spokes should be more appropriate (Figure 6.9). Small aircrafts stationed in Guwahati and other hubs could operate early morning (to take advantage of early daybreak in the region) and fly travellers back to Guwahati/Agartala and shift into bigger aircrafts to travel further to Delhi, Kolkata, Mumbai, etc. The transit time should not be more than 30-40 min in the morning and also evening so that travellers are able to reach their destinations outside the region by 10:00-10:30 am and return the same day if possible. At least for Delhi and Kolkata, this model needs to be in place.

In order to get this model going, the following are required:

- Development of physical infrastructure for hubs. This is the easier part as it involves plan investment by AAI with funds from MoCA/DONER/NEC. *Creation of airport hubs with hangars is strongly recommended for Guwahati, Agartala, Imphal and Dibrugarh.*
- To make the airlines to use the facilities of the hubs at Guwahati, Agartala Dibrugarh and Imphal is the difficult part, as there is not enough manpower. Further, locally trained manpower is not available. Trained and deployed people are unwilling to shift to Guwahati.
- For the hub and spoke model to be successful, small aircraft are needed. This requires change in policy and perhaps mindset to promote use of smaller aircrafts in the NER.

Air services within the region will be based on the multi-utilities such as passenger traffic, high value cargo, medical and other emergency services. It addresses the viability issues of air services by operating smaller carriers. Further, this will stimulate the development within the region by bringing together the critical mass required for growth in terms of networking of sparse population, transport of high value commodities like flowers, fruits, medicinal plants, organic products. As horticulture and floriculture grows in the NER, multiple use (passenger and cargo) of aircrafts will be useful in quick transportation of these perishable but high valued commodities to the markets outside the NER. Passenger in peak hours and cargo in non-peak hours

can be combined in small-sized dual-use aircraft to carry both passengers and cargo from spokes to the hub. It will also address the viability issue of small aircraft.

PROMOTION OF HELICOPTER SERVICES

Helicopter services will play an important role, especially for remote areas. These, however, are expensive. How they can be made viable is a crucial question. We have discussed the scheme being operated by Ministry of Home Affairs for helicopter services. The hub and spoke model can be achieved by three-tier air services:

- Connectivity between regional hubs like Guwahati, Agartala, Imphal, etc, and metros like Delhi and Kolkata: big aircrafts
- Intra-regional connectivity between regional hubs and smaller airports and airfields within the region: small aircrafts
- And finally, helicopter services in remote districts to the smaller airports/ airfields/ regional hubs, which may be operated depending on the daily/ weekly needs.

Such three-tier system would fit into a 'Hub-and-Spoke' model to feed the big carriers to outside of the region and address the viability issues in a systematic manner.

CREATION OF LOCALLY TRAINED MANPOWER TO RUN CIVIL AVIATION INFRASTRUCTURE

Airport facilities in the region are being expanded. However, as there is general reluctance for employees to work in the NER, airports are not adequately manned. Even the IAF acknowledges that they are not able to operate a night landing facility in the civilian enclave for Silchar airport due to lack of manpower. Hence, it is recommended that local youth be trained in different sector of aviation, particularly in ground handling, navigation, logistics.

For creation of a base of adequately trained manpower who would be willing to serve the region, local training facilities have to be developed. Lilabari in Assam could be a potential location for establishing such a training facility. The bigger challenge lies in setting up the facilities (with public investment), developing accredited curriculum and training courses and operating the institute. A practical option would be to have a branch of the National Aviation Academy at Rae Bareilly in Lilabari. Aircraft maintenance courses could be started in polytechnics in the region. The aviation academy will have to be owned and run by the Central Government as private agencies are unlikely to find Lilabari presently attractive nor are the state governments capable of running such institutions. Civil Aviation is in the Union List of the Constitution.

Government-funded training facilities in the NER for pilot or air hostess training are not required as

Box 6.1

Incorporating the Specific Requirements of NER in an Aviation Policy for the Region

One of primary reasons for lack of effective civil aviation services in the NER is the application of same policy instruments for the region as well as for the rest of the country. Policies will have to be tailor made, given the peculiar character of the region and the challenges it presents. MoCA has come out with a set of revised regulatory policy changes which is under active consideration.

Recently, the Ministry of Civil Aviation has prepared a report² on improving Regional Air Connectivity. Some of the major recommendations are as under:

- a. Modify Route Dispersal Guidelines to assign more weightage to non-capital stations in the NER. Additional connectivity created should be distributed in the ratio of 40:60 between capital and non-capital stations.
- b. Airlines should be asked to deploy additional capacity in future in Meghalaya and Nagaland, of course subject to market demand and adequate infrastructure.
- c. Promote deployment of small aircrafts (See Annex 6.2).
- d. Setting up Essential Air Services Fund to promote government intervention for connectivity to peripheral remote locations. Such schemes are prevalent in developed countries also—UK (North East England and Wales), USA (Essential Air Services Programme, Small Community Air Service Development Programme), European Union, Caribbean and Pacific countries. This is particularly relevant to the NER and we recommend that MoCA take a positive view.
- e. As scheduled airlines in India desire to maintain homogenous fleet of aircrafts, the character of non-scheduled operators (NSOP) should be changed to allow them more flexibility as they operate smaller aircrafts (less than 40 seats). They should be allowed to publish their schedule and have joint operations with scheduled airlines. In this way, the hub and spoke model—small aircrafts at the spoke (NSOPs) can work together with scheduled operators at the hub. They can bring passengers in small aircrafts from smaller places to Guwahati or Agartala from where the passengers will be put in larger planes to connect them to the metros.
- f. Facilitating the promotion of regional airlines.

The Ministry of Civil Aviation needs to take a quick and practical decision on the recommendations of the Rohit Nandan Committee.

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Table 6.10

State-wise Distribution of Rail Network [Km]

STATE	BROAD GAUGE	METRE GAUGE	NARROW GAUGE	TOTAL
Arunachal Pradesh	14.66	1.26	-	15.92
Assam	1,800.03	845.96	-	2,565.99
Tripura	-	195.40	-	195.40
Nagaland	11.13	1.72	-	12.85
Manipur	-	13.85	-	13.85
Mizoram	-	1.50	-	1.50
Meghalaya	-	-	-	-
Sikkim	-	-	-	-
Total NE Region as on 1.4.2012 (Starting of 12th Plan) in NE Region	1,301	1,060		2,661

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

2. Rohit Nandan Committee Report (2012).

Table 6.11
New Railway Projects

PLAN HEAD	NEW LINE	GAUGE CONVERSION	DOUBLING	RAILWAY ELECTRIFICATION	TOTAL
Projects in progress	13	4	1	1	19
Total Cost (Rs billion)	226	75	2.5	8	311
Cumulative Expenditure up to March'12 (Rs billion)	51	53	0	3	107
Throw forward (in Rs Billion as on 1.04.2012)	125	29	0	5.3	204
Length of Ongoing Works (Km)	965	1,510	45	836	3,356

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Table 6.12
Physical Achievement in New Railways Projects (km)

YEAR	NEW LINE	GAUGE CONVERSION	DOUBLING
2007-08	20	107	-
2008-09	113	170	-
2009-10	-	110	-
2010-11	58	110	31
2011-12	148	409	-
Total	339	906	31

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

these are available in the private sector in adequate numbers outside the NER also.

UP-TO-DATE WEATHER INFORMATION

State-of-the-art weather information systems are required to prevent accidents and frequent cancellation and delays. As services are not reliable especially in routes that are in the interior, passengers find it safer to depend on roads. This leads to insufficient passenger load that affects commercial viability. As the weather is tricky, regular up-to-date information to the pilot can reduce the number of cancellations and enhance the trust of the public in the regularity and certainty of air services. The Department of Meteorology should develop a plan for effective collection of weather data and broadcasting it in real time to airline operators.

DEVELOPMENT OF GUWAHATI AS AN INTERNATIONAL AIRPORT

Guwahati Airport has now received full international status in principle, but there are no international flights operating from this airport except to Bhutan. NTDP recommends that this airport be developed

as a gateway to South East and East Asia, consistent with the overall Look East policy of the Government, and the increased strategic and business links with Myanmar, Thailand and other ASEAN countries. As the India-ASEAN Comprehensive Economic Cooperation Agreement gathers force, and other initiatives for increasing economic cooperation with neighbouring countries bear fruit, the development of Guwahati airport as the gateway to ASEAN would be very desirable.

The existence of an airport has been used in many places to generate economic activity. Schiphol Airport at Amsterdam is a case in point. It has enabled the development of the Dutch flower industry which supplies flowers to far-flung places. Furthermore, in the reverse direction, it enables the supply of flowers to Europe from Latin America by using the flower markets of the Netherlands.

Thus, the development of Guwahati airport as a full-fledged international airport will do much for the development of the region. This capacity can be further utilised by locating light industries such

Table 6.13
Gauge Conversion Status

PROJECT	STATE	KM.	REMARKS	TARGET DATE FOR COMPLETION
Lumding-Silchar-Jiribam & Badarpur-Kumarghat	Assam, Tripura, Manipur	483	National Project	December 2013
Rangia-Murkongselek alongwith linked fingers	Assam, Arunachal Pradesh	510	National Project	March 2014
Katakhal-Bhairabi	Assam, Mizoram	84		December 2014

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Table 6.14
New Lines

NAME OF PROJECT	STATE	LENGTH (KM)	REMARKS	TARGET DATE
Bogibeel Rail cum Road Bridge	Assam	73	National Project	December 2015
New Maynaguri-Jogighopa	Assam, W.Bengal	245.68		March 2014
Murkongselek-Pasighat	Assam	30.61		March 2015
Tetelia-Byrnihat in lieu of Azra-Byrnihat	Meghalaya, Assam	21.5	National Project	March 2014
Dudhnoi-Mendipathar	Meghalaya, Assam	19.75		March 2013
Harmuti-Itanagar	Arunachal, Assam	33		Harmuti-Naharlagun: March 2012
Byrnihat – Shillong	Meghalaya	108	National Project	March 2017
Bhairabi-Sairang (Aizwal)	Mizoram	51.38	National Project	March 2014
Jiribam-Tupul (Imphal)	Manipur	98	National Project	Jiribam-Tupul: March 2014 Tupul-Imphal: March 2016
Dimapur-Zubza (Kohima)	Nagaland	88	National Project	March 2015
Agartala-Sabroom	Tripura	110	National Project	Agartala-Udaipur: December 2012 Udaipur-Sabroom: March 2014

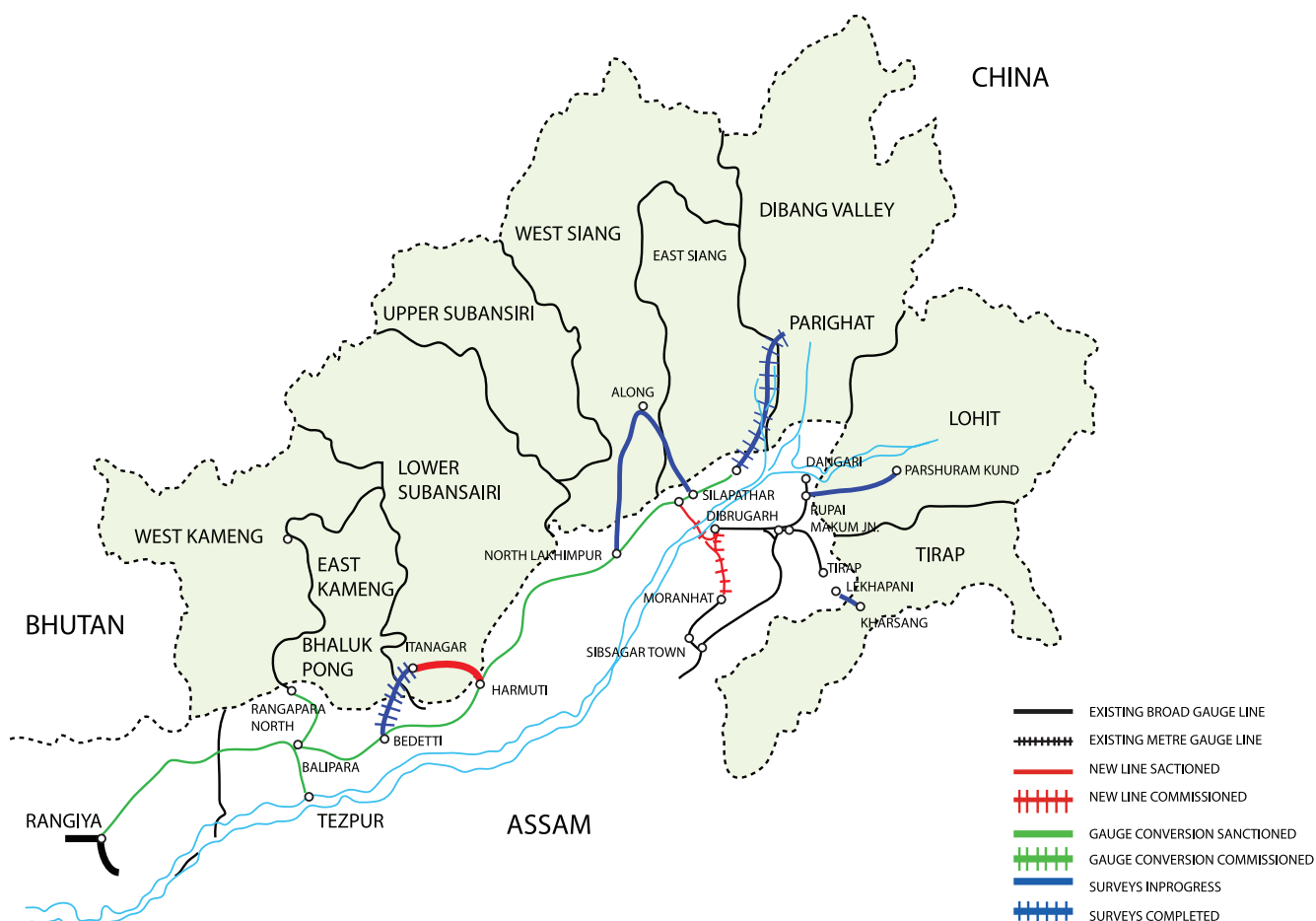
Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Table 6.15
Status of Connectivity to Capital Cities

STATE	CAPITAL	NAME OF PROJECT	REMARKS & TARGET DATE
Assam	Guwahati (Dispur)	--	Connected
Tripura	Agartala	Kumarghat-Agartala	Connected
Arunachal Pradesh	Itanagar	Harmuti-Itanagar	Harmuti-Naharlgun:Mar-2012
Manipur	Imphal	Jiribam-Tupul	Jiribam-Tupul:Mar-2014 Tupul-Imphal:Mar-2016
Nagaland	Kohima	Dimapur-Zubza	Mar- 2015 (T) Extn. to Kohima will be pro- cessed after detailed survey, Problem in LA.
Mizoram	Aizwal	Bhairabhi-Sairang	Mar-2014 Extn. to Aizwal will be examined during detailed survey
Meghalaya	Shillong	Azra-Byrnihat-Shillong	Tetelia-Byrnihat in lieu of Azra- Byrnihat - Mar-2014 Byrnihat- Shillong not fixed.
Sikkim	Gangtok	Sivok-Rangpo	Sivok-Rangpo – Mar-2015.

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Figure 6.16
Railway Projects and Surveys in Arunachal Pradesh



Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Figure 6.17



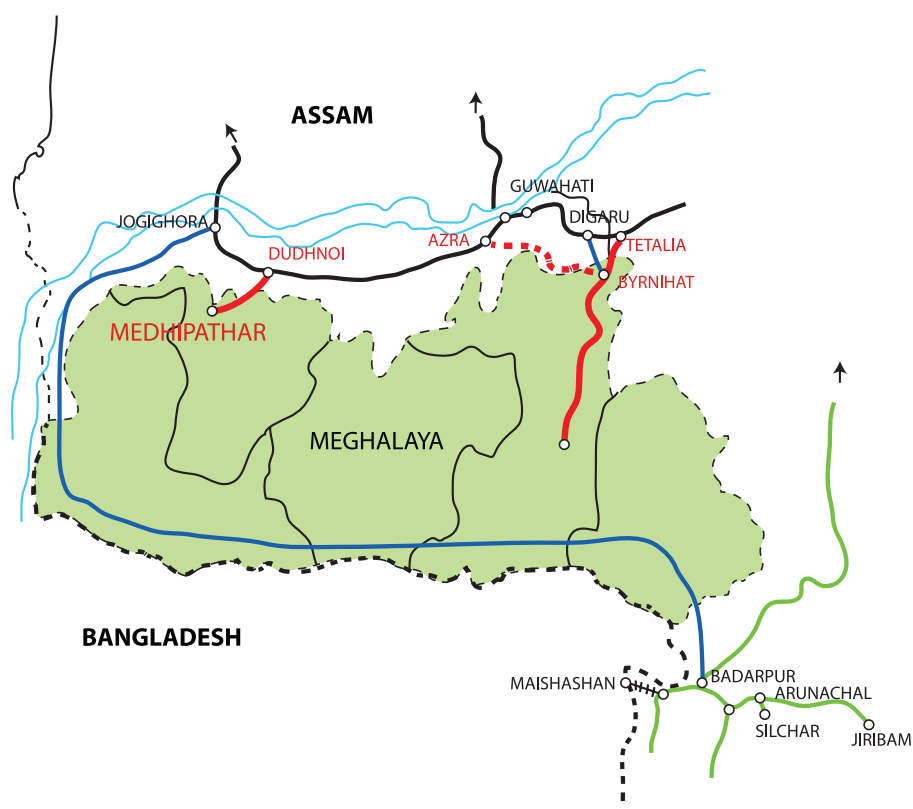
Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Figure 6.18



Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDPC.

Figure 6.19
Railway Projects and Surveys in Meghalaya



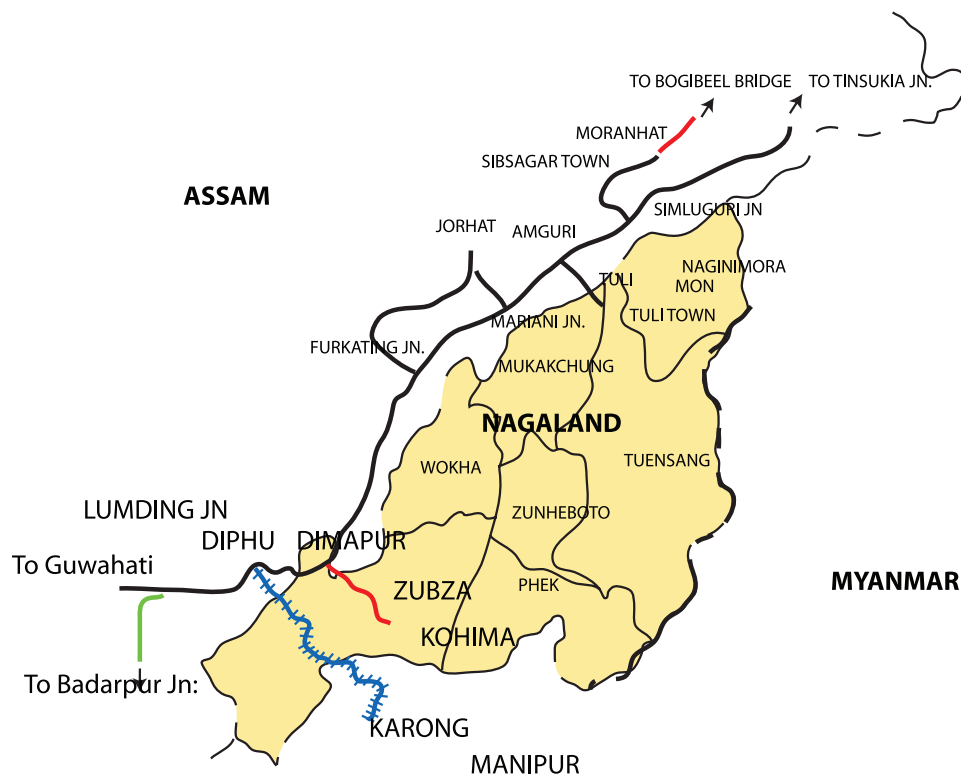
Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Figure 6.20
Railway Projects and Surveys in Mizoram



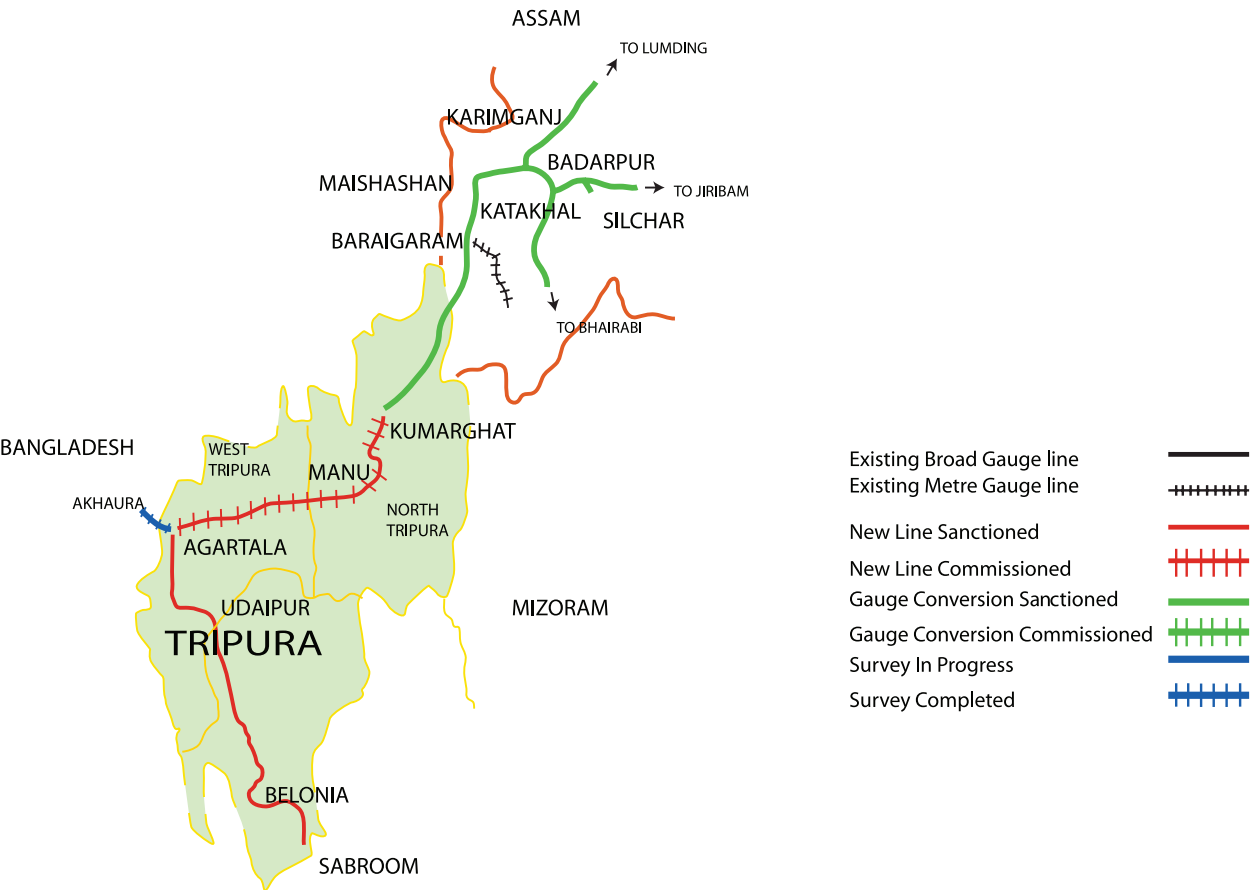
Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Figure 6.21
Railway Projects and Surveys in Nagaland



Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Figure 6.22
Railway Projects and Surveys in Tripura



Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

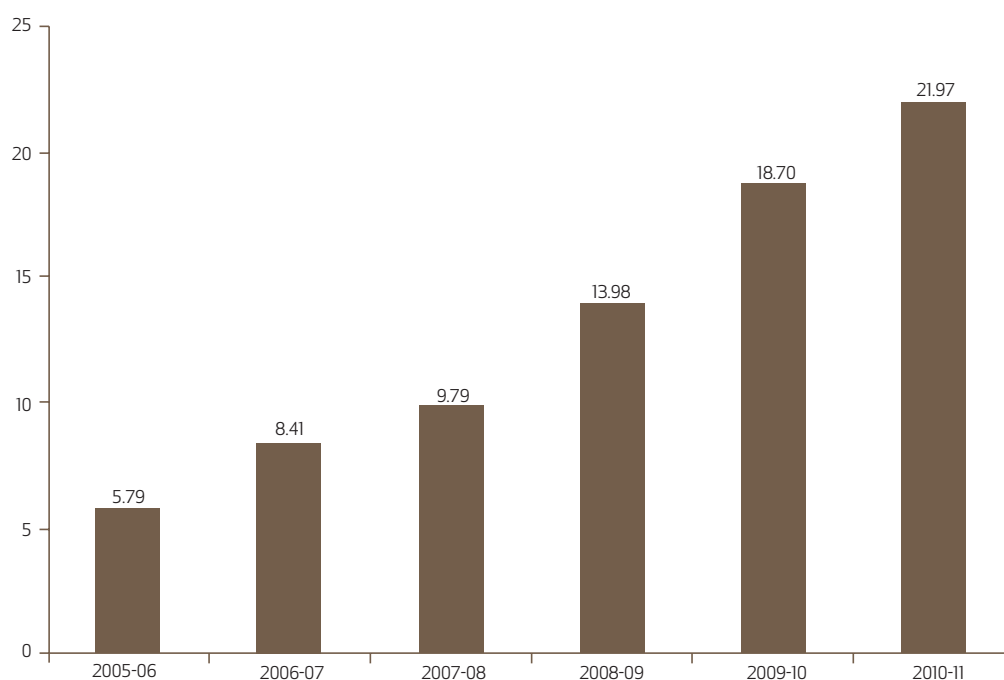
Figure 6.23
Railway Projects and Surveys in Sikkim



Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Figure 6.24
Railway Investments in the North East

[■ Rs Billion]



Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

It is hence proposed that Badarpur and Dhubri should be developed as multi-modal hubs in the NER, where all the four modes of transport –rail, road, air and waterways–converge. These hubs are also strategically well placed–both geographically and demographically.

as food processing, floriculture, sericulture and the like in its proximity, or striking distance. It would also greatly help the development of tourism in both directions.

RAILWAYS

It is surprising to note that the railways entered the remote areas of eastern Assam relatively earlier than the more accessible regions of British India. Assam Railway and Trading Company commissioned a 65-km metre gauge track from Dibrugarh to Margherita in 1881. Commercial interest of the East India Company in trading of tea and coal drove the technological upgradation in transportation. Discovery of petroleum catalysed the growth, and around 1947, just before Independence, the whole NER, which included the erstwhile East Bengal (now Bangladesh), was buzzing with robust railway connectivity to the mainland as well as with the deep port of Chittagong–the fulcrum of all international trade for the region.

The vivisection of 1947 hit rail connectivity to the NER in the belly, with not only Chittagong getting disconnected, but connectivity to the mainland lost. Immediately after 1947, the task of providing rail connectivity through the Siliguri corridor or the ‘Chicken’s neck’ was taken up earnestly. By 1958, a new railway zone, Northeast Frontier Railway (NFR) with its headquarters at Malegaon, Guwahati, had been carved out of the North Eastern Railway. NF Railway has since become the lifeline of the NER, transporting essential goods like food grains, POL, coal, fertiliser, salt, cement, etc, all over.

Historically, the whole of the NER was served only by a metre gauge railway system with its attendant inadequacies of low speeds, low throughput etc. The ‘Unigauge’ policy of Indian Railways adopted in 1993 metamorphosed rail transport in the NER. The country’s longest train run (Vivek Express) from Dibrugarh to Kanyakumari traverses a distance of 4,273 km across the length and breadth of the country. This has become possible only because Dibrugarh town has come on the broad gauge map of IR.

The rail network (as on 1 April 2012) in the NER comprises 2,661 km out of which 1,601 km (60 per

cent) are on BG (all due to gauge conversion). After the gauge conversion projects on hand get completed by December 2014, only 20 km of metre gauge will remain as a rump, reminiscent of an era gone by.

ON-GOING PROJECTS

Upgradation of the rail network in the NER has received significant attention of the Ministry of Railways in the last 25 years. Capacity has been augmented manifold leading to introduction of a large number of long distance passenger carrying trains and removal/reduction of transshipment activities which hitherto has been the single biggest bottleneck in smooth movement of traffic.

Seventeen projects comprising new line/gauge conversion/doubling and railway electrification are in progress with a total throwforward of Rs 162 billion (as on 1.4.2012). The category-wise break up of projects is given in Table 6.11.

The physical achievement so far (as of 2011-12) in terms of new lines, gauge conversion and line doubling are tabulated in Table 6.12. It can be seen that 57 per cent of gauge conversion has actually materialised in the five-year period from 2007 to 2012.

There is still a little more than 1,000 km of metre gauge track in the region necessitating transshipment at Rangiya for traffic going to destinations north of the Brahmaputra and at Lumding for destinations in the Cachar hills of Assam, Tripura, Manipur and Mizoram. Once this portion also gets converted to broad gauge, it will provide seamless transportation of people and material to every corner of the country. It is expected that these projects shall be completed by 2014. The details are in Table 6.13.

There are, at present, 11 new line projects on hand which shall add 882 km (33 per cent of the existing) of new routes to the rail network in the region upon completion. Table 6.14 gives the details.

As noted earlier, rail density in various states of the NER has been abysmally low. Except Assam and Tripura, no other state can boast of a rail link to its capital town. The Government of India has sanctioned rail projects which would put each of the state capitals in the NER on the railways map (Table 6.15). Refer to Figures 6.16 & 6.23 for ongoing projects in NER States.

INVESTMENTS

Due to difficult terrain, poor condition of law and order leading to insurgency in certain areas, the target realisations of projects have been quite tardy. However, in the last five years, the Ministry of Railways have put in arduous efforts to deliver on various

promises and utilises the funds allotted by the Planning Commission. As a result of the focused attention, the Railways' investment in the NEER has steadily been going up and output has also shown significant improvements (Figure 6.10).

KEY ISSUES AND RECOMMENDATIONS

Indian Railways has been a change agent in the NEER. The area has benefitted immensely from the 'unigauge' policy. By the end of 2014, when the gauge conversion works get completed, India would be connected seamlessly by rail from its easternmost corner to the westernmost corner. Completion of the Bogibeel bridge would connect the North of Brahmaputra railway alignment with south of Brahmaputra rail line at the easternmost end, providing an alternate route to Tinsukhia, Tirap, Dimapur, etc. If the Railways succeed in bringing to reality its ambitious programme of taking rail to the capitals of every state in the region, it would be a significant achievement.

In order to provide focussed attention to asset creation in the NEER, planning should be carried out in two phases.

PHASE I (UPTO 2020)

The Railways' shelf of projects is full to the brim for works upto 2020. Yet, projects in the NEER have the ill repute of never getting delivered on time. If the gauge conversion projects get completed by 2014 as planned, concentrated effort on building new lines already sanctioned, can be easily launched. However, even if all these new lines works are completed by 2020, the connectivity by rail for every capital of the NE states will still remain a distant dream. Determined and planned efforts are imperative to achieve rail connectivity to all the capitals by 2020. To this end, following is considered inescapable:

COMPLETION OF SURVEYS AND SANCTIONS BY 2014

All the remaining alignments to each of the capital towns which are yet to be sanctioned either due to surveys not getting completed or sanctions not received must be taken up post-haste to ensure that works get completed by 2020. At present, only Guwahati and Agartala are connected by rail.

- i. Arunachal Pradesh: Itanagar has to be joined to the Rangia-Murkongselek route (which is under gauge conversion) at Harmuti. It is a sanctioned work upto Naharlagun which will act as a terminal for Itanagar. The work is expected to be completed by 2014.
- ii. Manipur: The track from Jiribam to Tupul will get commissioned by March 2014. The extension from Tupul to Imphal has been sanctioned at a cost of Rs.44.78 billion in 2013.
- iii. Mizoram: Aizawl, the capital of Mizoram, is to be connected to Badarpur on existing alignment via Bhairabi. The work is being done in

two parts. Bhairabi to Sarang is a sanctioned work. The extension from Sarang to Aizawl is awaiting completion of survey. The sanction and resource mobilisation will follow.

- iv. Meghalaya: Shillong is to be linked to Tetelia on the existing rail route but at present only Tetelia to Byrnihat route is under construction. Byrnihat to Shillong portion has been sanctioned at cost of Rs.40.83 billion in 2012-13.
- v. Nagaland: At present, work is sanctioned only from Dimapur to Zubza. Its extension to Kohima is still getting surveyed.
- vi. Sikkim: Sivok to Rangpo, already sanctioned, is expected to be completed by March 2015. But Rangpo to Gangtok is still being contemplated. The survey for extending the railway line not only upto Gangtok but beyond upto Nathu La, should be expedited.

To improve its image and visibility on project completion, Indian Railways should unfailingly build 150-200 km of new lines every year in the region.

It is apparent from the above picture that the target of connecting all state capitals by rail link cannot be adhered to unless the alignment and cost for connecting Shillong, Kohima, Imphal and Gangtok is speedily finalised and sanctions taken.

TECHNOLOGICAL UPGRADATION

Most of the railway projects have been sanctioned based on old surveys. At that time, IR was daunted by the task of drilling long tunnels especially in the Himalayas. But with the success being experienced in Jammu and Kashmir projects, as well as the fully operational Konkan Railway line, IR should have developed sufficient capacity by now to undertake long and sophisticated tunnel projects even in inhospitable terrain. There is hence an urgent need for technological upgradation as well as updation of all survey reports of the NEER. The existing surveys have planned for stations at vertically distant locations. It may be possible to avoid this inconvenience by relying on introduction of more tunnels, not contemplated earlier for maintaining gradients as well as proximity to habitation.

The Committee envisages that once this connectivity is achieved; there will be eight Rajdhani Expresses—one from each state capital, running to the national capital by 2020.

Electrification upto Agartala

At present, electrification of BG line upto Guwahati has been sanctioned. In order to provide seamless connectivity within the region, electrification

The North East Region being riverine offers immense scope for development of inland waterway transport. This mode also has a natural fit with the bulk commodities that the NER imports from and exports to the rest of India.

of Guwahati-Lumding-Silchar-Agartala line should also be taken up and completed by 2020.

Augmentation of network capacity

The development of the rail network in the area is likely to increase the freight and passenger traffic and therefore augmentation of the network capacity will be needed. At present, the route from New Jalpaiguri to Lumding has double line in parts. With passenger and freight traffic likely to go up considerably in the future, the entire stretch from New Jalpaiguri to Guwahati will need to be doubled. The following routes are expected to be strengthened in due course.

- Doubling of New Jalpaiguri–New Alipurduar route
- Doubling of New Bongaigaon to Guwahati route
- Doubling of Guwahati to Lumding route: This route is the common portion which serves traffic going to Dibrugarh side and towards Silchar. To avoid congestion, this route needs to be doubled. A part of the route between Guwahati and Digaru has already been completed and commissioned.

PHASE II (2020-32)

The projects being undertaken in Phase I will provide excellent inter-regional and intra-regional connectivities. Yet, the following two actions will further catalyse trade, commerce, tourism in the region:

MULTI-MODAL HUBS

Badarpur and Dhubri are two locations which are eminently suitable for development as multi-modal hubs, particularly for the following reasons:

- Badarpur is a railway junction situated very close to Silchar. Indian Railways owns large tracts of land on which a suitable yard can be built to serve the needs of a multi-modal rail terminal handling containers of various sizes. The Barak river flows close by, where an Inland waterway port terminal can be planned. A National Highway passes through the town. Silchar (18 km away) has an operational airport.
- Dhubri is another such location. Located in close proximity to the Bangladesh border, it is situated on the banks of the mighty Brahmaputra where the Inland Waterway Authority is already in the process of developing an inland port. Dhubri is already on the railway map and NH-31 passes through the town. An

airport at Rupsi (24 km away) is also coming up by 2020.

It is hence proposed that Badarpur and Dhubri should be developed as multi-modal hubs in the NER, where all the four modes of transport–rail, road, air and waterways–converge. These hubs are also

strategically so well placed–both geographically and demographically that they may be amenable to be developed through PPP mode.

NEW LINE FROM DHUBRI TO SILCHAR VIA SHILLONG

It is suggested that a new line through Meghalaya connecting Dhubri to Silchar via Tura-Shillong should be surveyed and taken up as an alternate route for Badarpur-Silchar and beyond. This new alignment will link the entry point of Dhubri on the Indo-Bangladesh border to Meghalaya and southern Assam. It would create a link between the two proposed multi-modal hubs at Dhubri and Badarpur (near Silchar, 8 km). At Shillong, it will connect also with the new sanctioned line to Byrnihat (in Meghalaya on the Guwahati-Shillong road) providing another alternate connection.

TRANS-BORDER CONNECTIVITY

i. New line between Imphal-Moreh-Mandalay

By 2020, the railway should arrive in Imphal. In Phase II, this alignment should be extended to Mandalay in Myanmar via Moreh-Tamu which is emerging as India's gateway on the land route to South East Asia. With the doors of democracy having opened in Myanmar, trade and commerce between India and Myanmar is bound to escalate. A helpful infrastructure will only galvanise this progress. Further, this is bound to give a fillip to the Look East Policy. However, it is suggested that this connectivity should be provided on broad gauge upto Mandalay to ensure seamless movement across borders.

ii. New Rail Link from Sittwe (Myanmar)

India has invested heavily in developing Sittwe port in Myanmar in the Rakhine region. The transportation of goods via this port is at present planned by road and inland waterways. Kaladan Multi-modal Project has been undertaken to connect Sittwe port to India which includes development of waterways on Kaladan river and also a road connecting Sittwe port to Mizoram. However, it is felt that without proper rail connectivity, the potential of a major port cannot be exploited fully. It is hence suggested that the Indian government should plan for a rail link (BG) from Sittwe port to Aizwal in consultation with the Myanmar government.

This alignment can be taken up further north from Aizwal to Imphal to Kohima to Tirap on the existing rail route to Tinsukia. This rail link, if constructed, will generate many alternate rail routes for the whole region, thereby precluding any possibility of complete blockage of one state by a rogue group in a neighbouring state. If the Imphal-Moreh-Mandalay line also comes up, it will provide a handy connectivity to every state to take on international trade.

A direct rail link between Aizwal and Agartala will convert the whole alignment as a 'garland' on the neck of the NER adorning its body politic.

iii. Imphal as a new rail hub (National & International)

Imphal can become a potential rail hub in future through possible project extensions in the following manner:

Present proposal: Jiribam-Tupul-Imphal (National Project)

- Eastward extension: Imphal-Moreh-Mandalay
- Northward extension: Imphal-Kohima via Northern Nagaland-Tirap (Arunachal Pradesh)
- Southern extension: Line coming from Paletwa (on the Kaladan Multi-modal route)-Indo-Myanmar border—Lawngtlai-Aizawl Churachandpur-Imphal.

It is proposed that Imphal will become a hub for railway connectivity with Myanmar from two sides and also get Nagaland and Arunachal Pradesh.

INSTITUTIONAL CAPACITY BUILDING

There is a handful of sanctioned projects, many termed as 'National Projects' where the funding for the project is met to the extent of 75 per cent by the Central government and 25 per cent by the Ministry of Railways. This special funding arrangement is helping the timely completion of the railway projects. Yet, many projects are languishing purportedly for reasons like difficult terrain, poor condition of law and order bordering on insurgency in certain areas. Though railway administration has worked arduously to complete projects and utilise funds so generously available under National Projects scheme, yet the impression among the local populace is that of perpetual delays caused by willful neglect. In the last five years, the Railways' investment in the NER has steadily been going up and output has also shown considerable improvements.

150-200 KM OF NEW LINE ANNUALLY

To improve its image and visibility on project completion, Indian Railways should unfailingly build

150-200 km of new lines every year in this region. This would involve an expenditure of nearly Rs.35 billion annually. The institutional back up to sustain activity of this level shall have to be provided and strengthened by the Railways.

CLOSE MONITORING

There is a need to spend the allotted funds in a timely manner to cut down delays. Close monitoring of progress of works is essential at both Railway board and Zonal levels.

INLAND WATER TRANSPORT

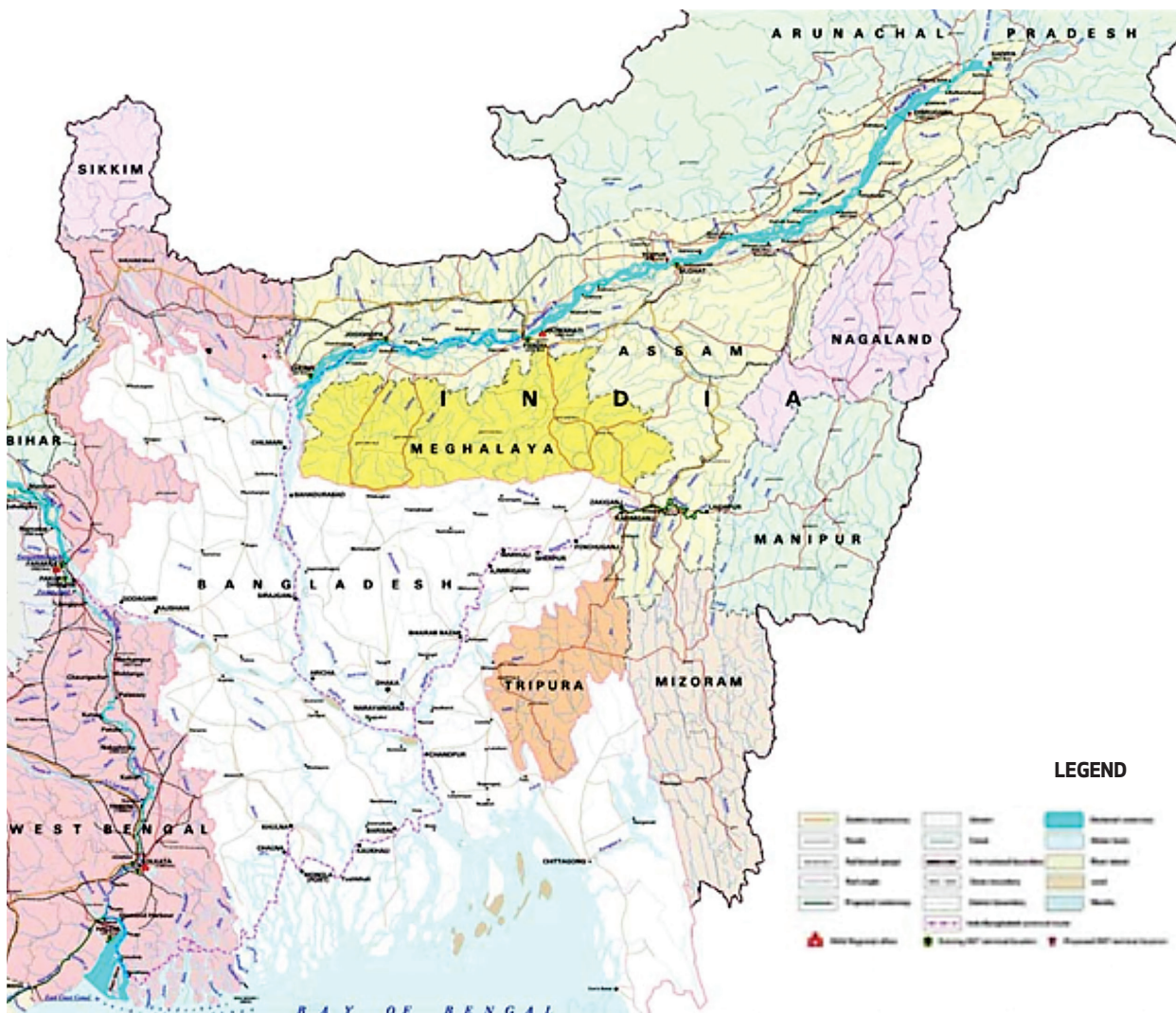
It may come as a surprise to many to learn that mechanical propulsion was not introduced into India with the arrival of the Railways in 1853, but almost 30 years earlier in 1,823 when the first propelled craft - Diana - weighing 89 tonnes, sailed with passengers from Kulpi Road to Calcutta, a distance of 80 km on the Hooghly. In 1,863, regular steamer service commenced between Calcutta and Assam. As East India Company's interests rested more on enhancement of traffic to and from ports for obvious reasons, 19th century trade and commerce relied heavily on river and canal navigation. At its peak in 1876-77, the country boat traffic registered at Calcutta was about 180,000 cargo boats, 124,000 at Hooghly and about 62,000 at Patna.

However, the advent of the railways in the second half of the 19th century and rapid expansion of its network brought a sea change in the scenario. The decline of river navigation started from 1860 onwards and could not be stemmed thereafter. The phenomenal growth of road transport, particularly during and after World War II drove the last nail in the coffin for IWT. After 1947, the road network made its foray into every nook and corner of India. The country already boasted of one of the largest rail networks in the world. Both these transport modes wrested away the centres of economic activity from the waterways and the survival of IWT as a commercially viable mode of transport became well nigh impossible. Diversion of waters from rivers for irrigation and deforestation of hilly ranges leading to erosion and consequent accumulation of silt in rivers further compounded the problem.

The IWT report of 1970 summarised the situation, as it existed in 1969, as under:

11.3.1. The Brahmaputra has been serving for a long time as an important means of communication in Assam and the water route was linked to Calcutta, Bihar and Uttar Pradesh. The trade between Assam and Calcutta gradually flourished as the steamer service provided and economic means of transportation. Assam used to depend largely on inland water transport for its import and exports. The main products of

Figure 6.25



Source: Inland Waterways Authority of India (IWA).

Assam are oil, tea, jute, timber, coal paddy and rice. When the services operated by Joint Steamer Companies were at their peak, about 93 per cent of tea and 90 per cent of jute crop used to move to Calcutta by river. The traffic gradually declined and by 1965, the tea traffic by river to Calcutta was reduced to 65 per cent and jute traffic to 25 per cent only. Large quantities of food grains, sugar, coal, fertilisers, machinery etc. also used to be moved by river route.

With the outbreak of hostilities with Pakistan in September 1965, the river route between Calcutta and Assam was closed.

There was a precipitous fall in traffic within a decade.

The economic advantages of this mode compared to other modes have been emphasised by a number

of high powered committees including the National Transport Policy Committee³ and a number of reports and studies⁴. Some of these studies also pointed out the role that this mode could perform to take care of the maintenance of ecological balance.

IWT DEVELOPMENT IN THE NER

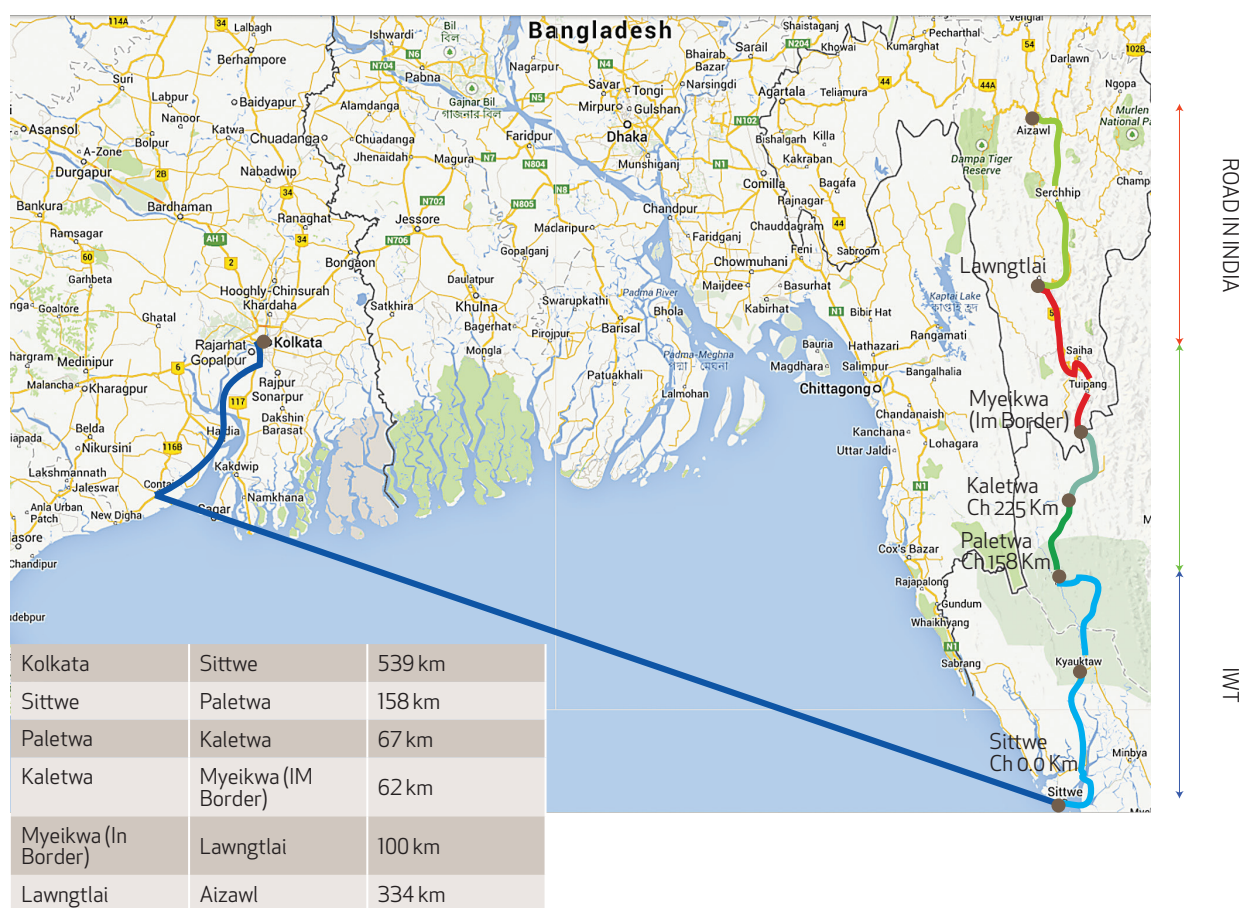
The Inland Waterways Authority of India (IWAI) was set up under the IWAI Act of 1985, based on recommendations by several committees, the main being NTPC, 1980. The IWAI is responsible to develop and manage National Waterways for navigation .

On 1 September, 1988, 891 km of the river Brahmaputra between the Bangladesh border to Sadiya was declared as National Waterway 2 (NW-2) by an Act of Parliament. At present, the waterway is being

3. Gol (1980).

4. NCAER (1974); UNDP (1993); Rao and Kumar (1996).

Figure 6.26
Kaladan Multimodal Transit Transport Project



Source: Ministry of Development of North Eastern Region (MDoNER).

used by vessels of the government of Assam, Central Inland Water Transport Corporation (CIWTC), Border Security Force, tourism vessels, and other private operators. The Brahmaputra now has several small river ports. In addition, there are more than 30 pairs of ferry ghats (crossing points) on the Brahmaputra, transporting both passengers and cargo. Long cruise tourist vessels make regular trips between Sivsagar near Dibrugarh and the Manas wild life sanctuary near Jogighopa.

Apart from the Brahmaputra system, the other riverine system is that of the Barak (Surma) river. This too had a substantive role to play in transport in the region, again relying on connectivity through (present-day) Bangladesh at Karimganj. This provided good access to commercially active centres like Agartala in Tripura. However, the Barak river system is now effectively navigable only for six months of the year and the through traffic through Bangladesh is again governed by the uncertain protocol arrangements with that country⁵. IWAI is also working to declare Barak river as National Waterways VI. It is likely to be done in the immediate to near future.

However, IWT still lacks policy focus and investments. Operators with required fleet size of vessels have not emerged either in private or in public sector. This has been a major bottleneck in the promotion. The Brahmaputra and Barak have not been fully commercially exploited for transportation purposes. IWAI is not an operator while the public sector, CIWTC is sick and has squandered away the advantages of fleet strength. The private sector, in both India and Bangladesh, has not emerged due to various policy reasons. Despite the inherent advantage of IWT in general and its natural fit for transportation in the NER, a policy regime needs to be created that will promote investment in appropriate fleets of vessels in both public and private sectors.

SIGNIFICANCE OF IWT FOR NER

The North East Region being riverine offers immense scope for development of IWT. IWT has a natural fit with the bulk commodities that the NER imports from and exports to the rest of India—tea, oil, cement and coal are exported; foodgrains, fertilisers, petroleum products are imported. All these commod-

5. Rangaraj and Raghuram (2005).

Table 6.16
National Waterway 2 Terminals

LOCATION	TYPE OF TERMINAL (FIXED/FLOATING)	PURPOSE
Hatsinghimari	Ro-Ro	For cargo cum passenger berthing facility – presently dropped due to severe erosion
Dhubri	Ro-Ro terminal under construction	For completion of customs and immigration both for incoming and outgoing vessels on Protocol route in addition to handling of cargo vessels and passenger ferries.
Jogighopa	Floating terminal with a steel crane pontoon.	For transportation of Meghalaya coal through waterway.
Pandu	Fixed/permanent terminal with two go-downs and RCC jetty	Pandu is the major location on NW-2 as an entry point to NE States.
Tejpur	Floating terminal with a steel crane pontoon.	For handling of cargo vessels, local ferry service. ODC cargo is also expected at this terminal in view of upcoming hydro power project.
Biswnath Ghat	Floating Terminal	For handling of PDS cargo by FCI.
Silghat	Floating terminal with a steel pontoon.	For movement of POL of Numaligarh Refinery.
Neamati	Floating terminal with a crane pontoon	For handling of cargo vessels, local ferry service. ODC cargo is also expected at this terminal in view of upcoming hydro power project.
Dibrugarh	Floating terminal with a steel pontoon	For handling of cargo vessels, local ferry service. ODC cargo is also expected at this terminal in view of upcoming hydro power project.
Opp. Dibrugarh	Floating terminal with steel pontoon.	For handling of FCI cargo.
Sengajan/ Panbari	Floating terminal with a crane pontoon	Considered in view of regular movement of Indian army IWT fleet.
Oriumghat	Floating steel pontoon	To facilitate vessels going to Arunachal Pradesh and BSF / Army

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

ities being non-perishable and high volume are suitable for transportation by IWT. It would be cheaper than road or rail but slower. But fast transportation is not required for these commodities. Investment in waterways can provide alternative routes for movement of bulk cargo for Nagaland and Manipur which would be a cheaper option and will not face blockages and similar exigencies. Plans and investment for IWT have to be anchored within a multimodal transport plan. As multimodal transport planning is yet to take off in the NER, IWT's full potential has not been leveraged.

Optimal use of IWT for transportation of bulk commodities will open up the narrow chicken's neck corridor for transportation of passengers through fast

moving rail connections, evacuation of power, telecommunication links etc. Tourism is also a potential user of IWT. Transport of Over Dimensional Cargo (ODC) for hydropower development in the North East essentially requires IWT as there are limitations on hill roads.

Undivided Bengal and the NER were an integrated economic market prior to Independence where the riverine transport system was intensively used for movement of cargo and passengers. The present challenge is to recreate those routes by combining investment with multi-modal planning.

Thus, development of IWT requires active and positive participation by Bangladesh. India's relation-

ship with Bangladesh is dependent upon the political climate. IWT arrangements should be devised in such a manner that stakeholders, both in India and Bangladesh, derive value from developing and using IWT.

Optimal development of IWT will happen when there is commonality of purposes among:

- Stakeholders such as the Food Corporation of India and the oil companies, tea industry, cement industry.
- Owners of fleet of vessels of the right size
- The goodwill of Bangladesh and its participation
- Multi-modal transport planning

The objective is to integrate IWT within intermodal transport systems to provide door-to-door services for the movement of domestic and international cargo traffic, thereby responding to market demand for convenient and competitive service while optimising the economic, financial, environmental and social benefits that can be derived from each mode in the entire transport chain in the North East.

SCHEMES/PROJECTS UNDERWAY

Indo-Bangladesh Inland Waterways Protocol

An inland water transit and trade protocol exists between India and Bangladesh under which inland vessels of one country can transit through specified routes of the other country. The existing protocol routes are

- Kolkata-Pandu-Kolkata
- Kolkata-Karimganj-Kolkata
- Rajshahi-Dhulian-Rajshahi
- Pandu-Karimganj-Pandu

For inter-country trade, five ports of call have been designated in each country: Haldia, Kolkata, Pandu, Karimganj and Silghat in India, and Narayanganj, Khulna, Mongla, Sirajganj and Ashuganj in Bangladesh. Under the Protocol, 50:50 cargo sharing by Indian and Bangladeshi vessels is permitted both for transit and inter-country trade.

KALADAN MULTIMODAL TRANSIT TRANSPORT PROJECT

The Project envisages development of an alternate connectivity to Mizoram through Myanmar. The project is piloted and funded by the Ministry of External Affairs. Following are the various components of the project:

- Port & IWT: Construction of a Port at Sittwe in Myanmar and development of inland navigation along river Kaladan from Sittwe to Paletwa (158 km) including supply of six 300 tonne capacity cargo barges. IWT terminals are to be constructed at Sittwe and Paletwa.
- Highway (Myanmar): Construction of a road from Paletwa to the Indo-Myanmar border with Mizoram (125 km)

- Road section in India: Construction of a road from the Indo-Myanmar border till NH-54 at Lunglei in Mizoram (100 km)

Terminal facilities

Terminal facilities for loading and unloading of cargo are being maintained by IWAI at strategic locations like Dhubri, Jogighopa, Pandu, Silghat, Neamati and Dibrugarh. Dhubri is the first important terminal on the Brahmaputra. Pandu (Guwahati) is being developed as a multi-modal transport hub which can serve the entire NER. The existing temporary IWT terminal at Jogighopa is proposed to be upgraded to a bulk cargo handling terminal for products like Meghalaya coal, with rail connectivity up to the terminal.

DEVELOPMENT STATUS

Details of terminals at 11 locations being maintained on NW-2 for handling cargo vessels and passenger ferries are given in Table 6.16.

Encouraging infrastructure has been built on the Brahmaputra by IWAI. Fixed terminals are proposed at Dhubri and Hathsinghimari on both banks of the river with RO-RO services.

The Barak also has small ports at Karimganj, Badarpur, and Silchar and ferry services at several places across it. In Arunachal Pradesh, the rivers Lohit, Subansiri, Burhi Dihing, Noa Dihing, and Tirap are used for navigation by small country boats in stretches where there are no rapids.

POTENTIAL BUSINESS OPPORTUNITY

The largest expected cargo movements in the NER shall arise from the ambitious power projects being implemented by various private sector companies along with the National Hydroelectric Power Corporation (NHPC), North Eastern Electric Power Corporation (NEEPCO), and National Thermal Power Corporation (NTPC) on various tributaries of the Brahmaputra, particularly in Arunachal Pradesh. These developments are expected to generate cargo movements of about 50-100 million metric tonnes over a period of 20 years (2.5 to 5.0 million metric tonnes per year). Accordingly, the infrastructure requirements for the same will be substantial. IWT can play the most momentous role in catering to needs of such an immense scale.

As regards specific projects, the proposed transportation of coal from Haldia through the Indo-Bangladesh Protocol Waterway to Jogighopa and onwards to the NTPC power plant at Bongaigaon is a PPP project undertaken between NTPC, IWAI and a private operator, that has the potential of proving the utility of waterways for commercial operations. Other projects that have great potential for movement of waterways in NER are:

In October 2007, a closed-door meeting of the Chief Ministers of the NE states, the External Affairs Minister and other senior Ministers saw the first formal articulation of the connectivity needs of the NER with neighbouring countries.

- Transportation of foodgrains of FCI from Kolkata to Tripura through Ashuganj (in Bangladesh) and within NW-2.
- Transportation of food grains and fertilisers between mainland and NER, especially Assam and Tripura
- Transportation of containers on the Kolkata-Pandu-Kolkata route, and the Kolkata-Patna-Kolkata route.
- Transportation of pipes and other cargoes of Oil and Natural Gas Corporation (ONGC) and Oil India Ltd. from Kolkata to Dibrugarh/Jorhat/ Karimganj/Agartala via Ashuganj.
- Transportation of perishable cargo produced in Meghalaya and consumable goods for West Garo Hills between Phulwari, Dhubri and at other locations by Ro-Ro vessels.
- Proposed terminals on the Brahmaputra at Dhubri and Hathsinghimari to facilitate transportation between Phulbari and Dhubri.

RECOMMENDATIONS

IWT traffic in the NER on the mighty Brahmaputra has to be seen in two segments:

- Traffic across the boundary on international waters in Bangladesh i.e. from Sadia to Kolkata/Haldia
- Traffic entirely within the national boundary i.e. from Sadia to Dhubri/Jogighopa

The first segment, movement across Bangladesh, has exciting prospects for both countries, but its estimated potential could never be exploited due to short-term extensions of Indo-Bangladesh Inland Waterways Protocol.

From 2001 to 2012, the protocol has been renewed about 26 times. The existing protocol is valid upto 31st March 2015.

If the protocol could be extended in one go for at least 20 to 25 years, it would spur private players into action to provide investments both in capital in the form of modern mechanically propelled boats as well as in operations and marketing. This would provide stability to the trading environment with a concomitant confidence building in both public and private sectors to join hands for possible PPP projects. As it is in mutual interest of both India and Bangladesh to keep this protocol route navigable, the Indian government should consider assisting Bangladesh not only in maintaining the channels navigable, but also

for upgrading the system to ensure night navigation smoothly.

In case a long duration protocol is not forthcoming from Bangladesh, we should concentrate on developing IWT on the Sadia to Dhubri segment. NTPC, 1980, had delved into the financial aspect of IWT at quite elaborate length. What it did not perceive at that time was the way inter-modal traffic would gain acceptance in the next 20-25 years. The NER is devoid of large scale industry. It cannot generate a 'block rake load' for finding acceptance on rail. Hence, this report suggests developing inter-modal hubs at Badarpur and Dhubri. IWT can be very conveniently as well as gainfully utilised for bringing containers (40 ft or 20 ft) by barges/boats to these hubs for aggregation and subsequent transport by rail from these to the rest of India. For smooth transfer of goods from one mode of water to the other, the integration point i.e. the inter-modal hub should necessarily have facilities for:

- Permanent berths
- Handling gear like shore cranes and gantries (for containers)
- Mobile cranes, forklift trucks and trailers
- Storage sheds, warehouses and open stacking yards
- Reliable power supply and sufficient lighting (for shore connections to vessels etc)
- Water supply
- Bunker supply
- Rail yard adjacent to the riverside berth
- Proper road connectivity

Once adequate infrastructure is put in place, IWT is bound to get a fillip. This would auger well for the growth of small scale industry in the region.

Government should also survey the possibility of constructing a navigable canal from the Brahmaputra to Ganga via the Siliguri neck to ensure round-the-year IWT traffic from the NER to Kolkata/ Haldia. Inland Waterways Authority and Central Rail Warehousing Corporation (a subsidiary of Central Warehousing Corporation) are proposing to jointly develop a multi-modal logistic hub at Jogighopa with a rail siding.

CREATION OF BARAK RIVER NATIONAL WATERWAY

In the pre-Independence era, the Barak river was used for IWT quite intensively. After 1947, this traffic ebbed and vanished altogether by 1965. There is now a need to develop the Barak river as a national waterway, preferably for connecting Manipur and Nagaland to Chittagong port. In case that does not fructify due to political issues with Bangladesh, the river can still provide a connection between the proposed inter-modal hub at Badarpur and the hinterland served by the river.

CREATION, MAINTENANCE AND REPAIR FACILITIES FOR VESSELS

Right from its inception in the 19th century, IWT was developed with its focus at Kolkata. It was hence natural that the maintenance facilities for the mechanised boats engaged in this movement were developed around the city. But to make the movement from Sadia to Dhubri independent of the rest of the segment, it is imperative that maintenance and repair facilities for these boats are developed at Pandu (near Guwahati) without any delay. This will also make strategic sense.

DEVELOPMENT OF A GIS-BASED STATISTICAL INFORMATION SYSTEMS

GIS-based statistical information systems should be developed to support policy, management and operational decision-making.

STIMULATING INVESTMENTS

If an enabling policy and planning framework is put in place, investments can then be stimulated in areas such as:

- Ships, ferry services and transport enterprises
- Modern material handling facilities on the Brahmaputra river at key nodes, e.g. for coal in Jogighopa for the Bongaigaon NTPC thermal power plant
- Appropriately designed barges that can promote containerised traffic on the Brahmaputra and Barak rivers
- Creation of multi-modal hub facilities at appropriate points such as Badarpur
- Facilitation of cargo transshipment between seagoing ships and inland vessels for onward distribution
- Small scale inland water transport for both passengers and cargo: Passengers and cargo are moved via inland water transport both in the organised sector and in the unorganised sector. In the unorganised sector, the fleet consists of wooden boats equipped with agricultural pumps. At present, there are no data regarding the transport volumes within this sector. However, this mode of transport is essential to small or remote communities for the transport of agricultural and commercial products to and from regional markets and growth centres, especially during the monsoon and flooding season. Therefore, relatively small investments in transport facilities for private or small-scale transport services would increase the strategic connectivity of rural communities through ferry services and small goods transport. An analysis should be undertaken to identify strategic nodal points through which increased access to markets, education, or health services might bring benefits to the region. Modernisation of country

craft development should be taken in hand to extend services to the feeder route.

For such investments to become feasible, they would have to pass the test of economic and financial viability. This will be facilitated by the clear announcement of public investment programmes related to the strengthening of IWAI for undertaking the creation of waterways infrastructure, and a stable policy framework that results from international arrangements referred to above.

There is a growing realisation that increased economic partnership with Bangladesh will bring substantial benefits. While India's foreign policy has seen certain developments to this end during the last couple of years, the traction needs to be sustained.

The desired development of IWT cannot be achieved through public investment alone; the private sector has a crucial role to play. As brought out by Dr Sriraman in his paper Long term perspectives on IWT in India, the 9th Plan has clearly recognised and envisaged the role of private sector in IWT, particularly in:

- Ownership and operation of vessels for cargo and passenger movement
- Fairway development and maintenance
- Construction and operation of terminals and river ports
- Provision of mechanised handling systems, maintenance of navigational facilities etc.
- Pilotage facilities
- Setting up and operating IWT training institutions

Apart from permitting Foreign Direct Investment upto 100 per cent of equity, government support has been outlined as conduct of pre-feasibility, preparation of DPRs by IWAI, land acquisition, long-term cargo assurance, equity participation etc. While the private sector response has so far been lukewarm, there are indications of some private investments being planned, particularly for vessel acquisition and construction of barges/jetties. Greater participation by the private sector shall be ensured through favourable policy framework and viable traffic volumes.

CROSSING THE BRAHMAPUTRA

As mentioned before, the 890 km length of Brahmaputra from Dhubri to Sadia has three existing bridges, and two more are under construction. Both for security and general communication, this is grossly

insufficient. Safe, modern and regular ferry services with RO-RO facilities should be operational at proper intervals. Currently, more than 70 ferry services are operational in Assam, out of which 50 services are being operated by the IWT department of the government of Assam.

IWAI is working on building terminals and RO-RO connectivity between Dhubri and Hathsingimari. A study should be conducted to locate more points where quality ferry services and RO-RO services should be introduced.

CONNECTIVITY WITH NEIGHBOURING COUNTRIES

LOOK EAST POLICY

The Look East Policy (LEP) was launched in 1992 just after the cessation of the Cold War and around the time when India was embarking on its first, and effective, dose of liberalisation. It was a strategic policy decision taken by the government and to quote Prime Minister Dr. Manmohan Singh, 'it was also a strategic shift in India's vision of the world and India's place in the evolving Indian economy'.

As a result, gradually but surely, India has begun to figure in the strategic thinking of Southeast Asia and there has been increasing cooperation on many fronts. ASEAN too began considering closer ties with India. India also started recognising the growing influence of ASEAN in the region while the LEP provided the right backbone to support domestic and public consensus in desirability of forging closer engagement with Southeast Asia. ASEAN has indeed emerged as a strong group of nations whose economy has been constantly looking up. There is hence a major potential in ASEAN-India cooperation on infrastructure. The Comprehensive Asian Development Plan (CADP) and the Master Plan on ASEAN connectivity (MPAC) emphasise the importance of ASEAN connectivity with neighbouring countries in South East and East Asia. ASEAN-India connectivity is the main theme of the CADP Phase II report. Development of the transport infrastructure in the NER and its simultaneous integration with ASEAN will not only shore up the Indian economy but also enhance India's reputation in the South East Asian region. (See Chapter 13, Volume II on Promoting International Transport Connectivity) between India and the South and South East Asia Regions.

NER TO PLAY THE ARROWHEAD

In October 2007, a closed-door meeting of the Chief Ministers of the NE states, the External Affairs Minister and other senior Ministers saw the first formal articulation of the connectivity needs of the NER with neighbouring countries. Fortunately,

the following years have seen growing closeness of relationships between India on the one hand and Bangladesh and Myanmar on the other. As rightly expressed in NER Vision 2020, North East India is India's gateway to South East Asia. The Look East Policy also envisages increasing commercial interchanges between NER, our international neighbourhood and beyond to South East Asia. At present, however, India's international transport linkages with the East are highly underdeveloped, as are its linkages with Bangladesh. However, with the increasing realisation to develop such international linkages, a couple of transport projects are being undertaken while certain others are contemplated. These projects have been outlined here in addition to the Committee's recommendations. The ongoing activities and recommendations have been discussed country-wise and not sector-wise.

IMPROVING LAND CONNECTIVITY

Land connectivity is the most effective and essential form of linkage across the international borders. Before considering country-specific external linkages, it is important that the complementary internal transport infrastructure develops as adequate integration to market places and centres of production alone will ensure equitable spread of benefits accruing from such investments. Due to the history of close cultural, commercial and economic linkages, there has been a free flow of informal trade across these borders. To formalise these linkages, we have to initiate operation of Land Custom Stations (LCSs) and the proposed Integrated Check Posts (ICPs) at suitable locations where sizable volumes of traffic is anticipated.

Of the total 5,437 km of international border of the NER, 1,880 km is with Bangladesh and 1,643 km is with Myanmar. (Table 6.1)

There are 38 LCSs notified under section 7 of the Customs Act, 1962, in the NER. But even today, most of these notified LCSs have very poor road connectivity. The government of India is working to upgrade the following five LCS to Integrated Check Posts at an approximate investment of Rs 120 million each:

- A. With Bangladesh
 - i. Dawki in Meghalaya
 - ii. Agartala in Tripura
 - iii. Satarkandi in Assam
 - iv. Khwarpuchia in Mizoram
- B. With Myanmar
 - v. Moreh in Manipur

A new statutory authority, the Land Ports Authority of India, has been created under an eponymous Act recently. The ICPs will function under this authority, though sovereign functions will continue to be

Table 6.17
The Trilateral Highway

S.NO.	STRETCH	REMARKS
1.	Tamu-Kalewa	Part of the Friendship Road. Good condition.
2.	Kalewa-Yagyi	India is constructing this stretch.
3.	Yagyi-Chaungma-Monywa	Myanmar is constructing this stretch.
4.	Monywa-Mandalay	Monywa-Mandalay stretch is already developed.
5.	Mandalay-Meiktila Bypass	This stretch is part of Mandalay-Yangon expressway. It is well developed.
6.	Meiktila bypass Taungoo-Oktwin-Payagyi	This stretch is part of Mandalay-Yangon Express Way. It is well developed.
7.	Payagyi-Theinzayat-Thaton	It is in good condition.
8.*	Thaton-Mawlamyine-Kawkareik	It is in good condition.
9.*	Kawkareik-Myawaddy	It is understood that Thailand is looking for funding from ADB to develop this stretch.
10.*	Myawaddy-Mae Sot	It is in good condition.

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDPCC.
Note: * Stretches from 8 to 10 are being developed by Thailand though the stretches are in Myanmar.

provided by the designated departments. This initiative is worthwhile. However, certain issues still need to be addressed.

- i. The LCSs which are not being upgraded to ICPs do not have any single-point administrative control for their management or development. Their development is done by state governments with funds from Assistance to States for Developing Export Infrastructure and Allied Activities (ASIDE) scheme of Commerce Ministry. Hence, their development is bereft of systematic planning and dependent on states' priorities.
- ii. The second drawback is that backward integration in terms of connectivity suffers. As there is tremendous pressure on the state governments for different roads catering to different ethnic/pressure groups, connectivity to LCSs which are perceived as Central Government responsibility remain neglected.

It is, therefore, recommended that a special programme to provide linkages to the Land Custom Stations should be taken up. Along with roads, improvement in the facilities at the LCSs should be taken up in a planned manner.

IMPROVING INTERNATIONAL AIR CONNECTIVITY

While country-specific transport linkages (particularly through road, rail and water) are discussed in detail in the following sections, a possible option to develop international connectivity through the NER with India's neighbouring countries also becomes relevant and needs consideration. Building on the recommendation made in the section on aviation earlier, the Hub and Spoke model proposed with smaller aircrafts can extend their operations to Dhaka, Thimpu, Myanmar and even further to the commercially active city of Mandalay. As such, certain airports are being made international as part of India's Look East Policy to boost the NER's connectivity and trade with South East Asia. Therefore, exploring viability of the Hub and Spoke model and with certain (Imphal and Agartala are proposed) airports becoming international, the air connectivity between the cities of the NER and Myanmar, Bangladesh and other neighbouring countries would be easier and boost trade, tourism and people-to-people contact.

BANGLADESH

The transport links with Bangladesh that were broken as a result of the Partition and then completely severed after the 1965 Indo-Pak War have been discussed in detail. The resultant damage to the economy of the NER is also well understood. Sincere efforts are needed by both nations to reconstruct and further develop their connectivity links and strengthen bilateral ties. There is a growing realisation that increased economic partnership will bring substantial benefits. While India's foreign policy has seen certain developments to this end during the last couple of years, the traction needs to be sustained and focused on-ground implementation.

ONGOING DEVELOPMENTS

Following high-level interactions between the Prime Ministers of the two countries, there has been an agreement on several important transportation and trade milestones.

- India to gain access to Chittagong and Mongla Ports in Bangladesh
- Agartala-Akhaura Railway line, which will provide rail connectivity between Tripura and Bangladesh
- Development of border haats on the Indo-Bangladesh border which will promote trade and connectivity
- Bridge over river Feni between India and Bangladesh at Sabroom, Tripura. It is recommended that this should be a rail-cum-road bridge to link the under-construction Agartala-Sabroom railway line to Chittagong
- Development of Sabroom-Ramgarh and Dhemagiri-Tegamukh border points which will provide new connectivity between Bangladesh, Tripura and Mizoram. It may be stated here that Mizoram, prior to Independence, had exchange of commodities through the Dhemagiri-Tegamukh route via the Karnaphuli river. Presently, Mizoram has no connectivity to Bangladesh.
- Reviving the Kulaura-Mahisashan rail link

EXTENSION OF THE INDO-BANGLADESH PROTOCOL

The Indo-Bangladesh Protocol on Inland Water Transit and Trade has been applicable since 1972. Four routes are specified with five ports of call in each country. The protocol permits inland vessels of one country to transit through the specified routes of the other country. The existing protocol routes are:

- Kolkata-Pandu-Kolkata
- Kolkata-Karimganj - Kolkata
- Rajshahi-Dhulian-Rajshahi
- Pandu-Karimganj-Pandu

For inter-country trade, following five ports of call have been designated in each country:

Ports of Call in India

- Haldia (West Bengal), Kolkata (West Bengal), Pandu (Assam), Karimganj (Assam) and Silghat (Assam).

Ports of Call in Bangladesh

- Narayanganj, Khulna, Mongla, Sirajganj and Ashuganj.

A point earlier made needs reiteration. The IWT Protocol should be extended for 20 years so that both India and Bangladesh's business can make informed long term investment choices and benefit.

REGIONAL MOTOR VEHICLE AGREEMENT

A draft Regional Motor Vehicle Agreement expected to provide an enabling legal framework for seamless travel across SAARC borders has been on the drawing board for several years now. North Eastern states would be largely benefited by such an agreement.

NEW BUS SERVICES

An Agartala-Dhaka bus service has been in operation since 2003, underscoring the close bonds on both sides. Bus services on both sides linking Sylhet to Shillong and Dawki, Dhaka and Shillong, and Dhaka and Guwahati should also be started. emphasis

CONNECTING MEGHALAYA AND TRIPURA WITH BANGLADESH

Connecting Meghalaya with Bangladesh at Dawki, Shella, Baghmara, Burengapara and Mahendraganj and similarly Tripura at Kalkalighat, Kamalpur, Khowai, Ranir Bazar and Sabrum will develop international linkages with Bangladesh. This will facilitate alternate routes between these two states, with rest of the country, access to the Asian Highway network and connectivity with major cities in Bangladesh.

By linking Mizoram at Tlabung with Bangladesh, a much shorter route between Mizoram and Tripura (at Sabroom) could be developed. Apart from this, alternate routes between Mizoram and Meghalaya can be developed through Bangladesh (via Chittagong and Dhaka).

INDO-BANGLADESH RAIL CONNECTIVITY

A prestigious project has already been taken in by the Government of India by providing funds for connecting Akhaura (Bangladesh) and Agartala (India). This will provide access to Dhaka as well as Chittagong. However, this will remain on metre gauge which would need transshipment at Agartala. Possibility should be explored for mobilising fund for conversion of line from Agartala to Dhaka-Chittagong from MG to BG to have seamless freight operations on this route. When India and Bangladesh finally agree for opening of Chittagong, this seamless connectivity will unlock value for

both India and Bangladesh. It will also provide a unifying connectivity from Kolkata to the NER and beyond via Dhaka–Agartala. There is already a proposal for surveying a rail connection from Belonia (India) to Chittagong (Bangladesh) which may also be pursued.

MYANMAR

There has been a series of high-level visits between India and Myanmar in 2010, 2011 and 2012. With the advent of democracy in Myanmar, relations are on an upswing. The main gateway between Myanmar and India is at Moreh (Manipur)–Tamu (Myanmar). Arunachal Pradesh, Nagaland, Manipur and Mizoram share a 1600 km border with Myanmar along with strong cultural and ethnic links. Due to difficult terrain and insurgency on both sides, transportation linkages have not adequately developed.

India has built the Moreh-Tamu-Kalemyo-Kalewa (TKK) Friendship Road in Myanmar. Apart from Moreh, the only other connecting links are at Pangsau Pass in Arunachal Pradesh and Zawkhathar in Mizoram. Recently, it has been decided to develop Pangsau Pass as a first formal border haat between India and Myanmar on the lines of the Indo-Bangladesh border haat on the Meghalaya border. At Zawkhathar, India has a well-developed LCS but hardly any trade takes place as links between Zawkhathar and Rih and beyond in Myanmar are very poor. *India is now developing the Rih-Tiddim Road with grant assistance to Myanmar.*

The proposed Trilateral Highway between India, Myanmar and Thailand as part of the Asian Highway project can be a game changer for the NER as it will provide direct road connectivity to the markets of South East Asia. It is expected to be completed by 2016. The known status of this road beginning from Moreh in Manipur to Mae Sot in Thailand is shown in Table 6.17.

Along with the initiated transport projects, certain others are recommended:

IMPHAL-MANDALAY BUS SERVICE

A bus service between Imphal and Mandalay has been a persistent demand from Manipur. Though it was expected that a protocol would be signed between the two countries during the recent visit of Prime Minister, Dr Manmohan Singh, to Myanmar in May 2012, due to certain technical reason it could not materialise. It is understood that the Myanmar Government is positive on the idea. *It is recommended that the bus service should be started without waiting for a perfect road as the road from Tamu to Mandalay is not good in some parts.*

INDO-MYANMAR RAIL CONNECTIVITY

The railway link to Imphal is expected to be completed by 2016. While this line is under construction, the survey for extending the line from Imphal to Moreh and from Moreh to Mandalay should be completed. A railway link (BG) upto Mandalay will open great opportunities for trade and travel between India, Myanmar and South East Asia. It is also suggested that the Kaladan transport project (discussed below) also should have rail connectivity from Sittwe port to a suitable point in India (Mizoram)—either Sabroom or Lawngtlai.

KALADAN MULTI-MODAL TRANSIT TRANSPORT PROJECT

It is a strategically important project for India providing link from Indian ports on the East Coast to Sittwe in Myanmar and onwards to the waterway on the Kaladan river. It will link South Mizoram to Myanmar providing an alternate connectivity to the NER, the others being the Chicken's Neck and the Indo-Bangladesh Protocol waterway route. Getting transit right to Bangladesh for NER is uncertain. Hence, the strategic importance of the Kaladan project cannot be over-emphasised. It is recommended that a draft transit protocol between India and Myanmar be worked out soon and discussions undertaken. To strengthen the connectivity through Sittwe and to make Imphal a railway hub for the region, the following routes are recommended:

- i. **Rail link from Sittwe (Myanmar):** The Kaladan Multi-modal Project is providing link from Sittwe through a waterway and road link in Myanmar. The Government of India has decided to provide funds for development of Sittwe port. However, the port does not have rail connectivity. It is recommended that rail connectivity from Sittwe to Aizawl should be conceptualised as it would help us exploit the investment in Sittwe port properly. Proper arrangements for handling containers on this route also have to be ensured. The line from Sittwe port can join Silchar which in turn is proposed to be connected to Meghalaya (proposed Dhubri-Silchar-Badarpur).
- ii. **Connectivity from Sittwe through Mizoram-Manipur:** It is suggested that a railway line be built from Paletwa (Myanmar)–Indo Myanmar border–Lawngtlai (Mizoram)–Aizawl–Churachandpur–Imphal. This could be a long term projection. Due to the low draft of Sittwe port, it cannot carry ships beyond 10,000 tonnes. A new deep sea port is being built in Myanmar at Kyaukpyu which can take vessels bigger than what Sittwe can take. To enable larger ships from mainland India to be able to dock in Myanmar and transport goods northward to the NER by land, India can consider a railway line starting from Kyaukpyu instead of Sittwe.

iii. **Imphal as new rail hub (national and international):** Through these new railway projects, Imphal too can become a rail hub in future in the following manner:

- a Present proposal: Jiribam-Tupul-Imphal (National Project)
- b Eastward extension: Imphal-Moreh-Man-dalay
- c Northward extension: Imphal-Kohima-via Northern Nagaland-Tirap (Arunachal Pradesh)
- d Southern extension: Line coming from Paletwa (on the Kaladan multi-modal route)-Indo-Myanmar border-Lawngtlai-Aizawl-Churachandpur-Imphal.

It is proposed that Imphal be made a hub for railway connectivity with Myanmar from two sides and also get Nagaland and Arunachal Pradesh.

BHUTAN

India partners closely with Bhutan in its development as much as it does to be its biggest trade partner. A free trade regime (under the India-Bhutan Trade and Commerce Agreement) exists between India and Bhutan which is reflective of the strong bilateral ties that concede to mutually beneficial economic linkages between the two countries.

Currently, the major items of exports from Bhutan to India are electricity (from Tala, Chukha and the Kurichhu hydroelectric project), base metals and articles, minerals, vegetable fat and oils, alcoholic beverages, chemicals, cement, timber and wood products, cardamom, fruit products, potatoes, oranges and apples, raw silk, plastic and rubber products. Major exports from India to Bhutan are petroleum products, mineral products, base metals and articles, machinery, automobiles & spares, vegetable, nuts, spices, processed food and animal products, chemicals, wood, plastic and rubber. The Agreement on Trade and Commerce also provides for duty-free transit of Bhutanese merchandise for trade with third countries. Sixteen exit/entry points in India identified in the Protocol for Bhutan's third country trade are Jaigaon, Chamurchi, Ulta Pani, Hathisar (Gelephu), Darranga, Kolkata, Haldia, Dhubri, Raxaul, Panitanki, Changrabandh, Phulbari, Dawki, New Delhi, Chennai and Mumbai. Of these, Kolkata, Haldia, Mumbai and Chennai are the designated seaports, Dhubri is the riverine route, New Delhi, Chennai, Mumbai and Kolkata are the air routes and Raxaul is the rail route. The others are the designated road routes.

During 2010, imports from India were of the order of Rs 29 billion and constituted 75 per cent of Bhutan's total imports. Bhutan's exports to India in 2010

amounted to Rs 26 billion and constituted 90 per cent of its total exports. Total trade in 2010 grew by about 26 per cent from 2009.

There is an urgent need to improve connectivity between India and Bhutan both by road and rail. By connecting Jashingang Dzong (in Bhutan) with Arunachal Pradesh and Assam three alternate routes will be developed improving inter-state connectivity. These routes are:

Connectivity between Assam and Arunachal Pradesh via Bhutan

- i. Tawang (Arunachal Pradesh)-Jashingang Dzong (Bhutan)-Darranga (Assam). This will provide an alternate route between Arunachal Pradesh and Assam.
- ii. Tawang (Arunachal Pradesh)-Jashingang Dzong-Mongar-Dzong-Kogkha-Tongsa Dzong-Shemgang Dzong-Gelekphu (all in Bhutan)-Rani Khata (Assam). This provides another alternate route between Assam and Arunachal Pradesh.

Connectivity between West Bengal and Arunachal Pradesh via Bhutan (circumventing Assam)

- iii. Tawang (Arunachal Pradesh)-Jashingang Dzong-Mongar-Dzong-Kogkha-Jongsa Dzong-Punakha-Gasa-Dotanang-Pokangnag-Thimphu-Kyapcha-Chanakha (all in Bhutan)-Jaigaon (West Bengal).

Rail Connectivity between India and Bhutan

- iv. There are on-going surveys for rail connectivity to Bhutan with three alignments under consideration at present. It is suggested that a possibility be explored, reaching right upto Thimpu, the capital of Bhutan, in one of these alignments. Alternatively, Thimpu may be connected to Itanagar via Tawang via rail.

SUMMARY

It is for the first time that while formulating the National Transport Policy, special and specific attention has been paid to the transport needs of the North Eastern Region. The Committee decided to look at the situation under three categories:

1. Intra-Regional transport connectivity
2. Inter-Regional transport connectivity
3. Trans Border Movement

It was considered necessary by the Committee that the development of transport in the North Eastern Region should be ahead of the transportation links to be developed with the neighbouring countries so that the NER can exploit fully the connectivity with

neighbouring countries by way of enhanced trade and commercial activities. In a nutshell, recommendations for the NER are:

ROADS

Roads are going to be the mainstay for bringing transformational changes in infrastructure of the region.

- i. It is necessary to form a separate body under the aegis of MODONER to monitor the construction activities in the sector.
- ii. Road maintenance is a huge challenge for the NER. It is recommended that a policy decision be taken to cover maintenance expenditure under the Plan. All road contracts should have in-built provision of periodic maintenance and its reporting by the contractor for a period of initial five years. Subsequently, the state governments should be responsible for drawing a master maintenance plan, preferably in blocks of five years. This master maintenance plan shall then form the basis on which the funding agencies will release funds.
- iii. It is imperative to have a GIS mapping of roads in this region for which MoRTH should provide funds to the states and undertake the responsibility without any delay.
- iv. There is a need for changing the technology being used for construction of roads to improve their longevity.
- v. There is a need to have training institutions to develop skills in the local population for good maintenance of roads constructed both with the present technology and the superior technology whenever adopted.
- vi. There is a need for foot suspension bridges in abundance.
- vii. While four-laning of many routes has been recommended and many of them have already been sanctioned, the Committee feels that it would be prudent to have an additional two lane constructed on the other side of the hill so that in case of landslides, the whole route does not get blocked/and suspended. It may also help in meeting the environmental considerations.

RAIL

- i. New railway lines, one connecting Sittwe in Myanmar to Tirap in Arunachal Pradesh across Mizoram, Manipur and Nagaland and another line connecting Dhubri to Silchar via Meghalaya is considered essential to improve transportation in the region.
- ii. The railway has now extensive knowhow of tunnel construction. They should reduce distances by making prudent use of tunnels.

CIVIL AVIATION

Civil aviation holds the key to not only linking the region to the rest of India, but also catalysing trade and commerce with the neighbouring countries.

Guwahati Airport must be developed as a major international airport as a gateway to ASEAN countries.

It would be financially desirable to make a model for bringing in PPP as suggested in the report to develop a viable civil aviation network in the region.

It is felt that bringing in private operators may change the scenario so much that cheap air travel may become possible through induction of smaller aircrafts with better technology for which onetime capital cost may be met by the Government and the private operators may be asked to operate the services without any dependence from subsidy for day-to-day operations.

In keeping with the geographical contours of the region and the thin spread of population, we are of the view that a hub and spoke model with hubs at Guwahati, Imphal and Agartala should be developed for the region.

DONER should catalyse development of meteorological forecasting network in the region to make civil aviation predictable and safe. The necessary investments for that may be provided by the Government through DONER.

Development of skills among the local population not only for operations of aircrafts but also for maintenance needs to be undertaken. This can be done by bringing in an institute not only for developing aeronautical engineers but also for subordinate maintenance staff. This would facilitate night halt of aircrafts at various locations and provide connections in early morning so that local population may be in a position to reach Kolkata/Delhi/Mumbai in the morning hours to attend meetings and return in the evening.

There is a vast network of airports in the region due to the war effort during World War II, but many of them are lying dormant. It has been suggested that a few of these airports should be made operative within a time frame for civilian use to provide better connectivity not only for men but also for cargo.

These would help establish connectivity required for horticulture/floriculture/aquaculture common in the region.

INLAND WATERWAYS

- i. Large paraphernalia already exists for inland water transport in the river Brahmaputra. Proper usage of this capital is necessary,

which can be achieved by entering into a long time treaty with Bangladesh Government to provide access from West Bengal through Assam to their river system. This can be possible if the Indo-Bangladesh Protocol on Inland Water Transit & Trade is extended for at least 10 years at a time to attract investment.

- ii. Maintenance of barges and other supporting equipment must be developed near Guwahati without any further delay. This would make the barges available for the longer duration for transportation.
- iii. Inland water transport should be utilised for movement of over dimensional consignments to avoid congestion on roads especially in the Chicken's Neck area of the corridor between North Bengal area and Assam.
- iv. Barak River should be utilised for inland water transport in the North Eastern Region and also connecting it to Bangladesh by taking up this project as a National Project on similar lines as has been done for river Brahmaputra.
- v. The optimal use of the waterways in the North East requires investment in vessels and their regular operations. Apart from the policy regime of an extended period of the Indo-Bangladesh Protocol, an agency either in the public sector or with introduction of private players has to be found.
- vi. Infusion of PPP in inland water transport.

DEVELOPMENT OF MULTI-MODAL HUBS

The geography and demography of the region is spread in such a manner in the North Eastern Region

that the committee feels that development of multi-modal hubs at two stations will facilitate smooth transportation in the region in times of calamity as well as insurgency. These hubs have to be developed at following stations:

- Dhubri
- Badarpur

At both stations, it is possible to have connectivity from rail, road, inland water transport as well as civil aviation. These multi-modal hubs can be later on given to private players for operation or may be run by a corporation developed for the purpose.

CONNECTIVITY WITH SOUTH EAST ASIA

The Look East Policy envisages increasing commercial interchanges between NER, our international neighbourhood and beyond to South East Asia. At present, however, India's international transport linkages with the East are highly underdeveloped, as are its linkages with Bangladesh. India could not leverage the shared colonial experience, cultural affinities and an incredible historical baggage to build relations with Southeast Asia. The Committee recommends that it is an opportune time for India to develop strategic long term view on intensifying international transport linkages from the north east region to its neighbours like Bhutan and Bangladesh as also the ASEAN countries, Myanmar in particular. For such international linkages to be productive there has to be even better transport integration of the region internally, and with the rest of India.

Annex 6.1

State-wise Airports/Advanced Landing Grounds

[Updated as of April, 2012]

AIRPORT AIRFIELD/ ADVANCED LANDING GROUNDS (DISTRICT)	OWNERSHIP	STATUS	PLANS
ARUNACHAL PRADESH			
Aalo (West Siang)	Ministry of Defence (Indian Air Force)	Being developed for dual use (military & civil) depending on availability of land for civilian conclave. Indian Air Force and Airports Authority of India are developing the military and civil enclave respectively.	State government to inform whether 7 acres for civil enclave will be available. Defence portion will be completed by March, 2014.
Pasighat (East Siang)	Being transferred to Indian Air Force by AAI.	-do-	AAI will construct civil enclave on 5 acres to be retained by it. Lease agreement for transfer of Pasighat airport from AAI to IAF is being finalised.
Ziro (Lower Subansiri)	Ministry of Defence (Indian Air Force)	-do-	State government to inform whether 10 acres for civil enclave will be available. Defence portion will be completed by March, 2014.
Daporijo (Upper Subansiri)	Airports Authority of India	Will be developed by AAI depending upon the availability of land from the State Government.	State government to inform whether land for civil enclave will be available. Daparizo Aerodrome to be developed and opera- tionalised by AAI for ATR-42 operations. Additional 34.3 acres requested from State Govt. Development works can be taken up after provision of additional Land and fund.
Mechuka (West Siang)	Ministry of Defence (Indian Air Force)	Being developed as Advanced Landing Ground	Will be completed by March, 2014.
Tawang (Tawang)	-do-	-do-	
Tuting (Upper Siang)	-do-	-do-	
Vijaynagar (Changlang)	-do-	-do-	
Walong (Anjaw)	-do-	-do-	
Tezu (Lohit)	Airports Authority of India	Being developed for ATR-72 type of aircraft with VFR	Being developed with funds with NEC. Will be ready by December, 2013. The State government has transferred Tezu Aero- drome along with additional 108 acres of land to AAI in Sept. 2010 for upgradation / development for ATR-72 type of operation. NEC has sanctioned Rs.0.8 billion in 2009-10 to AAI.
Itanagar (Papum Pare)	Proposed Greenfield - The site of the proposed airport is under discussion.		
ASSAM			
Guwahati (Kamrup) (DGCA licensed as Public Use Category as on 31.12.2011)	Airports Authority of India	Operational International Airport. Being de- veloped as Inter-Regional Hub.	Runway extension by 360 metres already completed and commissioned. Apron expansion to accommodate 11 additional park- ing stands completed and commissioned. Construction of Parallel Taxi Track subject to avail- ability of land from IAF planned. Installation of Cat-I Approach Lights for Runway 02 will be taken up subject to availability of land from IAF. Construction of new integrated terminal building subject to availability of land for city side develop- ment.
Dibrugarh (Dibrugarh) (DGCA licensed as Public Use Category as on 31.12.2011)	-do-	Operational	Extension of runway from 1829 to 2286 metres and allied works. Construction of aircraft maintenance hangars and apron for A-321 hangar.

AIRPORT AIRFIELD/ ADVANCED LANDING GROUNDS (DISTRICT)	OWNERSHIP	STATUS	PLANS
Lilabari (Lakhimpur) (DGCA licensed as Public Use Category as on 31.12.2011)	-do-	Operational	Night Landing Facilities – being planned, requires provision of additional land from State Govt.
Jorhat (Jorhat)	Indian Air Force (civilian enclave)	Operational	Expansion of Civil apron at a cost of Rs 0.08 billion. Construction of new terminal building subject to provision of 9 acres of land as requested from State Govt. for City side development.
Tezpur (Sonitpur)	-do-	Operational	--
Silchar (Cachar)	-do-	Operational	New Domestic Terminal Building subject to land availability.
Rupsi (Dhubri)	Being transferred to Indian Air Force. To be developed for dual use.	Non-Operational	AAI Aerodrome being transferred to IAF for its de- velopment and operationalisation of ATR-72 type of aircraft. AAI will construct and manage a civil enclave.
MANIPUR			
Imphal (Imphal) (DGCA licensed as Public Use Category as on 31.12.2011)	Airports Authority of India	Operational	Night Landing facilities have been installed and com- missioned on 21 st May, 2010. Additional 640 acres approximately provided by State Govt. for future airport development for bigger size aircraft like Boeing 747-400. Construction of aircraft maintenance hangars for A-321 hangar. Runway extension by 350 metres in phase-I for wide bodied 'D' category aircraft is in planning stage.
MEGHALAYA			
Shillong (Barapani) (East Khasi Hills) (DGCA licensed as Public Use Category as on 31.12.2011)	Airports Authority of India	Operational	Construction of boundary wall around newly acquired land.- DPR for safety and security infrastructure including perimeter wall etc. Runway extension Expansion of apron for A-321 type of aircraft. Construction of new ATC tower and technical block Construction of new Fire Station Construction of Isolation Bay. Installation of Night Landing Facilities and ILS.
Tura (West Garo Hills)	Government of Meghalaya	Though the airport is operation- al, there are no regular flights.	Aerodrome belongs to state government. of Meghalaya. On the request from state government, AAI has submitted a DPR for expansion of existing airport for operationalisation of ATR-72 aircraft to Ministry of Civil Aviation and State Govt along with the request to provide approximately 56.5 acres of additional land. State government is yet to respond.
MIZORAM			
Lengpui (Aizawl) (DGCA licensed as Public Use. Category as on 31.12.2011)	Government of Mizoram	Operational	--
Tural (Aizawl)	Airports Authority of India	Non-operational	

AIRPORT AIRFIELD/ ADVANCED LANDING GROUNDS (DISTRICT)	OWNERSHIP	STATUS	PLANS
NAGALAND			
Dimapur (Dimapur) (DGCA licensed as Public Use Category as on 31.12.2011)	Airports Authority of India	Operational	
Cheithu (Kohima)	Proposed Greenfield – under discussion		
SIKKIM			
Pakyong (East Sikkim) Greenfield Airport	Airports Authority of India	Under construction Proposed date of Completion – June, 2014 Actual operationalisation may take another six months.	
TRIPURA			
Agartala (West Tripura) (DGCA licensed as Public Use Category as on 31.12.2011)	Airports Authority of India	Operational	Construction of new control tower in progress - Near- ing completion Construction of aircraft maintenance hangars for A-321 hangar. State government has been requested to provide 303 acres for expansion and airport development, which includes: (i) 31 acres for shifting of Glide Path – required for full landing distance available on runway; (ii) 26 acres for runway strip – for DGCA license;
Khowai (Khowai)	Airports Authority of India	Non-operational	As per study, cannot be developed
Kailashahar (North Tripura)	-do-	-do-	Cannot be developed for ATR-72 operations due to one side bandh and other side highway.
Kamalpur (North Tripura)	-do-	-do-	AAI conducted feasibility study for its operationali- sation for ATR-72 which requires provision of 50.5 acres of land which has already been requested from State Govt. State Govt. is vet to respond.

Source: Airports Authority of India.

Annex 6.2

SMALL AIRCRAFTS FOR INTRA-REGIONAL CONNECTIVITY: ANALYTICAL MODEL

An analytical model to assess the viability of operating aircrafts to provide intra-NER connectivity is presented below to illustrate that operating small aircrafts can make business sense.

Considering the significance of the development of the civil aviation industry in the NER, an exercise has been carried out to examine the typical economics of airline operations. The main objective of this exercise is to identify a workable option for providing regular and reliable air service in the North East Region.

METHODOLOGY AND RESULTS

Owing to the absence of data on operation of air services, the committee has relied upon the data provided by one of the private airline operators. This data has been modified keeping in view the Indian conditions in discussion with the aviation experts. Liberal norms have been adopted to work out the cost. Accordingly, the cost of operations worked out could perhaps be on the higher side.

The cost per available seat kms has been computed for 3 different scenarios - 2,000, 2,500 and 3,000 flying hours over a distance of 100 nm, 200 nm, 300 nm (Model calculation on viability with 2000 flying hours is placed at Annex 6.4).

The identification and classification of cost elements was based on the data provided for running

Table 1
Computation of Revenue per Passenger Kilometre

ORIGIN-DESTINATION	REVENUE PER PASSENGER (INR)	AIR DISTANCE BETWEEN O-D (KM)	REVENUE PER PASSENGER KM (INR/KM)
Aizwal-Imphal	2,395	172	13.92
Guwahati-Agartala	2,495	267	9.34
Aizwal- Guwahati	2,675	288	9.29

Source: NTDP.

Table 2
Computation of Revenue per Passenger Kilometre

ORIGIN-DESTINATION	REVENUE PER PASSENGER (INR)	AIR DISTANCE BETWEEN O-D (KM)	REVENUE PER PASSENGER KM (INR/KM)
Aizwal-Imphal	3,439	172	20
Guwahati-Agartala	3,439	267	12.88
Aizwal-Guwahati	4,429	288	15.38

Source: NTDP.

a Dornier 328 Jet aircraft. For a typical 32 seater aircraft, the study indicated that the operating cost per ASKm (available seat Km) for all the different scenarios were in the range of Rs 8.96 to Rs 11.73. Assuming a load factor of 75 per cent under the various scenarios, the operating cost per RPKms turns out to be in the range of Rs 11.95 to Rs 15.64. This cost is further subjected to reduction since the above calculation has not taken into account the aspect of exploring air based freight transportation of:

- i. Floriculture, horticulture and spices
- ii. Express Mail and Postal Services

Since tourism is at its nascent stage in the NER, scheduling of hopping flights during the day hours is another possibility to promote inter-regional, intra-regional as well as international connectivity in the NER.

Table 6.1 provides existing system of pricing of air tickets by Air India in the NER. The figures have been extracted from the airline's official webpage and the calculation thus involves some level of judgment and empiricism due to lack of sound database.

The above air fares are prevalent in a time lag of two months from the day of booking an air ticket. Table 6.2 shows the price structure between the cities on a very short notice period, say a day or two.

The results show that on a liberal basis, the simple average RPKms, ranges between Rs.10.85 to Rs.16.09 depending on the ticketing scenario. Since the data

of foot count of passengers travelling between O-D was not available, weighted average method could not be adopted.

It is observed that the simple average cost of airline operations for all the different scenarios, turns out to be Rs 13.40 at a load factor of 75 per cent while the simple average revenue charge per passenger from Air India for above three flights is Rs 13.49. Figuratively, this implies that on varying the load factor, the differential between the operating cost per ASKm and the Revenue per passenger km would diverge distinctly. This value would also differ on taking into account the revenue earned for movement of cargo by airline operators. For a load factor of 60 per cent, the operating cost turns out to be Rs 16.75 while it is Rs 14.36 at a load factor of 70 per cent. Thus, it provides a unique vantage point to call firsthand that there requires a shift in the paradigm of providing capital subsidy for airline operators in the NER once the available resources are allocated efficiently.

This calls for introducing a new and innovative policy based on operating smaller aircrafts. Airlines shall be required to focus on operationalising the existing smaller airports/airfields based on hub-and-spoke model which hinges on small aircraft-centric operations without locking up huge capital. This approach shall not only be cost-effective, but will also meet the local requirement and yield potential returns as unutilized and idle assets available in the region are put to productive use.

Annex 6.3

On-going Surveys (Railways)

PROJECT	REMARKS	KMS	COST (RS BILLION.)
ARUNACHAL PRADESH			
New Line from Lekhapani to Kharsang	Survey completed. Report under examination	31	3
New Line from North Lakhimpur to Shilapathar via Along	Survey completed and Report under examination.	248	112
New Line from Jagun to Nampong via Jairampur.	Survey not yet sanctioned.		
New Line from Miao via Jagun and Kharsang.	Survey not yet sanctioned.		
New Line from Pasighat-Tezu-Parsuramkund.	Survey in progress	130	
New line from Rowta to Twang via Udalgiri-Shikardanga-Kalaktang-Shergaon-Tenga.	Not yet sanctioned.		
New Line from Misamari-Tawang	Survey in progress	329	
ASSAM			
New Line from Silghat to Tezpur along with construction of bridge river across River Brahmaputra	Survey in progress sanctioned in 2011-12	33	
New Line from Salona to Khumtai	Survey completed, Report under examination.	99	29
New Line from Jorhat to Sibsagar. This part of Chaparmukh-Dibrugarh. To be done under PMRVY	Survey completed, 2010-11 and examined.	344	35
2 nd Railway Bridge at Saraighat across River Brahmaputra	Survey completed, Report under examination.		3
New Line from Tirap – Lekhapani	Survey completed, Report under examination	6	0.5
New Line from Pancharatna to Silchar	Shelved by Board	437	182
Doubling of New Bongaigaon to Kamakhya via Goalpara	Survey in progress	178	
Doubling of New Bongaigaon to Kamakhya via Rangiya	Survey completed	150	
Doubling of Digaru to Dibrugarh	Survey completed	520	32
Railway Electrification from Guwahati to Dibrugarh	RE from Katihar to Guwahati is sanctioned and work is in progress.		
MANIPUR			
New Line between Imphal-Moreh (Myanmar)	Survey to be sanctioned.		
MEGHALAYA			
New Line from Jogighopa (Panchratna)-Tirikila-Selsella-Zikzak-Baghmara-Ranikor-Shella-Dawki-Silchar.	Shelved by Board	437	1.82
New Line from Jowai-Lokro	Survey in progress	170	
New Line from Shillong to Chandranathpur	Survey sanctioned in 2011-12		
MIZORAM			
New Line from Sairang to Indo-Mayanmar Multi Modal Transit Transport Route at Hruitezwi and lateral extension to Tlabung and Chaphai.	Deferred		
Lalabazar (Assam)-to Vairengte (Mizoram)	-	20.3	3.6
NAGALAND			
New Line from Dimapur to Tizit	Survey is in progress	190	
New Line from Amguri to Naginimora	Survey completed and report under examination	31	3.8
New Line from Tuli-Tuli Town	Shelved	9	1.0

PROJECT	REMARKS	KMS	COST (RS BILLION.)
TRIPURA			
New Line from Agartala-Akhaura BG rail line as a National Project. (Total length on Indian side 5.4 Kms & cost Rs 1.0555 billion)	Survey in progress	10	2.5
New Line from Belonia (Tripura) to Belonia (Bangladesh) and Sabroom- Ramgarh.	Survey not yet sanctioned.		
SIKKIM			
Extension of New Line from Sivok -Rangpo (sanctioned) & Rangpo to Bhusuk (Gangtok)	Sivok – Rangpo sanctioned & being done by IRCON.	69	49
New Line between Mirik-Rangpo	Mirik-Gangtok:-Survey already done. Railways has been asked to explore possibility of connecting this line to Sivok-Rangpo-Gangtok line at some point to save on cost.	163	117

Source: Final Report of Working Group on Improvement and Development of Transport Infrastructure in the North East for the NTDP.

Annex 6.4

Model Calculation based on 2000* Flight Hours per year

NETWORK A/C UTILISATION	
Average Annual Block Hours per A/C	2308 BH per year
Average Annual Flight Hours per A/C	2000 FH per year
Average Annual Flights per A/C	1847 Sectors per year
Average Sector Distance	367 km
Annual Weeks of Operation	52 weeks per year
Flying Hours Per Month	166.67

CALCULATION OF TOTAL COST		
	TOTAL (P.A.) (MILLION)	PER HOUR
Fuel		
Average Fuel Price(Rs 63/ltr for 2000 hours @1050 lt/hr)	132.3	66,150
Ownership		
Ownership Cost per year	29.7	14,850
Insurance per year	4.95	2,475
Interest p.a.	32.30	16,151
Flight Crew		
Captain Salary per year	6	3,000
Co-pilot Salary per year	4.2	2,100
Crew Attendant (2 in nos.) per year	1.08	540
Maintenance, Charges and Handling		
Engineer Cost @ Rs 250,000 per month	3	1,500
Routine Maintenance Spares (excluding TBO)	5.5	2,750
2 technicians and 2 helpers salary @ Rs 200,000 pm	2.4	1,200
Landing gear overhaul reserve(@Rs 1,500/hour)	3	1,500
APU Overhaul Reserve(@Rs 1,000/hr)	2	1,000

CALCULATION OF TOTAL COST		
	TOTAL (P.A.) (MILLION)	PER HOUR
Annual Cost of Labour	0.15	75
Engine Overhaul Reserve(12,000 per hour)	24	12,000
Landing, Parking and Hangarage charges(@Rs 10,000/day)	3.65	1,825
Technical Office and Admin Expenses	13	6,500
Passenger Handling	60	30,000
Transportation and Airport Expenses	30	15,000
Catering	18	9,000
Total Direct Operating Cost	375,23	187,616
Total Cost	375,23	187,616

Note: * Model calculation based on 2,500 and 3,000 flight hours have also been similarly undertaken

SECTOR ECONOMIC DATA				
SECTOR RELATED DATA		CITY A-B	CITY A-B	CITY A-B
Sector Distance	nm	100	200	300
Available Seats Per Flight	Seats	32	32	32
On Board Passengers per flight	pax	24	24	24
Annual Utilisation (Block Hours) Per A/C	BH/Year	2,901	2,531	2,366
Annual Utilisation (Flight Hours) Per A/C	FH/Year	2,000	2,000	2,000
Annual Utilisation (Flights) per A/C	Sectors/Year	5,405	3,183	2,198
Flight Time Per Sector	Min	22.2	37.7	54.6
Block Time Per Sector	Min	32.2	47.7	64.6
Block Fuel Per Sector	Kg	431	677	842

CALCULATION OF DIRECT OPERATING COST				
Interest	Rs/Sector	5,976	10,148	14,696
Ownership Cost	Rs/Sector	5,495	9,331	1,3512
Insurance	Rs/Sector	916	1,555	2,252
Fuel	Rs/Sector	24,477	41,565	60191
Captain Salary	Rs/Sector	1110	1,885	2,730
Co-pilot Salary	Rs/Sector	777	1,320	1,911
Crew Attendant	Rs/Sector	200	339	491
Engineer Cost	Rs/Sector	555	943	1,365
Routine Maintenance Spares (excluding TBO)	Rs/Sector	1,018	1,728	2,502
2 technicians and 2 helpers salary	Rs/Sector	444	754	1,092
Landing gear overhaul reserve	Rs/Sector	555	943	1,365
APU Overhaul Reserve	Rs/Sector	370	628	910
Annual Cost of Labour	Rs/Sector	28	47	68
Engine Overhaul Reserve	Rs/Sector	4,440	7,540	10,919
Landing, Parking and Hangarage charges	Rs/Sector	675	1,147	1,661
Technical Office and Admin Expenses	Rs/Sector	2,405	4,084	5,914
Passenger Handling	Rs/Sector	11,101	18,850	27,298
Transportation and Airport Expenses	Rs/Sector	5,550	9,425	13,649
Catering	Rs/Sector	3,330	5,655	8,189
Direct Operating Cost	Rs/Sector	69,423	117,886	170,715
Direct Operating Cost per ASM	Rs/Sector	22	18	18
Total Operating Cost	Rs/Sector	69,423	117,886	170,715
Total Operating Cost per ASM	Rs/Sector	22	18	18
Total Operating Cost per ASKM	Rs/Sector	12	10	10

OPERATING COST BREAKDOWN PER AIRCRAFT	IN PERCENTAGE		
Fuel Cost	35.26	35.26	35.26
Crew cost	3.01	3.01	3.01
Maintenance Charges and Handling	43.89	43.89	43.89
Ownership	7.92	7.92	7.92
Interest	8.61	8.61	8.61
Insurance	1.32	1.32	1.32
Total	100.00	100	100
Aizwal to Imphal 172 km price charged by Air India	Rs 2,395		
Revenue Per km	Rs 13.92		

Source: NTDPC.

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