

# A COMPARATIVE STUDY ON THE AVAILABILITY OF RURAL INFRASTRUCTURE IN ASSAM vis-à-vis INDIA

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**Abstract:** Adequate infrastructural support is a pre-requisite for accelerated economic development of a country. In simple terms, infrastructure is an umbrella for many activities referred to as 'social overhead capital' by such development Economists like Paul Rosenstein Rodan, Ragnar Nurkse, and Albert Hirschman. Rural infrastructure is a powerful tool in strengthening the foundation of agriculture which is a pace setter for the economic growth. Poor physical infrastructure in Assam has acted as roadblocks thwarting the socio-economic development thus increasing the sense of insanity that has led to the other social issues. Inclusive growth or development is one of the key factors that every state or a country as the main objective of development encompasses. But even after decades of Govt intervention in form of development planning, Assam still has gaps not only in physical infrastructure but also in creating adequate social infrastructure. In the present paper, an investigation has been made to analyze the level of development of various agriculture infrastructural indicators in Assam to understand the disparity and compare the gap of the availability of rural infrastructures with that of the other states in order to know the Assam's position. This paper deals with the secondary data of Assam in terms of adequacy or inadequacy of level of agricultural infrastructure.

**Keywords:** *Rural infrastructure, Social Overhead Capital, inclusive growth.*

**1. INTRODUCTION:** Adequate infrastructural support is a pre-requisite for accelerated economic development of a country. In a developing country like India, infrastructural facilities are generally weak and inadequate. Many people, especially the rural poor areas are not accessed with the sufficient infrastructural facilities. In simple terms, infrastructure is an umbrella for many activities referred to as 'social overhead capital' by such development Economists like Paul Rosenstein Rodan, Ragnar Nurkse, and Albert Hirschman. Rural infrastructure is a powerful tool in strengthening the foundation of agriculture which is a pace setter for the economic growth. Thus, infrastructure is composed of all those activities and facilities which help to sustain the growth in production and income generation in the economy. The major items of infrastructure as included in the planning process include irrigation, power, transport, communication, education, health etc. Within these major heads, there are sub-items of rural infrastructure which have direct impact on agricultural development. For example, it is not only the availability of power in the states but also equally the consumption or excess of electricity in the villages are important. Likewise, source of irrigation is also important. The major sub-items of infrastructure includes percentages of villages electrified, percentage of power used in agriculture, percentage of irrigated area, intensity of tube wells, density of rural roads, intensity of transport vehicles, fertilizer sale depot, flow of rural credit to the agricultural sector, intensity of wholesale markets, storage facilities, agricultural research etc. Thus, power, irrigation, transport, communication, education, health etc are the major items of infrastructure that have received special attention in the development planning of the country. All these facilities and services constitute collectively the infrastructure of an economy and the development and expansion of these facilities is an essential pre-condition for increasing agricultural production in any area.

## 2. OBJECTIVES:

1. To study the status of major components of infrastructure for agricultural development in the country.
2. To compare the gap in the availability of such infrastructures with that of the country in order to understand Assam's position.

## 3. SOURCE OF DATA:

The study is purely based on secondary data. Most of the data on infrastructural development indicators for the different states were collected from RBI Data, Economic survey of India, Directorate of Economics and Statistics and Agricultural report at a glance. Published literature in the form of books, booklets and articles on infrastructure development were used to provide a general background of the study.

## 4. METHODOLOGY:

An attempt has been made in this paper to study the growth of important infrastructural variables and their importance on agricultural land productivity of Assam, a north-eastern state. The present study is based purely on the secondary data collected from various published or unpublished records of Assam. The eight infrastructure parameters were taken in the study i.e., irrigation, road, villages electrified, financial system, primary schools, primary health centers, fertilizer consumption and percentage of area under HYVs been made in this paper to study the growth of important infrastructural variables. The study undertakes the major states of the country regarding infrastructural development and major infrastructural indicators for the ten years gap in the respective two time-periods i.e. from 2005 to 2015 and a relative infrastructure index is constructed to compare the relative changes in the availability of infrastructures of Assam in relation to India in the two periods.

## 5. STATE WISE DEVELOPMENT OF INFRASTRUCTURAL INDICATORS IN INDIA:

In this paper, we discuss the infrastructure development in India in relation to the agricultural sector of different infrastructural indicators. The need for a state wise analysis of the infrastructural indicators arises mainly from two areas : ( i) in understanding the relative performance of the Assam State in terms of certain important infrastructural facilities as compared to the other states of the country; (ii) in establishing a dimension to know the states performance in terms of agricultural indicators is relatively better so that the states performance indicator can be used in the following chapter as a benchmark for analyzing the infrastructural facilities within Assam. Analyzing infrastructural data in order to arrive at the benchmark level is a pre-requisite for making inter-district comparison. Therefore, in this paper , we make an attempt to understand the relative position of the Assam state with the help of secondary data on different kinds of infrastructural indicators. As already described, our main aim is to establish a benchmark as a criterion for assessing the infrastructural facilities in Assam.

### 5.1 TYPES OF INFRASTRUCTURAL INDICATORS:

**Table 1 : Classification of infrastructure indicators.**

Types	Indicators
<b>Economic Infrastructure</b>	<b>Irrigation</b>
	<b>Road Transport</b>
	<b>Power</b>
<b>Social Infrastructure</b>	<b>Education</b>
	<b>Health</b>
<b>Institutional Infrastructure</b>	<b>Markets</b>
	<b>Agricultural credit</b>

Source: Researchers own

**5.1.1 IRRIGATION:** Irrigation is one of the main source of occupation and a trustable method for fighting famine. Irrigation refers to the supply of water from rivers, lakes reservoirs, tanks, canals and wells for agricultural operations. It is a very essential

method to sustain life and an important input in socio-economic development of the country. The following table reflects the changes in the percentage of irrigated area to the total cross cropped area in various states of the country.

**TABLE 2: State wise percentage of net irrigated area to the total cropped areas:**

States	(Areas in hectares)	
	% of net irrigated area to total cropped area	
	2005	2015
Punjab	51.80	52.41
Tamil Nadu	49.44	45.47
Uttar Pradesh	52.38	55.03
Andhra Pradesh	34.75	38.06
Haryana	46.76	45.50
West Bengal	32.54	32.01
Gujarat	35.89	33.14
Kerala	13.43	15.77
Karnataka	23.68	29.30
Maharashtra	14.47	13.81
Bihar	44.85	38.92
Himachal Pradesh	11.01	12.30
Orissa	22.89	24.33
Madhya Pradesh	31.64	40.25
Rajasthan	3.72	7.24
Assam	32.61	34.47
India	51.80	54.41

Source: RBI data, 2018

In the above table 2, we can see that in the year 2005, only the state Punjab and Uttar Pradesh, the irrigation facility measured in term of the irrigated area to the total cropped areas is well above the country's figure with 51.80 and 52.38. But in the year 2015, except for the state Uttar Pradesh, the irrigation facility in the other states is well below the country's average. As on 2015, about 34.47 percent of the irrigated areas have access to irrigation in Assam which seems to have a little favourable increase in the last 10 years. In the same period of time there is an improvement in this facility at the all India level.

### 5.1.2 ROAD TRANSPORT:

Road network is vital for sustained and inclusive growth of the economy. It facilitates the movement of passengers and freight across the country. It promotes efficiency in the economy by minimizing total transportation cost in terms of economies of production, distribution and consumption. The table 3 below shows the development of Road infrastructure in the state using the indicators such as percentage of surfaced roads and road density per sq. km.

**TABLE 3: State wise Road Length in India:**

States	2005			2015		
	Total length (in kms)	% of surfaced roads	Road density (per 100 sq. km)	Total length (in kms)	% of surfaced roads	Road density (per 100 sq. km)
Punjab	46490	83.58	92.31	105368	89.04	209.22
Tamil Nadu	176209	78.73	135.48	261100	80.45	200.75
Uttar Pradesh	256683	54.04	106.53	415383	85.86	172.40
Andhra Pradesh	329407	55.08	202.12	179022	68.28	109.85
Haryana	28657	93.41	64.81	46287	90.50	104.69
West Bengal	195679	20.04	220.47	295997	37.32	333.51
Gujarat	143419	90.44	73.16	182287	89.50	92.99

Kerela	169516	53.89	436.18	194854	69.36	501.38
Karnataka	210415	62.73	109.71	321808	67.34	167.79
Maharashtra	220937	79.36	71.79	608140	77.49	197.63
Bihar	119958	48.18	127.39	206010	52.54	218.78
Himachal Pradesh	23452	83.06	42.12	55593	71.95	99.856
Orissa	215141	14.09	138.17	283692	87.07	182.19
Madhya Pradesh	163920	48.32	53.17	288931	80.65	93.73
Rajasthan	149753	67.25	43.75	248156	78.47	72.50
<b>Assam</b>	208788	11.67	266.18	326512	18.29	416.26
<b>India</b>	2962463	53.88	90.12	4508827	68.96	137.16

Source: Census of India 2001 and 2011, Transport of Research wing, Ministry of Road Transport and Highways.

As seen from the above table, the availability of road infrastructure in Assam is generally a moderate one as compared to other states in the country. Road density to geographical area per 100 sq. km ranges from 502 in Kerala to 72 in Rajasthan in 2015. Again, the percentage of surfaced roads ranges from 90 in Haryana to 18 in Assam in the same period. It is to be noted that Assam has the lowest percentage of surfaced roads as compared to the other states. In spite of the fact that some of the states may have negligible network of railway lines and therefore it is necessary to have rely on roads for freight and passenger transportation.

### 5.1.3 POWER:

Power is one of the most prime movers of agricultural development. It is considered to be core infrastructure as it facilitates development across various sectors of the Indian Economy such as manufacturing, agriculture, commercial enterprises and railways etc. Keeping this into account, Govt of India right from the inception of the first five year plan period has given special emphasis for its development. There is always a direct relationship in the growth of consumption of power and that of the economy. The following table 4 shows the availability of power among the major states of the country:

**TABLE 4: State wise availability of Power:**  
(Millions Units net)

States	2004-05	2014-15
Punjab	30383	48144
Tamil Nadu	47570	92750
Uttar Pradesh	41565	87062
Andhra Pradesh	50061	56313*
Haryana	20562	46432
West Bengal	22789	46827
Gujarat	52724	96211
Kerala	12540	22127
Karnataka	33687	59926
Maharashtra	81541	133078
Bihar	6476	18759
Himachal Pradesh	3917	8728
Orissa	13875	26052
Madhya Pradesh	30097	53082
Rajasthan	28974	65310
<b>Assam</b>	<b>3582</b>	<b>5696</b>
<b>India</b>	<b>548115</b>	<b>1030785</b>

Source: Reserve Bank of India, 2018.

The state wise availability of power in the above table 4 shows that the availability of power in the state of Assam is increasing to a favorable rate from the year 2005 to 2015 alongwith the nations at the same period of time. On account of this, the number of villages electrified in Assam alongwith the other parts of the states has been notified below in the following table.

**Table 5: Villages electrified in India state wise as per 2001 and 2011 census:**

STATES	Total no of inhabited villages (2001 census)	No of villages electrified (2005)	percentage	Total no of inhabited villages (2011 census)	No of villages electrified (2016)	percentage
Punjab	12,278	12,278	100	12,168	12,168	100
Tamil Nadu	15,400	15,400	100	15,049	15,049	100
Uttar Pradesh	97,942	57,042	58.24	97,813	97,589	99.77
Andhra Pradesh	26,613	26565	99.81	16158	16158	100
Haryana	6764	6759	99.92	6642	6642	100
West Bengal	37,945	31705	83.55	37,463	37,449	99.96
Gujarat	18,066	17940	99.30	17,843	17,843	100
Kerela	1,364	1,364	100	1017	1017	100
Karnataka	27,481	26771	97.41	27,397	27,358	99.85
Maharashtra	41,095	40351	98.18	40956	40956	100
Bihar	39,015	19251	49.34	39073	38080	97.45
Himachal Pradesh	17,495	16891	96.54	17882	17848	99.80
Orissa	47,529	37663	79.24	47677	45452	95.33
Madhya Pradesh	52,117	50,864	97.59	51929	51674	99.50
Rajasthan	39,753	38,786	97.56	43264	42944	99.26
<b>Assam</b>	25,124	24,156	96.14	25372	23422	92.31
<b>India</b>	593732	560993	94.48	597464	586065	98.09

Sources: Census of 2001 and 2011, Village Electrification data from Central Electricity Authority (CEA) website.

The above table 5 shows the number of villages electrified in Assam as well as in the other states as per 2001 and 2011 census data. Surprisingly it can be seen that the number of inhabited villages in Assam according to 2001 census is 25,124 whereas the number of inhabited villages according to 2011 census is 25,372 with a slight increase in the inhabited villages. But, the number of villages electrified in 2015 is 23422 which is less than the number of villages electrified in 2005 with 24,156. Accordingly, the percentage of electrified villages is decreasing from 96.14 to 92.31 whereas the nation's percentage increased from 94.48 to 98.09 at the same period of time.

#### 5.1.4 EDUCATION:

Educational infrastructure is one of the strongest tool for the upliftment of agricultural productivity. The following table shows the number of schools including only the Primary and upper primary schools below:

**Table 6: State wise number of schools per ten thousand population (including only primary and upper primary schools) 2005-06 and 2015-16**

States	2005	2015
	No of schools per thousand population	No of schools per thousand population
Punjab	6.47	6.21
Tamil Nadu	6.76	6.22
Uttar Pradesh	10.49	10.97
Andhra Pradesh	10.42	9.83
Haryana	6.77	6.35
West Bengal	6.38	9.21
Gujarat	7.70	6.83
Kerala	3.09	3.73



Karnataka	10.31	9.40
Maharashtra	7.08	7.28
Bihar	6.08	7.29
Himachal Pradesh	22.56	20.86
Orissa	17.22	14.11
Madhya Pradesh	21.54	18.74
Rajasthan	15.13	11.69
<b>Assam</b>	15.08	19.80
<b>India</b>	10.31	10.50

Source: Handbook of Indian States 2016, Ministry of Statistics and Programme Implementation Govt of India;  
Education – Statistical year book of India 2016

It can be seen from the table that the number of schools in 2005 ranges from 22.56 in Himachal Pradesh to 3.09 in Kerala. Again in 2015 the number of schools per thousand populations ranges from 20.86 in Himachal Pradesh to 3.73 in 2015. Interestingly, it is seen that in Assam the number of schools per thousand populations is increasing from 15.08 in 2005 to 19.80 in 2015. In the same period of time, there is also a slight improvement in this facility at the all India level.

### 5.1.5 HEALTH:

Health care performance exhibits sustained improvements over the years. These improvements are the outcomes of concentrated efforts of the Govt towards establishing an efficient system of health care and family welfare management. The availability of health infrastructures in various states of India including only the Primary health centers is been laid below:

**Table 7: State wise number of Primary Health centers per thousand hectare of geographical area (2005-06 and 2015-16):**

States	2005		2015	
	PHCs	Number of PHCs per thousand hectare of geographical area	PHCs	Number of PHCs per hectare thousand of geographical area
Punjab	484	9.61	427	8.47
Tamil Nadu	1380	10.61	1372	10.54
Uttar Pradesh	3660	15.19	3497	14.51
Andhra Pradesh	1570	5.70	1069	3.88
Haryana	408	9.22	461	10.42
West Bengal	1173	13.21	909	10.24
Gujarat	1070	5.45	1247	6.36
Kerela	911	23.44	827	21.27
Karnataka	1681	8.76	2352	12.26
Maharashtra	1780	5.78	1811	5.88
Bihar	1648	17.50	1883	19.99
Himachal Pradesh	439	7.88	500	8.98
Orissa	1282	8.23	1305	8.38
Madhya Pradesh	1192	3.86	1171	3.79
Rajasthan	1713	5.01	2083	6.08
<b>Assam</b>	610	7.77	1014	12.92
<b>India</b>	23236	7.06	25308	7.69

Source: Govt of India, Ministry of Health and Family Welfare Statistics Division, 2005-06 and 2015-16.

### 5.1.6 MARKETS:

**Table 8: State wise number of Regulated Markets operating in India as on 2005 and 2011:**

	2005	2011

States	Regulated Markets	Number of regulated markets per thousand hectare of geographical area	Regulated Markets	Number of regulated markets per thousand hectare of geographical area
Punjab	437	8.67	488	9.68
Tamil Nadu	288	2.21	292	2.24
Uttar Pradesh	584	2.40	605	2.48
Andhra Pradesh	889	5.45	905	5.55
Haryana	284	6.42	284	6.42
West Bengal	684	7.70	687	7.74
Gujarat	405	2.06	414	2.11
Kerala	***	***	***	***
Karnataka	492	2.56	504	2.62
Maharashtra	871	2.83	880	2.85
Bihar	510		***	
Himachal Pradesh	38	0.68	48	0.86
Orissa	314	2.01	314	2.01
Madhya Pradesh	488	1.58	517	1.67
Rajasthan	416	1.21	431	1.25
Assam	224	2.85	226	2.90
<b>India</b>	<b>7566</b>	<b>2.30</b>	<b>7249</b>	<b>2.20</b>

Source: agriculture policy and reforms for higher and sustained farmers income prepared by ICAR – National institute of agricultural economics and policy research new Delhi – 110012, India.

### 5.1.7 PRIMARY AGRICULTURAL CREDIT SOCIETIES (PACS)

**Table 9: State wise number of Primary Agricultural Credit Societies in India as on 31-03-2005 and 31-03-2015.**

States	2005		2015	
	PACS	PACS per thousand hectare of geographical area	PACS	PACS per thousand hectare of geographical area
Punjab	3985	79.12	1609	31.94
Tamil Nadu	4892	37.61	4436	34.10
Uttar Pradesh	8929	37.06	8929	37.06
Andhra Pradesh	4512	27.68	2050	12.57
Haryana	2433	55.03	711	16.08
West Bengal	18956	213.58	7402	83.40
Gujarat	9093	46.38	8804	44.91
Kerala	1796	46.21	1647	42.37
Karnataka	4051	21.12	5337	27.82
Maharashtra	20984	68.19	21094	68.55
Bihar	5936	63.03	8463	89.87
Himachal Pradesh	2089	37.52	2135	38.34
Orissa	4036	25.92	2701	17.34
Madhya Pradesh	4586	14.87	4457	14.45
Rajasthan	5651	16.51	6365	18.59
Assam	809	10.31	766	9.76
<b>India</b>	<b>108779</b>	<b>33.09</b>	<b>93367</b>	<b>28.40</b>

Source: National Federation of State Cooperative Banks Ltd .

### 6. Relative Growth in Economic, Social and Institutional Infrastructure in Assam during the two gap periods:

In order to measure the progress of economic, social and institutional infrastructural facilities in Assam in comparison with the all India position, we have prepared a relative index of infrastructures by selecting a few infrastructure variables. This index exhibits the change in the relative position of the Assam state vis-à-vis all India. It however, shows if the gap in the availability of these selected infrastructure variables is widening (increasing) or narrowing (decreasing) with respect to the all India position.

For capturing the relative changes we have used the following formula:

$$\frac{X_n - X_i}{X_i} \times 100$$

Where  $X_n$  stands for indicator value of infrastructure indicator of Assam and

$X_i$  stands for indicator value of India.

The indicators taken for this objective represent different types of social, economic and institutional infrastructure dimensions such as the irrigation sector represented by the percentage of net irrigated area to the total cropped areas, transportation sector represented by the percentage of surfaced roads, power sector represented by the percentage of villages electrified, health sector represented by the number of PHCs per thousand hectare of geographical area, education sector represented by the number of primary and upper primary schools per thousand population, markets represented by the number of regulated markets per thousand hectare of geographical area and institutional credit represented by the number of Primary agricultural credit societies per thousand hectare of geographical area.

The following table 10 depicts the changes in the availability of the above mentioned infrastructure indicators in Assam vis-à-vis India.

**Table 10: Changes in the Availability of selected infrastructure in Assam vis-à-vis India:**

Infrastructural indicators	Indicator value			Indicator value		
	Year	Assam	India	Year	Assam	India
% of net irrigated area to total cropped areas	2005	32.61	51.80	2015	34.47	52.41
% of surfaced roads	2005	11.67	53.88	2015	18.29	68.96
% of villages electrified	2005	96.14	94.48	2015	92.31	98.09
No of PHCs per thousand hectare of geographical area	2005	7.77	7.06	2015	12.92	7.69
No of schools per thousand population	2005	15.08	10.31	2015	19.9	10.6
No of Regulated markets per thousand hectare of geographical area	2005	2.85	2.30	2011	2.90	2.20
No of PACs per thousand hectare of geographical area	2005	10.31	33.09	2015	9.76	28.40

Source: Researchers own

Table 10 shows that during the last two periods, Irrigation, Road, Health Centers, Literacy and Regulated Market infrastructures in the state of Assam have improved to some favorable extent in the areas of Assam. It has been seen that the percentage of net irrigated area to total cropped areas over the last ten years, has increased by 1.86 percentage points, whereas for all India it has increased by 0.61 percentage points. Thus, we see that the difference between the state of Assam and India is not a big one. During this period of time, in respect of the percentage of surfaced roads for Assam, it has gone up by 6.62 percentage points, whereas for the country as a whole it has increased by 15.08 percentage points. In the case of Health infrastructure the number of Primary Health Centers which is being measured by the number of PHCs per thousand hectare of geographical area, the number of PHCs in Assam has increased by 5.15 points, whereas for India, it has been increased by 0.63 points. Next in case of educational infrastructure being measured by the number of Schools (including only the Primary School) per thousand



populations, the number of schools in Assam is increased by 4.82 points but for the country as a whole, the number is increased by 0.29 points. Again, in case of the Regulated Markets measured by per thousand hectare of geographical area, the number of Regulated Markets in Assam is increased by 0.05 points which is not so favorable for the state of Assam whereas for India, as a whole the number of regulated markets is being decreased by 0.1 points.

However, in case of the availability of infrastructure regarding the power sector and Primary Agricultural credit Societies (PACS) being measured by the percentage of villages electrified, there has been a deterioration in the availability of the infrastructure in Assam, with the percentage of villages electrified being decreased by 3.83 percentage points and with the number of PACS per thousand hectare of geographical area being decreased by 0.55 points between 2005 and 2015.

Now in order to know the position of Assam with respect to India a Relative infrastructure index have been transformed to give a better picture of the growth of the infrastructural indicators in Assam which has been shown below:

**Table 11: Relative Infrastructure index for the state of Assam:**

Relative infrastructure index (transformed value- India 100)		
Infrastructural indicators	ASSAM	
	2005	2015
% of net irrigated area to total cropped areas	37	34
% of surfaced roads	78	73
% of villages electrified	1.75	5.89
No of PHCs per thousand hectare of geographical area	10.05	68.01
No of schools per thousand population	46	87
No of Regulated markets per thousand hectare of geographical area	24	31
No of PACs per thousand hectare of geographical area	68	65

Source: Researchers own

Table 11 gives a detailed picture of the relative development of the seven infrastructural variables in Assam vis-à-vis the all India position during the period 2005 to 2015. Transformed values for the Assam state shows that the number of villages electrified, primary health centers, number of schools and number of regulated markets infrastructures indicators have improved in the two periods 2005 and 2015. It is to be noted that the gap in the availability of these infrastructural facilities in Assam in relation to the availability of the same at the all India level has narrowed down i.e., the gap has reduced.

Individually, if the infrastructure is to be analyzed we find that in case of the number of villages electrified, the transformed values has not only improved but the gap in the availability of these infrastructural facility has narrowed down but has also come up at par with the all India average. However, in case of the availability of the Primary health centers, number of primary schools and the number of regulated markets it is to be noted that not only the transformed values has improved but the gap in the availability of these infrastructural facilities has narrowed down as well as it has surpassed the nations average.

On the other hand, the transformed values of Assam in case of the availability of the irrigation sector, has deteriorated that is progressively worse when compared to the all India situation, as well as with the index showing a widening of the gap in the availability of these infrastructure. Similarly, we find that in case of the road transportation and PACS (Primary Agricultural

credit societies), the situation seems not to be better off because the transformed values has deteriorated as well as the gap in the availability of these infrastructures as compared to the all India position has widened during the two periods under study.

Thus, we can conclude that the position of Assam in the field of social, economic, institutional infrastructure gives a mixed picture in the prevailing study. However, the absolute position in respect of the availability of these infrastructures is still below the all India average. Since, infrastructure is inseparably related to the agricultural development, much needs and progress is to be done in terms of the provision of the availability of the infrastructures especially in case of the irrigational infrastructure in Assam so that it comes at least par with the all India position.

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