As regards communications in India, the State has usually been, and is still, better equipped than most of its neighbours. It has one mile of railways for every 22 square miles, and one mile of metalled road for every 12 square miles of its territory. No other State equals it for this density of railways and only Madras and Bombay surpass it in density of metalled roads.

The roads, in the modern sense of the word, and railways are really the outcome of the British rule in India. Motor railways including light railways, tramways and aviation, bullock carts, camel-carts, hand-carts, pack-animals, tongas, ekkas and rickshaws are the only available transport facilities within the State. The experience of the last few years in the supply of wagons and trucks for sugar and coal transport has shown that these facilities are quite inadequate for all the movement of men and goods in the State. Means of transport in many parts are still very primitive. To the south of the Son river in the Mirzapur District, for instance, it is on rare occasions when a few pack bullocks are available to Chopan.

It is clear, however, that the success of industrialisation depends upon the expansion and improvement of agriculture and both agriculture and industry depend for their development on facilities for transport. In many industries, transport is the governing factor. For instance, in the case of paper-
industry "no forest, no matter how good and plentiful, is of much value to paper-maker unless it is associated with cheap transport". Certain timber such as fir and spruce which grow in abundance on the Himalayas have not yet been utilised due to lack of easy means of transport in those areas. A satisfactory solution of floating out resin efficiently and economically down the rivers would at once open up extensive pine areas which are at present outside the sphere of economic working. Due to uneconomic transport conditions no news-print paper manufacturing industry has yet been started in this State.

"If the manyfold resources and teeming man power of our country are to be utilised for the benefit of the common man, they must be harnessed to the chariot of production and move along the lines of communications". It is with this consideration that a new broad gauge line of 51 miles has been laid from Gaunar to Churk to provide transport facility to the cement factory recently constructed at the latter station.

As a matter of fact, transport developments have not kept pace, either in quantity or quality, with developments in other spheres, such as the increase in population, agriculture, industries or commerce. Thus, it cannot be said that the State is equipped with all the transport facilities she needs. This paucity of transport facilities which promote national prosperity, is at present a big obstacle in the rapid expansion of the industries.

1. Raitt: The Digestion of Grass and Bamboo for paper making, p. 100.

2. Dr. John Mathai: Message to the 12th Session of Indian Road Congress held at Roorkee in April, 1948.
Railways

Railway transport is the biggest State enterprise overshadowing completely all capital investment in all the basic industries in the country. As regards the State's earnings, the next greatest contribution comes from the group comprising 'grain and oil-seeds' which account for about 15 per cent of the total goods revenue and which are largely produced within the State.

Though it was Lord Dalhousie who argued the case of railway construction with great vigour, yet the history of its construction in this State began with the year 1847, when the East Indian Railway Company agreed to construct a line from Allahabad towards Delhi. By the end of the 19th century over 3,000 miles of railroads of various gauges were constructed and the mileage had increased to almost 6,000 by the end of the year 1936. These are either broad gauge (5'6") or metre gauge (3'3") or narrow gauge (2'6" or 2'3") railways. Thus the different parts of the State 'suffer from a mixture of gauges'.

The two trunk lines passing through the length of the State parallel to the great rivers belong to the Northern Railway on the broad gauge. This railway was commenced before the Mutiny as a military line and trade route. A loop line serves Jaunpur, Faizabad and Barebanki; important cross connections are from Ghaziabad to Bijnor, from Bareilly and Moradabad to Aligarh, and from Moradabad to Ghaziabad, from Lucknow to Kanpur, Kanpur to Unchahar, Unchahar to Rae Bareli, from Khurja to Meerut and from Tundla to Agra.

The Northern Railway meets the Eastern Railway at Moghal Sarai and thus connects the railways of this State with those

of the West Bengal and further with those of East Pakistan Dominion affording a through service between Calcutta, Delhi and the North-Western Frontier of the West-Pakistan Dominion. It meets the Central Railway at Naini, Kanpur, Agra and Mathura, while it meets the Western Railway at the latter two stations.

The North Eastern Railway system (metre gauge) serves, besides the Ganga Yamuna Doab, the Ganga-Ghagra Doab as well and connects this region with North Bihar and Assam States. The Northern Railway system (broad gauge) serves the Ganga-Yamuna Valley and connects it with the Panjab and PEPSU.

Most of the broad gauge railways are single line excepting the sections of the N.R. main line between Moghal Sarai and Allahabad, between Kanpur and Tundla, Ghaziabad and Delhi and between Lucknow and Bareilly. Short extensions have been completed in the Bijnor, Unnao, Hardoi, Lucknow, Sultanpur and many other districts.

(Map No. 18) There is a scheme to connect Etah with the North-Eastern Railway.

The following supplementary tramways and light railways are also running in the State, but they are not public as they are intended to carry goods of the owners only, and are exclusively or largely used for the transport of sugarcane to sugar factories:—

1. Tramways in Gorakhpur Division
2. Light railway at Banbasa for the headworks of the Sarda Canal,
3. Light railway in connection with the Ram Ganga Hydro Electric Scheme,
4. Railway line from Banbasa to Jagburah,
5. Daurala Sugarcane Tramway,
6. Umri Dhampur Sherkot Tramway,
7. Tramway in the Haldwani Forest Division, and
8. Saharanpur-Shahadra Light Railway.
Roads

'Ve have paid for good roads whether these water or not. It pays more if it has not got them.'

Among all the modes of transport, road transport seems to be the oldest and the most important factor in the development of trade, industry and commerce and in the spread of culture. Although roads are no less remunerative than railways, yet it is not quite easy to calculate the return on investment in roads. Nevertheless, it is common knowledge that it saves money. Recently, the Indian Roads and Transport Development Association conducted a survey in certain areas of Bombay, which has the best roads in the Republic. The figures showed that from every 100 rupees spent on roads the return to the community in the shape of various benefits was of the order of Rs.277. Generally, it is calculated that there is a saving of from 30 to 45 per cent to operate a motor vehicle over good roads rather than bad ones. Besides, there is efficiency on good roads. Even the bullock carts carry heavier loads over good roads, the wear and tear is less so that the cart lasts longer, the time taken is shorter, thus allowing the farmer to put his bullocks to some other use.

The art of road-making is not new to this country. Owing to the situation of Agra and Delhi, the seats of the Mughal Emperors in this region, the condition of roads here, even during these days, was far better than in any other region. But the road system had never had a sound and scientific basis. The real reform in the matter of public road construction under the British regime was begun by Lord William Bentinck, but it may be called only a super-structure raised on the previous tracks.

1. Our Roads, Govt. of India, 1948, page 43.
The total road mileage of metalled roads within the State is about 10,000. This is 20 per cent of the total roads mileage in the Union. The mileage of unmetalled roads is 25,553 and of local roads in the State is about 11,500.

The length of the metalled roads increased at the end of the 19th century, but the demand for more metalled roads remained as insistent as ever. The advent of motor traffic has greatly increased this demand. "With the road development in the Province, there has been a general expansion of road transport and as road construction proceeds apace, road transport is not slow to follow." It was the increasing realisation of this fact that led to the appointment of the Special Road Development Committee in 1927 and a Central Road Fund in 1929. But all this did not improve the condition of the village roads.

A road Development Programme initiated in August, 1938, could not be executed in full on account of out-break of World War II in 1939. Only some of the roads, provided therein, had been completed. In 1945 a fresh Post-War Road Development Scheme was formulated on the basis of Nagpur Plan drawn up by the Chief Engineers of all the States in a meeting held in 1943 at Nagpur, to discuss all the aspects of highways and matters related to them. They evolved a formula known as 'Grid and Star' formula to evaluate the required mileages both for metalled and unmetalled roads for each State with a view to balance the need of highway development during next 20 years of the Post-War period.

1. Rizvi, S.M.Tahir, op. cit, p.256.

The total mileage of metalled and unmetalled roads required in the State on the basis of the above formula are:

(i) Metalled road 16,484 against 9,387 miles of roads that existed under P.W.D., District Boards and in merged States in 1946.

(ii) Unmetalled roads 42,307 miles as against 25,553 miles of roads that existed in 1946 under P.W.D., District Boards and in merged states.

The metalled roads with District Boards were not being maintained properly and had become practically as earth roads, and earth roads had become tracks without bridges and culverts. This indicates that the State needs 7,097 more miles of new metalled roads including feeders, 16,754 more miles of the unmetalled roads and improvements to (i) practically all the existing unmetalled roads that would be left after their inclusion under new metalled roads and (ii) to almost all the existing local metalled roads which have deteriorated for want of proper maintenance and increased traffic.

From the point of view of administration, roads may be considered under the following heads:-

1. **National Highways** - They connect capitals of States, industrial areas, ports and foreign highways. They also include the roads of strategic importance. They are under the Central Administration; a list of National Highways within U.P. is appended herein (vide Appendix V.)

2. **The State Highways** - All the main trunk or arterial roads of a state connecting up with the National Highways, or Highway of other adjacent states, district headquarters and important cities with the State.

3. **Major District Roads** - They connect areas of production and markets with either a highway or a railway. These are also dealt with by the State P.W.D.

1. See Appendix No. IV.
4. **Minor District Roads and Village Roads** - They mostly meet the requirements of rural population.

5. **Local Roads** - They form the major part of the total mileage and are maintained and administered by the local bodies as municipalities, district boards, etc.

The development of various types of roads has been considered with a view to great economic and scientific planning. The target figure for each district of the State has been calculated. Some districts have unmetalled roads of greater length than what is permissible under the scheme, while some other districts have a big deficit. Now construction has, therefore, been provided in such deficit districts as far as possible and through communications have been kept in view to have a more and better balanced system of communications.

The Road Development Programme has been spread over 10 years in phase I of 2 years, Phase II of 3 years and Phase III of 5 years. In each phase of the scheme, the construction programme has been drawn up with a view that roads of all classes are given equal weight. The first Phase was drawn up in 1946-47 but was revised and started in 1950.

The National Five-Year Plan necessitated the drawing up of a State Five-Year Plan for road development in U.P. So the Phase I of the Road Programme was incorporated with this Plan of the State. Certain states e.g. Tehri, Garhwal, Ramnagar, Banaras, etc., were merged with the State and the responsibility of construction of roads in those states also fell with the U.P. Government. At the close of this Five-Year Plan in 1955-56 it is envisaged that about 30 per cent of the works contemplated in the Five-Year Plan and about 21 per cent of the works of the State Phase I Programme will still be left over for continuity in the Second Five-Year Plan.
The details of the Five-Year Plan have been given in Appendix no. VI. Since the existing State roads are comparatively in a satisfactory condition and the local roads in a dilapidated condition, the scheme lays great stress on the improvement of local and village roads.

After the completion of this Five-Year Plan the State will have completed:

1. Reconstruction of local roads 2,419 miles
2. New metalled roads to -
   (a) Top Coat stage 772"
   (b) Inter Coat stage 1,184"
   (c) Soling Coat Stage 1,358"
   (d) Earthwork Stage 1,639"
   (e) Bridges and culverts 1,639"
3. C.C. Tracks -
   (a) Earthwork 501"
   (b) Complete tracks 194"
4. Unmetalled Roads -
   (a) Earthwork 4,724"
   (b) Bridges and culverts 3,966"

Recent Constructions

Though, due to difficulties in the procurement of material, road-making machinery, technical personnel and adequate transport facilities, the programme has been put back by a year, yet construction has started on the major bridges given in Appendix no. VIII.

Boat-bridges are under construction also on the Ghagra River at Behramghat and on the Sarju River on Lucknow-Gonda Road. Construction for the boat-bridges at Chopan between Robertsganj and Dudhi has been completed. Prospects for further construction of boat-bridges are under the consideration of the State.
In connection with the road development in factory areas, the State announced a plan for cement tracking of 1,600 miles of roads in the factories-gate areas and, eventually, a scheme for the development of 529 miles of such roads was adopted by the Government as the first phase of their plan. Fifteen per cent of the mileage scheduled had been constructed up-to June, 1948, two years after the scheme was announced. Several old national highways, which had been badly damaged during the War, were re-constructed and widened with the assistance of the Government of India. In the programme of construction of State Highways, Lucknow had been connected with Hardoi and the road from Chamoli to Joshimuth and the way to Badrinath had been completed. Thus 75 per cent of the first phase programme has been completed by now.

The Tarai area and the submontane portion of the State lying north of Pilibhit has been opened up with a new road which connects Neorai and Pithoragarh and another road linking Moradabad with Ramnagar. In this area, which only a couple of years ago was infested by wild animals and malarial mosquitoes, are situated prosperous farms, dairies and modern villages inhabited by displaced persons from the West Panjab. A bridge on Uttarjan on Agra-Bah road has been completed to facilitate the movement of police and military forces in the Khadars of Yamuna and the Chambal, the dwelling place of the terrorising dacoit Man Singh and his party.

Quite recently, a few roads of local importance have been constructed within the State by social workers under the 'Shram Dan' movement. But these roads are subject to deterioration if proper care and maintenance is neglected.
Economic survey of district and traffic census on roads for the second phase programme is being carried on. The alignment of all new roads will aim at serving the largest number of people in the villages.

Comment on Road Development Scheme

The railways should not be afraid of the development of road traffic. On the other hand, the inter-relation of road and railway policies with a view to effect co-ordination of work as has been suggested by the Jayakar Committee on Road Development (1928) is both possible and highly desirable to ensure efficient, economical and advantageous service to industry. Good roads can render much service by providing feeders for the railways, and by enabling them to concentrate their facilities at large centres. For example in the district of Badaun, Islamnagar, an important mandi of grains, ghee, ropes, etc., may be connected with Bahjoi railway station and thus the raw materials may be drained to other markets. At present large quantities of sugar-cane are crushed locally to be converted into 'gur' and 'Khandsari'. Sometimes an exportable surplus is perished because they have no means of bringing it economically to the market. The waste of time, money and energy, suffered by the primary producer even in bringing his cart a few miles out of his village through fields or uneven tracks is simply enormous. Even so four or five months of the monsoon keep thousands of villagers cut off from the outside world.

In the important industrial and commercial areas of the State, for example Meerut, Agra, Bareilly and Kanpur, the road
traffic is parallel to the railways. But the rush of traffic is so heavy that both the roadways and the railways find it difficult to cope with. Thus, the advent of road motor service is to be desired in such areas rather than feared provided there can be maintained a proper check on both the railways and road motors to avoid uneconomic competition.

The map No. 20 clearly indicates that the mileage of unmetalled roads per 100 square miles is the largest in the middle eastern districts, specially in the districts of Jaunpur, Ghazipur, Azamgarh, Ballia, Banaras and Deoria. But the metalled roads of the Meerut division are better in quality. In the entire programme great stress has been laid on the improvement of local and village roads which are in a very bad condition and require immediate attention. As compared to whole of India, the scheme aims at constructing more than one-third of the village roads allotted for the Republic. Thus the State heads the list of all the states in road development.

The study of the existing roads and the Road Development Schemes, reveals that after the execution of the whole programme the condition of the State would be vastly improved. Further, from the study of the appendix No. 6 it is calculated that the completion of Phase I and Five-Year-Plan would develop the condition of the dilapidated existing minor district roads but thousands of villages will be left unconnected by roads or railways with urban centres. So long as the II and III Phases are completed, the districts of (south) Mirzapur, Hamirpur, Jalaun, Badaun, Pilibhit and a few hilly districts would not be developed, to the same extent as others.
In order to furnish southern part of the district Mirzapur with suitable communications the Government should take up a scheme of making a chord line of a length of 140 miles from Mirzapur to Maher (Madhya Bharat), a broad-gauge railway link between Chunar and the Son river preparatory to a crossing to Pipri and another scheme of building a light line of rail which would penetrate the southern portion of the district. These schemes should also be included in the National Five-Year Plan. Besides, roads and ropeways should be established for the exploitation of forests from the Kumaun Himalayas.

If the vital importance of rural transportation is not realised, as has been envisaged under the contemplated scheme, the farmer would not be able to produce vegetables, milk and dairy products, market them in good condition and make good profits. Nearly half of such perishable produce in the State will continue to deteriorate owing to delay in marketing. Thus, the poor farmer is reduced to such a pitiable condition that he is not in a position to buy seeds, implements and manures for his fields. Over and above all this, lack of road system has been responsible for large tracts of fertile land remaining uncultivated and these are not being put to any other use as well.

Thus, the implementation of the road programmes would automatically improve conditions of rural life, help agriculture of higher standard, assist development of industries and ensure rapid supply from rural areas to urban districts of such essentials as fresh vegetables, dairy products, etc.
Bullock Cart and other Vehicles

India has sometimes been represented, by foreign journalists and writers, as land of the slow moving cart with two bullocks, escorted by three or four attendants, in addition to the cart driver, to prevent, the vehicle tumbling down over narrow tracks, one side of which is 2 or 3 feet above the other. It is even at present an usual sight in rural areas. One should not forget at the same time that bullock cart, the eternal legacy of the village road, has not only played a very important and useful role, from the earliest times of recorded history in this state but its future contribution to the economic development of the State is bound to be considerable.

The railways in their present position cannot cope with the growing demand of transport in the State which is on the path of industrial progress. There is no hope that even in the coming five years the output of wagons would guarantee a supply commensurate with the demand. The alternate means of transport, bus and truck service, too, is dependent upon the supply of petrol so deficiently supplied to the State. The obvious conclusion is that one has to fall back upon the old and cheap bullock cart. With 11,00,000 of bullock-carts U.P. stands third after Madras and Madhya Pradesh.

It is, perhaps, the best suited vehicle to the peculiar agricultural conditions of the State and will continue to serve as a primary means of transport in the absence of other means of cheap transport. When large schemes of railway and bus-service are held up in the present monetary crisis, cooperative caravans of double bullock carts over long distances,
and safe transport in the rural areas. Dr. Pattabhi Sitaramaya, the then Congress President, went on so far as to say in a broadcast speech on rural transport, from Madras on the night of 10th November, 1949, "A whole caravan of carts may well take grains from Kistna and Godavari to Wardha and bring back cotton with adequate Police or Home Guard to protect goods against robbery."

There is more reason for its criticism than for sympathetic treatment. It moves, with a load of 30 maunds, at the average speed of only 2 miles an hour, besides wearing and tearing the roads with its iron-tyred wheels. But if certain improvements are made in it as it runs today, e.g. the replacement of iron-tyres with pneumatic tyres, it will serve two ends. Roads will not get deteriorated rapidly, their cost of maintenance will also go down and the load pulled would be greater. But the task seems difficult to be achieved due to certain obstacles in the way of the uneducated cartmen. Therefore these tyres should be sold to the present cart-owners on hire-purchase system by the Government or through local cooperative societies with the idea that they should ultimately replace the old type of cart wheels entirely. One large motor car tyre can protect two pairs of an ordinary bullock-cart wheels and the strips can easily be replaced by the cartman carrying a few strips with him. Experiments on a larger scale should be carried on in the State as well.

Ponies, donkeys, camels, yalks (in the Himalayas), etc. have long been used in the State to carry loads from one place to another. They are quicker modes of transport as compared
to bullock carts and human transport, though they can carry lesser quantities. Their usefulness increases during rainy season when the tracks get so muddy that even bullock carts cannot ply or where the path is too narrow for bullock carts to pass. The important markets of Chandusi, Moradabad, Aligarh, Meerut, etc. will have little business in the rainy season if the village production is not transported on the backs of donkeys and ponies.

'Telas' are very important means of transport in cities and towns for carrying both agricultural and industrial products. These are largely used in Firozabad for transferring semi-manufactured glass bangles from place of one processing to another. Like the wheels of the bullock-carts, the wheels of 'telas' may also be replaced with rubber tyred wheels so that they may be easily pushed.

In the absence of any other means of conveyance head loads are a convenient form of transport, but it should not be encouraged as it dehumanises men, as also do rickshaws which are largely increasing in all large towns. One cannot deny the usefulness of cycle which has become quite common since many years particularly for carrying milk, fruits, vegetables and clothes of the washerman from suburbs to the thickly populated towns.

Exceptionally diversified in form and function the motor transport has become popular in both the freight and the passenger fields, in local, radial and inter-city movements and in public and private transport service. The actual figures of motor vehicles in operation throughout the State in 1945-46 were 15,817. In the year 1953-54, no less than 3,00,00,000
passengers travelled a distance of some 3,46,00,000 miles on the Government Roadways only.

The State transport policy aims at providing maximum convenience to the public at the cheapest rates and complete nationalisation of the industry. Although it is not possible to bring about complete nationalisation forthwith, because of a number of difficulties such as trained personnel, procuring of suitable sites for construction of bus-stations and workshops, availability of vehicles (from dollar areas), spare parts, rise in the prices of petrol, tyres and tubes, Government are going ahead with a rapid pace as far as practicable under the circumstances.

By the end of March, 1954, the "Nationalised Road Transport" in the State had covered 4,700 miles out of 10,000 metalled road miles. Up to this date, it has owned a total number of 2,190 buses, 683 trucks and 641 taxi cabs. The development and progress of this kind of transport may be estimated from increasing annual profits which amount to Rs.4,55,000 in 1949-50 after deduction of all charges such as operation, interest on capital, depreciation and maintenance. The last year's profits amounted to Rs.12,00,000.

Goods services have also been started in most of the regions. The rapid development of goods transport by motor trucks is worth consideration. In the vast local movement of raw products, and merchandise to and from factory farms, stores, warehouses and railway stations, the truck has found its least disputed and most distinctive place. For complete nationalisation of passenger and goods transport in the State, a fleet of about 7,000 vehicles doing a daily
mileage of nearly 7,00,000 will be necessary.

The motor transport would attain tremendous importance with the achievement of road programmes in their entirety. The ultimate aim of the road plan, after the third phase, would bring every village within two miles of an all-weather road, place every village or town with a population of over 1,000 on some road while provide every town of 5,000 population in the State with a metalled road.

Facilities available in the State

As for the industries related to the means of transport, there are three railway workshops in the State, viz. Northern Railway Workshop at Lucknow, North Eastern Railway Workshop at Gorakhpur and Izatnagar (Bareilly). There are nine regional workshops of the State Roadways at Kanpur, Allahabad, Gorakhpur, Meerut, Dehra Dun, Agra, Lucknow, Kathgodam and Bareilly, and many sub-depots in each region. Besides these, there is a central workshop at Kanpur. Tongas and ekkas, bullocks carts and hand carts are all locally made and repaired. The repairing of motor vehicles is also carried out in the State, but there is no industry to produce them or their parts and accessories.

A five-year scheme for giving two years training to graduates, diploma holders and mechanics in automobile engineering has been approved by the Government. Herr Herbert Kuehnel, a German Automobile Expert, has taken charge of the Kanpur Central Workshop recently and would advise the Government on the training of technical personnel.

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1. 'Amrita Bazar Patrika' Allahabad, January 7, 1951.
The forests in the State yield timber, and castor oil is also produced and it can be turned into mobile oil. As regards draught animals, a large number of bullocks, buffaloes, horses and camels beside elephants are available to provide the basis for the establishment of any industry connected with transport in the forest areas.

As for the supply of fuel oil, it is understood that the Bihar Government have introduced legislation making it obligatory to mix a certain percentage of gur-alcohol in petrol used in driving motor vehicles. Alcohol can also be manufactured from molasses, if similar legislation is passed here as well. (See chemical industries)

To facilitate tapping of forest resources for industrial purposes, the State has constructed a tramway at Haldwani and proposes to construct metalled roads running into the forests.

The State has started its own research centre for experimenting on soil stabilisation and utilisation of various types of road material available to the road builders in a concrete form.

The Central Government has established a Road Research Institute at Roorkee (District Saharanpur). The Central Road Organisation is setting up a co-ordinating machinery whose task would be to co-ordinate, assimilate and disseminate the results of work done in the various States, having regard to the needs of the country.

Navigation

In the days of antiquity, it was remarked about India "there never was a country so intelligent and rich in which roads were so few and travel so difficult". In those days the only important highways of commerce were the navigable river
Originally, all four of the canals in this State namely the Upper Ganga Canal (1854), the Lower Ganga Canal (1878), the Agra Canal (1874), the Eastern Yamuna Canal (1830), were used, to more or less extent, for navigation, the most extensive system being the inter-connected Upper and Lower Ganga Canals.

The products of the river valleys and the cotton of Madhya Bharat and Madhya Pradesh used formerly to be conveyed by the Ganga River to Calcutta. The trade on the River Yamuna, too, was of some importance but the river was chiefly utilised by the Moghal Emperors for travelling from one place to another such as Delhi, Agra, Mathura and Allahabad, and there existed a regular Moghal Navy on this river.

The history of navigation by means of canal waterways in the State is, however, a very chequered one. With the linking of Kanpur, Ghaziabad, Meerut, Saharanpur and Moradabad by railways, in the third quarter of the last century, navigation in this part of the State began to decrease. Records show that during the whole of November 1893, only six boats sailed up the canal and eight down the canal in the Kanpur Supply Channel. Even during 1951-52 the State had nominal navigation drawing a revenue of Rs.3,242 only because of increased motor and rail transport being available to consuming markets. The total length of channels open for navigation had been 124 miles and 6 furlongs.

A glance at the railway map of the State would show that the whole of the area of the Upper and Lower Ganga system is served by railways. A branch line connecting Khurja, Bulandshahr...

and Meerut passes through the richest part of the whole of the Doab and renders it quite unnecessary to maintain any system of navigation nearby. Fate of the navigation on the Agra and Eastern Yamuna Canal is similar to that of the Upper and Lower Ganga Canals. The whole channel of the Agra Navigation Canal was abandoned in 1905 as a result of the construction of the Agra Delhi Railway. Previous to the opening of the North Eastern Railway trade on the Gogra was also of great importance.

Thus, the whole history of navigation within the State is manifested as one of utter failure from beginning to end. The problem of making it financially self-supporting at the stage, when the State is traversed by a vast network of railways and roads, seems to be all the more complicated than it was some 30 or 40 years ago. Apart from the above considerations, to ensure rapid development of agriculture, the water of the canals is to be utilised to its last drop for irrigation purposes.

The navigation channels link up big cities and industrial areas and connect these with areas of raw materials, such as timber-producing forests. But on the other hand, irrigation channels tend to avoid, from their very nature, big cities and towns and areas where agriculture is subordinate to industry.

The Ganges, Gomti, Gogra and the Yamuna are the four main rivers of the State. During the whole irrigation season the entire supplies flowing in the Ganges, the Yamuna and the Sarda are diverted, at the various headworks, into the canals for irrigation, and for all navigation purposes are dry at least in parts of the State in which are concentrated the industrial and commercial centres. At Agra the river Yamuna appears to be
a small 'nala' for a greater part of the year and contains insufficient water even for human consumption. While the Gomti and the Gogra, which are free from fluctuations, traverse through semi-industrialised and commercialised areas.

Another broad feature of the larger rivers of this State is the instability of their beds. They usually have a wide 'khadar' (that of the Ganga at Narora is some 15 miles wide) about which they meander in the most unaccountable manner, rendering the river unsuitable for navigation for some part of the year. Of the lesser rivers of the State, Ramganga is dry below canal headworks at Bhagwara near Moradabad and the Deoha river is dry below the barrage at Duni in the Pilibhit district. All the rivers in Bundelkhand are dry in the cold weather and all supplies are tapped for irrigation purposes.

Inspite of all such circumstances, with the industrial development of the State, the need for developing inland water transport has been increasingly felt to relieve pressure on the railway system. It should consist of a very necessary phase for the planned development of the State. The difficulties will have to be surmounted with an optimistic outlook. Even the past history of inland navigation does not afford to disappointment but shows that the failure was either due to negligence or created to meet the selfish ends. The East India Railway Company with its advent, had greatly reduced the rates on grain for export for long distances to the detriment of water transport.

In view of the steady loss to the Irrigation Branch navigation on the Upper and Lower Ganga canals was actually abolished in 1926. It was, however, pointed out that this
total abolition had resulted in losses to the Forest Department and hence the system was reorganised and there has since been a small profit.¹

The inland water transport may be slow, but it is definitely cheap. Each ton of wood pulp involves the same amount of transport charges as an over 8 tons of subsidiary materials. It is for this reason that preference must always be given to water transport in such matters. It has already been suggested that water transport is the only means of removing the silver fir and spruce woods to mill sites.

At present, Government controlled navigation exists only on a few of the canal systems in the State, and nothing has been done to develop it on the rivers of the State. The Lower and Upper Ganga canals taken together have a length of 412 miles open to navigation. Along the Gogra and the Ganga, below Allahabad, the navigation is still important. Below Mirzapur, the Ganga is mostly used to carry heavy goods such as building stones, salt-petre, etc. Timber, in large quantities, is floated down the rivers from Nepal. There is a regular steamer service below Ayodhya.

The special committee of the Inland Water transport which met at New Delhi on September 15, 1949, recommended a preliminary reconnaissance traffic survey in the areas served by the Ganga system of rivers, particularly between Buxuar (Bihar) and Allahabad, a distance of nearly 225 miles. The scheme stipulates to work a fleet of tugs or mechanically propelled barges or both.

to work up and down the river for carrying cement, coal and iron from Bihar and Bengal and to carry food grains, oils and other goods down the river. The scheme will be a great boon to the river side towns and villages. The survey work should be carried out now.

The best potentialities for developing navigation in the State are to be found on the Yamuna River. When the Betwa and the Ken are controlled, the supplies in the Yamuna River during the cold weather will be increased, in stages, by approximately 17,000 cusecs. This would enable the Yamuna to be made navigable from Hamirpur, which is only 37 miles by road from Kanpur and navigation facilities would then become available for large towns, such as Allahabad, Mirzapur, and Banaras, in addition to Kanpur. The completion of the Tons Project will further extend the length of navigation upwards in the Yamuna River.

A scheme for providing a fleet of twelve mechanically propelled barges in the Gogra River between Bahramghat and Barhaj for carrying materials, e.g. timber and agricultural produce of the valley to and from the important marketing centres, situated on the river, has also been prepared and submitted to the Government.

In the mean time, two high power tugs have been allotted to ply on the Gogra River. These tugs can drag a number of large sized country boats and shall be employed between Bahramghat and Barhaj. This will benefit the river trade and the inhabitants considerably. A detailed traffic and engineering survey of the river between Katarnighat and Bahramghat covering a distance of 178 miles is also being carried out now.
The scheme of making the Gomti River navigable is also under the consideration of the Government.

Sarda Scheme was purely designed for irrigation. The navigation aspect of the canal was ignored at that time. They probably thought that by providing navigation along Sarda Canal, all the forest produce and other building materials will find exit through the canal and business prospect of the railway (C & T.R) then owned by a British Company, would be jeopardised. If it is made navigable today, shortage of fuel-wood in the towns right up to Lucknow and that of stone and building material required for road construction and other purposes could have been mitigated. Incidentally, the construction of Sarda Sagar has scored out eighteen open falls and now with little effort and planning the canal can be rendered navigable to great extent.

For a proper co-ordination of the navigation system, the scheme of navigation canals in other parts of India will have to be considered. Sir Arthur Cotton, the distinguished Madras engineer, in the middle of the 19th century, dreamt of a vast network of navigable channels, spreading in all directions over a large area. He contemplated a navigable line 4,000 miles long from Karachi via Kanpur, Calcutta and Cuttack to Bhatkal, Manglore and Madras. "There is not a single obstacle to this", he wrote, "and the results would be far beyond any calculations". However, it is not all conjecture.

It would be no wonder, if the dream of the great engineer is materialised as all circumstances point to the wisdom of multiplying and developing canal communications. The larger the waterways the greater is the economy in transport.
Air Navigation.

The latest development in the ways of transport is by air, and India is quite air-minded. Allahabad is proud, in this respect, of carrying the first authorised air mail in India and probably in the world in January, 1911.

Uttar Pradesh can rank, viewed from the internal transport, with any advanced country which can develop great air services. Large commercial and industrial centres are situated on the plains at distances and ideal conditions for aviation are provided throughout the year with respect to location, topography and meteorology. The State, at present, contains a number of well-equipped aerodromes at Allahabad, Kanpur, Agra, Jhansi, and Lucknow. The first two towns are linked with Europe. It is hoped that in future the airways will do much to increase the trade and commerce of the State. A survey of aerodrome sites has been carried out in each district with a view to constructing more landing grounds, in order to promote civil aviation.

A firm called the Himalayan Transport and Survey, Ltd., has been carrying pilgrims from Haridwar to Badrinath, well on the hills, on the Alaknanda tributary of the Ganga, in the lesser Himalayas. These hills are undoubtedly practicable for aircraft by certain routes at certain seasons of the year, thorough landing ground will have to be prepared with more than ordinary care.

Suggestions

The railway map shows that the entire plain region of the State is so well served by the railways that there is no difficulty in moving goods and passengers from one region to another.

1. Barbour, G.B. The Himalaya is a Barrier to Modern Communications - Geographical Journal, January, 1936, p. 3.
The only district headquarter of the plain region not connected with any railway system is Etah. Even this would be brought on the North Eastern Railway system by a branch line, the preliminary survey of which is being carried on by the Government. But in the Himalayan districts and in the southern part of the Mirzapur district, the zone tapped by railway lines is extremely limited. Consequently, these tracts have remained almost virgin. For these areas light railways and other facilities may be provided as suggested on page 100. With the undertaking of the construction of the Rihand dam, a railway line will have to be planned to pass by the coal deposits near the dam site. But in order to exploit the lime-stone and forest resources of this part a railway line should immediately be constructed to connect Dudhi with the Garhawa Road Station.

In the Kumaun forest regions, because railroad is a costly means of opening new territory, the motor truck can be best adopted for long distance operation. Like the south African railways, the trucks equipped for both freight and passengers would be an effective alternative to branch line construction. Of course, strong vehicles would be required to carry bulky goods several hundred miles over poor roads of the undeveloped regions. With the objective of eliminating unprofitable trains, closing branch lines or seeking extension into adjacent territories, the railways should participate in both truck and bus services. In terminal areas, trucks should be used for inter-line transfers, for reaching off-track stations. Thus for a railroad co-ordinating scheme, motor transport would fill with finer weave the coarse meshes of the railway net and would also open up areas unmarked by rails so far.
The problem of navigation in the U.P. rivers specially the Rapti, Sarda and Gogra may be solved, if a sufficient depth of water is maintained in the main channels at all times. The necessary channel improvement is to be achieved by erecting a series of dams which would pound the water up stream to a minimum depth of 9 feet, combined with locks which would lift boats to the higher water above. Presently, there are falls on and regulators across, most of the canals in the State. Some are provided with navigation channels and locks to lower or raise the barges from one level to another. The construction of very many dams on the State rivers under the Government scheme is an asset of immense value towards the development of canal navigation.

Many commodities including timber, grain, etc. from Nepal could be transported to the Gogra and ultimately reach the Ganga. Bahramghat (District Barabanki) and Barhaj (District Gorakhpur) are important trading centres on the bank of the Gogra. Large quantities of molasses and 'Arhar' may be transported as far as Bengal and Assam. River steamers may also be engaged both in passenger and goods traffic. The Rapti river can be used for transporting large quantities of sugarcane to factories situated near its bank.

Regarding the co-ordination of the transport schemes, inland and water transport should for the present be allowed to develop freely. It would not stand in the way of future planning as in Germany a network of canals runs parallel to railways and roads. But it will not be possible to develop, organise and co-ordinate so long as all transport services are not under the control of the State Government.
In the rich forest divisions of the Kumaun region, ropeway transport of wood would be an inexpensive undertaking. Logs of the Chakrata forest area may be floated down the Tons river and may be taken out at Kalsi or Dakpathar, the latter is 28 miles away from the Dehra Dun Railway Station. Hence a ropeway communication may be established between them.

If the industrial and large towns are to be brought within the orbit of civil aviation, an elaborate ground organisation will have to be planned from now onwards with constant emphasis on future needs. A few air circuits connecting important district headquarters within the State for regular local services may also be considered.

**Conclusion**

It would not be out of place to mention in the end that the best interest of the country can be served only by a proper co-ordination of the four-fold modes of transport and not through the development of one kind only, however, efficient that may be. "Rail, road, water and even air all afford opportunities for cheap and efficient conveyance in certain areas and it would not be wise to run into uneconomic competition, where natural and other advantages are in favour of the one or the other.n1. The traffic in the State should be distributed among the four according to relative cheapness and efficiency. Therefore, it is high time that all should co-ordinate to utilise any special advantage they possess either collectively or individually for the benefit of the country.

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