

MEMORANDUM ON
THE KOYNA VALLEY PROJECT AND
THE POWER SHORTAGE IN BOMBAY
STATE
SUBMITTED BY THE DECCAN
MANUFACTURER'S ASSOCIATION,
SANGLI,
T O
THE PLANNING COMMISSION
THE KOYNA VALLEY PROJECT
AND THE POWER SHORTAGE
IN BOMBAY STATE.

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MEMORANDUM

ON

THE KOYNA VALLEY PROJECT

AND

THE POWER SHORTAGE IN BOMBAY STATE,

Submitted by

The Deccan Manufacturers' Association, Sangli,

To

The Planning Commission.

The Koyna Valley Project and the
Power Shortage in Bombay State

INTRODUCTION

The draft outline of the first Five Year Plan as prepared by the Planning Commission, has been engaging the attention of the various sections of the public for the past few months.

As the Deccan Manufacturers' Association, Sangli, is vitally interested in the various aspects of the plan, it is submitting this Memorandum for the sympathetic consideration of the Planning Commission.

The Deccan Manufacturers' Association, Sangli, established in 1946, is an Organization of the industrialists who have their factories situated in the area known as the Deccan, starting roughly from Poona to Belgaum.

The history as well as the present problem of the industries in this region is rather peculiar because of the fact that this region has very few advantages to offer by way of transportation, cheap motive power, water supply, trained labour, or above all, the supply of capital. Even then, because of the enterprising spirit of the manufacturers, the Deccan has now become an important industrial centre for a variety of products, such as Yarn and Textiles, Jaggery and Sugar, Agricultural Implements of various kinds, Pumps, Machine Tools, Oil Engines, Power Looms, Glass and Enamelware, Leather Cloth and Leather Goods, Hand-made Paper, Paints and Distempers, Oil and Soap, Water-heaters, Gold and Silver Ornaments, Chemical and Pharmaceutical Products, Fertilizers, Rice Flakes, Biscuits, etc., thus providing employment to about 1,00,000 workers on the whole.

A Committee Meeting of the Deccan Manufacturers' Association was held recently to consider the draft report of the Planning Commission.

The Committee, after having considered the Planning Commission's report, has asked me to convey their appreciation of the efforts on the part of the Planning Commission to prepare a coherent scheme for the future development of our country. The Committee of the Deccan Manufacturers' Association was, however, greatly disappointed at the non-inclusion of the Koyna Valley Project in the draft report prepared by the Planning Commission. In view of the vital importance of the Koyna Valley Project and the great transformation it is going to bring about in the day to day life of the people of the Deccan and Karnatak, I have been requested to bring to the notice of the members of the Planning Commission, the urgent necessity of including this Project at least, in the report of the Planning Commission for being included in the first Five Year Plan.

We do not think, it is necessary for us to dwell at length on the importance of a Hydro Electric Scheme in the economic and industrial life of any nation. The inclusion of some

important Hydro Electric Schemes in the draft report of the Commission is a sufficient indication of its realisation of the importance of such schemes. The main contention of the Deccan Manufacturers' Association, however, is that the Deccan and a part of the Karnatak have not been given any consideration which they deserve on account of the backward conditions of the people of these parts.

It is no doubt true that Bombay State has 50% of Hydro Electric Power and about 16% of Thermal Power in India. But, if the statistics of the location of power plants and load centres are carefully studied, it will be seen that most of the power generated is within a short distance from Bombay, Poona and Ahmedabad and is consumed in these three big cities only. This is not a very satisfactory state of affairs from the point of view of a progressive State if the essential amenities of life are to be made available to all classes of people throughout the country. It is on this background that the Koyna Valley Project should be studied.

HISTORICAL BACKGROUND

The Tatas had originally surveyed the possibility of developing a Hydro Electric Project by harnessing the Koyna River between 1917 and 1924.

Again in the year 1938, the Government of Bombay took up the survey of power requirements of different parts of the State. But, on account of the Second World War, the survey was not completed. Again, in the year 1944-45, the Government formed the Electric Grid Department for carrying out active investigations of new power projects, among which the Koyna Valley Project was also included. In the year 1946-47, the Electric Grid Department of the Government of Bombay started investigations of the Koyna Valley Power Project and the investigations since carried out by them show that the project is well suited for the generation of large blocks of power and their distribution to Bombay City and other industrial areas in the districts of Poona, Satara, Sangli, Kolhapur, Sholapur, Ratnagiri and Bijapur.

The estimates prepared by the Grid Dept. provided for the installation of seven generating units of 60,000 KW. each. About 44,000 Mcft. of water from the Reservoir was to be reserved for irrigating about 4,00,000 acres by lift irrigation. The designs included the distribution of large blocks of power as noted below—

Bombay area	...	2,00,000 KW
Other industrial areas	...	60,000 KW
Special Key Industries	...	60,000 KW
Lift Irrigation	...	80,000 KW

The second stage envisaged the installation of four more generating units, thus reaching the maximum capacity of 6,60,000 KW.

Since the above investigations were completed, the States of Madras and Hyderabad put in their claim for the share of the water of the Krishna of which Koyna is a tributary. As a result of the representations made by the above States, it was ultimately decided that 24 % of the water resources of the Krishna river should be utilised by the State of Bombay. The State of Bombay, therefore, again took up the question of making further surveys on the already surveyed Koyna Valley Project to suit the quantity of water allocated to them.

THE SCHEME AS IT STANDS TODAY

The revised scheme in its broad shape is as follows :

In the first stage	
The generation of power	3,00,000 KW.
Water available for irrigation	8,000 Mcft.
In the second stage	
The generation of power	4,20,000 KW.
Water available for irrigation	30,000 Mcft.

In the third stage

A tail race plant below the main power house and generation below the dam by utilising the supplies let down for irrigation

90,000 KW.

The cost of the first stage of the Project, it is estimated, would come to about 35 crores and the scheme can be completed within a course of six to seven years from the time the green signal is given to it. It is also estimated that not only the revenue collected from this after the completion of the scheme will enable the Project to stand on its own legs, but that it will also be yielding a substantial net profit, after meeting all expenses including interest. The power in bulk can be supplied at less than **half an anna** per unit. Even according to experts, it is estimated that there is no other scheme in the State of Bombay which would be so paying and economical as the Koyna Valley Project:

Very recently, the members of the Association had an opportunity to meet Hon'ble Mr. C. D. Deshmukh, the Finance Minister, Government of India, in Bombay. They tried to impress upon him the necessity of undertaking this project at an early date and to include the said Project in the First Five Year Plan. Hon'ble the Minister for Finance then informed that the Planning Commission could not include this Koyna Valley Project in their draft report because the Government of Bombay did not specifically recommend that this Scheme should be given the top priority over the other alternative schemes in this Province.

We feel that this indecisiveness on the part of Bombay Government in its recommendations to the Planning Commission is in no way justifiable. The Koyna Project has been under investigation for the past thirty years and the repeated claims of the people in the Deccan for the implementation of the Project have been too long denied.

KOYNA PROJECT AND CHOLA PROJECT

It is argued that in the case of Bombay, after increasing the power supply by installation of the Thermal Power Station at Chola, the present demand of Bombay and the area round about could be satisfactorily met, with the result that the Koyna Valley Power Project would not receive adequate number of consumers to consume all the power generated by the Project.

Before studying the feasibility of the Chola Project (Thermal Power Station) in greater details, we wish to make it absolutely clear at the outset that the Chola Project can in no way be a substitute for the Koyna river project. The main difference between these two Projects is that while the Chola Project is intended to tide over the present power shortage of Bombay-Poona and the area round about, the Koyna River Project is intended to supply cheap electric power to Deccan and part of Karnatak, besides meeting the requirements of Bombay and Poona. Koyna River Project is the **ONLY** permanent solution to the present shortage of electric power both in Bombay and Deccan and hence any other temporary solution like the Chola Project does not stand comparison to it. At least, Government which is expected to look many years ahead and to utilise the present slender resources with a view to build the foundation for the future economic development of the country, must not fritter away the resources on make-shift schemes like Cholas in preference to permanent schemes like Koyna's, the benefits of which will be available to Bombay as well the backward area of the Deccan.

ADDITIONAL EXPENSES

It has been stated by the advocates of the Chola Thermal Project that the present demand of the State of Bombay in respect of electricity would be met by spending about ten crores of rupees on the Chola Power Project. While suggesting this, the advocates of this scheme do not seem to have taken into consideration the fact that about 200 waggon loads of coal from Jharia Coal Fields of Bengal will be required every day and that an immediate provision of about 1500 waggons and 40 engines will have to be made available for carrying coal from the Jharia Coal Fields to Bombay. Besides, this may as well entail an additional expense of laying a double railway line between Nagpur and Kharagpur. The Thermal generation

is always costly and, in our opinion, the cost will be about one anna per unit while the cost of energy of the Koyna Valley Hydro Electric Project will be less than half an anna per unit.

If the cost incurred in purchasing waggons, engines, the laying of the additional railway line and the consequential dislocation of the traffic are taken into consideration, the scheme in the long run would be found uneconomic and costly.

VULNERABILITY TO ENEMY ATTACK

Moreover, from the point of view of defence, Bombay is a strategic area and hence, Power Stations which are of vital importance for the life of the community should not be located near such vulnerable places. The Koyna Valley Power Station would be located underground and would thus be safe from enemy attacks, both from sea and air.

WASTAGE OF COAL

Because of the use of large quantities of coal involved in this Scheme, we feel that it will be a waste of our vital natural resource as, in our opinion, the coal and the coking coal deposits of India are not sufficient to meet the new demands which will be made on them for the future development projects of the country.

At present, there is a lot of demand for Indian coal outside the country and if we can conveniently divert our present coal supplies from such Thermal Schemes as Cholas to these outside countries, they will bring in large amount of foreign exchange.

UNNECESSARY DUPLICATION

There is also no urgent necessity of undertaking the additions to the Chola Power Thermal Station at present as many of the consumers of electricity in Bombay area have already ordered out Generating Plants for their own use, and therefore, the scheme is not of an immediate importance as is made out by the sponsors of this scheme. Since the power plants are already ordered out by the industrialists, the State should not spend money again for generating Power for the same consumers.

Moreover, in these days of shortages, we must tighten our belts to the utmost capacity and should not plan schemes which would merely fritter away our resources in short-term, duplicate and stand-by schemes like the Cholas. The idea of putting up additional generating units at Chola Station, just to relieve staggering at present observed in the industries in Bombay-Poona region does not deserve, in our opinion, top priority.

USE OF POWER

We now turn to the general criticism directed against the Koyna Scheme as to whether Deccan would be capable of consuming all the power generated.

We wish to refer here to the principles on which the Five Year Plan is based :

- (i) Priority has to be accorded to schemes which will (a) develop material and technical resources, and in particular (b) increase the production of foods and raw materials in a relatively short period by improving agricultural production by expanding irrigation facilities, making technical knowledge and equipment available and **giving opportunities for alternative employment to cultivators.**
- (ii) It is also laid down in the Plan that the State Governments have mainly to rely on their own resources and **that the financial aid from the Centre for the State Plans meets as far as possible the requirements of the more backward areas.**

The various uses suggested hereunder will, we feel confident, go a long way in realizing the above objectives of the Planning Commission.

The power generated can be utilised in the following manner:—

BOMBAY

The Government of India have entered into an agreement to establish two Oil Refineries in the Bombay Region. The establishment of Naval Dock Yard and of Refineries in Bombay State is going to create good scope for starting Chemical and other industries in the State. Thus, by the time the Koyna Valley Project is completed, Bombay itself would require more than 1,00,000 KW. to cover the present shortage, as well as to meet the requirements of the new industries that would by then be developed.

DECCAN

The industries in the Deccan area are at present greatly handicapped because of the high cost of generating electricity. They have mainly to depend either on coal or oil with the result that the cost per unit is round about 0-3-6 annas per unit.

The availability of electricity in abundance as well as at cheaper price will encourage industrialists of this part to expand their present plants and to start new industries. (It has been our knowledge and experience of the past quarter of a century that some of the industries that were originally to be started in this region had to be shifted either to Bombay or to Mysore State for want of power.)

Thus, the estimated consumption of electricity by industries in Deccan would come to about 60,000 KW.

ALUMINIUM INDUSTRY

The Planning Commission in its report have realised the need of increasing the production of aluminium and have stated that the present production of 3,600 tons be increased to 20,000 tons within a period of five years.

The Planning Commission might be well aware of the fact that some parts of Deccan (especially the area round about Kolhapur) possess extremely rich deposits of Bauxite. These deposits cannot be exploited without cheap electric power in large quantities and Koyna Scheme, therefore, is the only Scheme which can provide this power to develop the aluminium industry which is of utmost national importance from the point of view of defence.

IRON INDUSTRY

The Planning Commission can do well to give its sympathetic consideration to the possibility of developing the iron industry in this part by installing electric furnaces as at Bhadravati, to meet the present acute shortage of pig iron and steel.

For the information of the Planning Commission, we wish to state that some parts of the Satara, Ratnagiri and Belgaum districts have large iron-ore deposits, the iron-ore having been exported to Japan in pre-war days.

KARNATAK

We understand that sulphur deposits have been found out in Karwar district. The sulphur industry which is one of the basic industries, can be very economically developed with the supply of power from Koyna.

Besides this, the power can be profitably used for utilising the forest resources of Karnatak and Bombay.

If all these basic industries like aluminium, steel and sulphur are started side by side with the Koyna Project, not only will these industries consume a large portion of the power generated, but these Key Industries will also form the nucleus of further industrial development in this backward region, thus offering " opportunities for alternative employment to cultivators. "

IRRIGATION

The agriculture in Deccan is entirely dependent on the vagaries of Monsoon rains. There is at present, no canal irrigation on an appreciably big scale. The result is, that the famine conditions have permanently come to stay in this region. As agricultural activities are mainly limited only to three months of the rainy season and the harvesting that follows, the majority of the land cultivating population is idle for 4 to 6 months in the year. The number of unemployed, as well as the land-less labour has assumed a threatening proportion with the daily increasing pressure on land and the rapid extinction of old rural industries.

The periodic outbursts of loot and arson, from which these parts suffer, are a glaring proof of the rapidly deteriorating economic conditions in the rural areas in the absence of adequate food and employment.

This condition can only be improved by providing cheap power to the cultivator so that he can resort to lift irrigation wherever possible, thus bringing more land under irrigation, and ensuring maximum yield. The beds of the Krishna and Koyna down stream from the site of the dam can be conveniently utilised as canals and pumping stations can be established on both sides of these rivers, thus irrigating the fertile lands on both sides. Electric Pumps can similarly be installed on wells or tanks in the interior villages through which the transmission lines will pass. This will bring more than 2,50,000 acres of land under lift irrigation and 1,50,000 acres of land under canal irrigation. The additional food production will help considerably in tiding over the present food shortage.

DEVELOPMENT OF RURAL INDUSTRIES

The cheap power can be used for starting new small scale or cottage industries in the villages or reviving some of the old ones in a modified form; for instance, electrically driven power looms can be introduced in villages, thus giving part-time employment to the agriculturists. Other small scale cottage industries like Seed Crushing, Flour Mills, Cane Crushing, Cotton Ginning and Pressing can also be encouraged.

Thus, a considerable part of the power can be utilized for growing more food as well as for the growth of cottage and small scale industries.

TECHNICALLY SOUND

To sum up, we wish only to make this observation that brisk industrial or agricultural activity follows electrification. There are not examples wanting in the foreign countries, as well as in our own country, where electrification has transformed the whole life of a region. We have before us the example of Hoover Dam which brought new life in one of the most backward parts of America. The example of Mysore State is equally inspiring and illuminating.

We therefore feel that it will be nothing but sheer shortsightedness and pessimism on our part if we lose precious time in worrying more on the utilization of the power than on its early generation.

The scheme has been examined and re-examined, estimated and re-estimated on several occasions, both by Indian and Foreign experts, official and non-official. Eminent dam experts like Dr. Savage have certified the scheme as one of the soundest in the world. Thus, the preliminary investigations have thoroughly been made.

High hopes have been raised in the public mind by the statements made both in Legislature and in the Election Campaigns by the responsible ministers and hence, any delay in the execution of the plan would lead to widespread frustration with unpleasant repercussions.

FILLING GAP IN GRID SCHEME

As an alternative to the Koyna Valley Project Scheme, it is suggested that the Kakara para Project on Tapi river can be utilized for generating electricity of about two lacs KW

and the electricity thus generated can be supplied to Bombay in due course of time. The Kakarapara Scheme which is going to cost about 48 crores is too costly an affair when compared to Koyna Power Project.

The completion of the Koyna Project will fill the gap in Grid System of the North and electricity brought upto Hubli from the Jog Project. The Koyna Project will thus link up the two Grid Systems of Jog and North & South Gujerath, and therefore, it is of greater importance than the scheme of power generation at Kakarapara.

Lot of money has already been spent in putting Thermal Stations in the North and South Gujerath and therefore, the idea of supplying electricity from the Tapti Project will only create an additional and superfluous source of power in the same region.

If at any future time, the Tapti Project is taken up, the power generated from that Project can be utilized for supplying power to the districts of East and West Khandesh and Nasik through which the Tapti river passes. In our opinion, the inhabitants of the above districts have a claim over the electricity generated by the Tapti Project on the same analogy as Madras and Hyderabad have got on the waters of Koyna and Krishna.

PUBLIC DEMAND

It need not be supposed that the demand of the Koyna Valley Power Project is made by a few industrialists of the Deccan. There is already a great discontent among the public of the Deccan on account of the non-inclusion of this Scheme in the draft report of the Planning Commission. If this scheme is not taken immediately and if money is spent in providing electrical power for Bombay and other centres which have already got the Grid Systems, we think, the money thus spent will make the rich richer and the poor poorer. As stated above, if the Koyna Valley Project is undertaken with all urgency, it will usher in a new era of peace and plenty in this region, by increasing the pace of industrialization, by helping the Grow More Food Campaign, and by rejuvenating the small scale and cottage industries in the villages.

We have placed before you the views of the Committee and the urgent necessity of including the Koyna Valley Project in the first Five Year Plan. The people of this region are very anxious to see that the above Project is included in the first Five Year Plan and the scheme undertaken immediately.

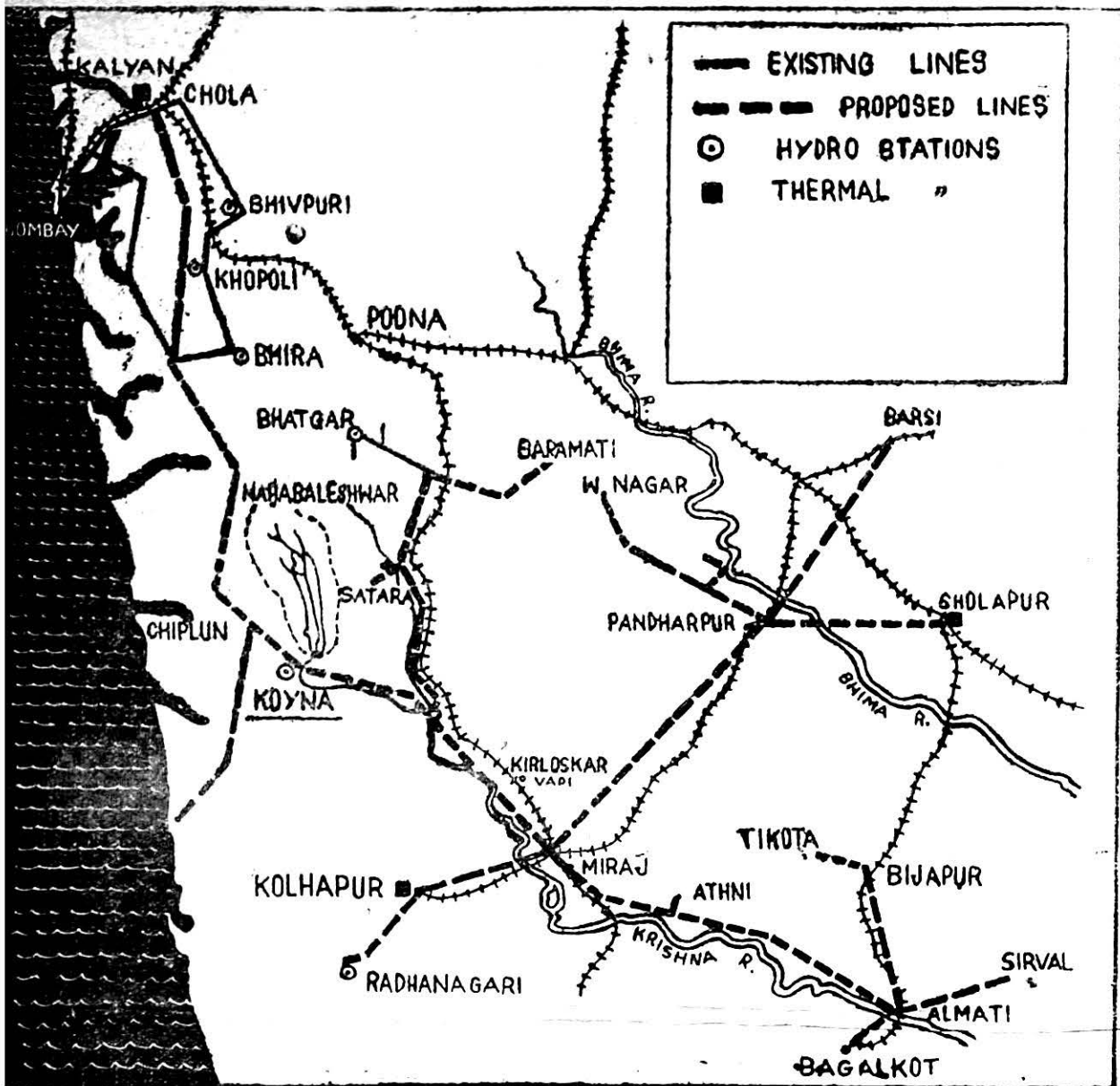
We therefore pray, in the name of the people of Maharashtra, that this Scheme should be given due importance which it deserves and should in no way be side-tracked. Such a step will only lead to the worsening of the economic conditions in this area resulting in more discontent in the minds of the people.

We therefore trust that our Memorandum will receive due consideration at the hands of the Planning Commission and that the Koyna River Project will be included in the first Five Year Plan.

Date : 25th Feb. 1952

S. V. Kirloskar
President, Deccan Manufacturers' Association, Sangli.

Koyna Service Area



Some Salient Features

	1st stage	2nd stage	3rd stage
RESERVOIR :			
Catchment area, sq. miles ...	346	346	346
Capacity at F.S.L., million cubic feet	53,600	98,700	98,700
Water spread at F.S.L., sq. miles ...	25.6	44.6	44.6
DAM :			
Height above river bed, ft. ...	226	269	269
Length at road level, ft. ...	3,050	3,050	3,050
WATER CONDUITS :			
Head race tunnel, length ft. ...	12,010	12,010	12,010
Head pond weir, height ft. ...	...	...	40
Pressure shafts, length each ft. ...	2,102	2,102	2,102
POWER HOUSE APPURTENANCES :			
Tail race, length ft. ...	7,200	7,200	7,200
Approach tunnel, length ft. ...	3,670	3,670	3,670
POWER GENERATION (KW) at 60 % L. F.			
Main power house ...	240,000	408,000	408,000
Tail race development ...	...	...	60,000
Dam power house (seasonal ) ...	...	...	30,000

THE DEVELOPMENT OF AN ALLUMINIUM INDUSTRY
UNDER THE KOYANA PROJECT:

INTRODUCTION:

As far as production of Aluminium is concerned, U.S.A and Canada share three-fourths of the world production among themselves. But the balance of production is rapidly changing as all nations are trying to increase the production of this metal. This key-metal turned the corner, in the Second world War. The Allies could manufacture more number of war machines at a rapid rate from this light metal, which at the same time had the strength of steel.

India is very fortunate in having, large deposits of Aluminium ore known as Bauxite. After the ore, the other important raw material being electricity, we must think the possibility of exploitation of this metal, whenever a Hydro Electric Scheme is thought of.

India is short of non-ferrous metals like Copper, Lead, Tin and Zinc. The recent inventions have made it possible to complete or partly substitute these metals by Aluminium. Therefore, if we want to be self-sufficient, then we have to make more and more use of this metal.

The Government of India has thought that this industry is very essential to its defence needs; therefore, this industry is subsidized to an extent of 50 to 60 lacs of rupees per year. In considering any new scheme, we must take note of the failures of the present concerns and take caution that we do not commit further mistakes in the future.

It is in this context that we must examine the Koyana Scheme. There are many arguments to put this scheme in abeyance. Our Country at present is importing about 12000 tons of Aluminium, which within a few years will rise to 30000 tons. If compared to U.S.A where the production is around 9 lacs of tons, our production is insignificant. Thus, as we build our own Shipping industry, locomotive industry and automobile industry, the demand may even go up to 60,000 tons. Koyana scheme is going to produce 5 lacs of kilowatts of electricity and it is in this context that we must examine that scheme of producing Aluminium near about this project.

The most important raw materials in the production of Aluminium are:

- (i) Electrical Energy.
- (ii) Alumina
- (iii) Electrodes, and
- (iv) Cryolite.

Out of the above things, the electrical energy can be supplied by the Koyana scheme. Alumina might be produced from the Bauxite ore at Belgaum, Kolhapur and Thana. Only petroleum, coke and pitch required to produce the electrodes and the cryolite must be imported.

THE PROJECT:

Having the things mentioned above in our mind, let us see when and where an Aluminium plant should be located and the reasons for locating the same.

The plant must be situated near Helwak which is about 40 miles from Karad, which is a railway station on Poona-Bangalore Section of M.S.M. Railway. This rail link between Helwak and Karad has

to be

constructed to carry out the construction of the Dam. Fortunately, this place is very near to Chiplun, which can be used as a harbour by coastal steamers. Just assuming the situation of the plant, let us go into the actual production cost per ton of Aluminium.

The cost of production in the Aluminium industry is distributed as follows:-

Electrical Energy	...	...	20 %
Alumina	...	...	30 %
Electrodes	...	...	18 %
Cryolite	...	...	2 %
General expenses and operating.			30 %

Therefore, to produce 30,000 tons of Aluminium, we require about 75,000 K.W. years of electric supply. Thus, 1/4th of the electricity produced at Koyana will be absorbed by this plant and the net revenue resulting from this would be about 54 lacs of rupees. This, the Koyana scheme will fetch without any lengthy transmission lines. It is said that the power side of the scheme will cost about 40 crores of rupees and only production of Aluminium metal will fetch the profit about 1½ % interest.

A L U M I N A :

All the Bauxite deposits of Thana, Belgaum and Kolhapur are within the range of 200 miles from the site of the plant. We want about 4.5 to 5 tons of Bauxite to produce one ton of Aluminium. The important factor with the Kolhapur and the Belgaum Bauxite is that they belong to gibbsite type, contains low quantity of iron and titanium and occur in the form of hills. The average analysis of these Bauxites have revealed that they contain more than 55 % Alumina. Silica content is as low as 3 per cent. These are the characteristics required for the Bayer's process for the digestion of the Bauxite ore. Therefore, the dissolving charges will be low and we think by the nature of the ore, the loss NaOH will not be more than about 90 Kg. of 100% NaOH per ton of Alumina produced. Therefore, about 5,500 tons of sodium hydroxide are required per year for producing 30,000 tons of Aluminium.

Fortunately, the necessary sodium chloride required for the manufacture of NaOH can be obtained from sea near Chiplun and 20 ton plant for production of NaOH can be put at the site. Electricity will be available from the Koyana scheme. This will not only save the conversion of solid sodium hydroxide into liquid condition but also will yield the same quantity of chlorine. This chlorine can be used for chlorination of water and production of D.D.T. This will not only help in controlling the malaria which results from every irrigation project, but also will help in supplying purified water, to towns having more than 5,000 people in the area. All this needs a vast quantity of electricity. Besides this, to run the machines for producing Alumina, will consume about 350 KW.hours per ton of Alumina produced.

The other important factor of this site is the small port of Chiplun. This can be made use by coastal steamers running upto Persina Gulf, therefore oil from the Persian Gulf ports can be cheaply brought to Chiplun and can be pumped to the site.

E L E C T R O D E S :

Aluminium industry uses continuous type of Soderburg electrodes. This requires petroleum coke and suitable coal-tar pitch. The new type of electrodes developed by the Montecatini Group of reduction plants in Italy has reduced the consumption of electricity from

22,400 K.W. hours to 16,000 K.W. hours. Petroleum coke can be obtained from the Persina Oil Fields and in case of emergency, from Assam Oil Fields. Pitch or coal-tar for making the paste can be obtained from Shalimar Tar Products Limited.

C R Y O L I T E :

At present, we entirely depend upon Denmark for this material. It has been found that the Dharwar type of rocks which extend from Belgaum to Dharwar contain many intrusions of fluorspar which are high in pure silica. Even some intrusions occur in Central Provinces. From these, it is possible to manufacture Synthetic Cryolite. This again requires a lot of electric power.

Thus, this plant will alone consume at the spot about 1,00,000 K.W. of electricity, which in terms of money is about 70,00,000 of rupees. This, the Government will get without having lengthy transmission lines.

But the production of primary Aluminium will not be the end. This has to be rolled into sheets, stripes, angles etc. Besides, large foundries have to be developed to make the various castings. The important feature in melting of Aluminium or of heating it for rolling of Aluminium ingots for rolling is that it is heated in electric furnaces. Thus, all the processes connected with this industry will consume not less than 30,000 K.W. years of electricity in the surrounding regions.

If you go into production economics of every hydro-electric projects that are being either worked out or thought of by the Government the only project that is suitable for the production of Aluminium is none other than the Koyana Project.

One more important fact is the question of unemployment. Pandit Jawaharlal Nehru in his recent Press Conference, told that the reason for discontentment is the huge unemployment that is prevailing in various parts of India. If we want to give permanent employment, then permanent employing sources must be tapped. Our multi-purpose schemes give temporary employment and cannot solve permanent employment. It is in this context, the Koyana Scheme and its associated thing, that is the production of Aluminium must be started at an earlier date. If the Government taps the right sources, money can be procured.

In concluding, we hope that the scheme will be taken up immediately by our National Planning Commission, to not only get rid of the poverty and famine that is existing in the areas affected by the project but also to help in decentralizing the important industries from the present congested areas.

A Short outline
of

THE KOYNA HYDRO ELECTRIC CUM IRRIGATION PROJECT.

Locale and history

The Koyna River which rises on the Western slopes of the Mahabaleshwar Plateau in the Western Ghats of the Bombay State, offers one of the most suitable sites available for development of cheap hydro-electric power and for providing storage for irrigation.

The first investigations of this scheme were undertaken in the years 1920-25 by Tatas. Again in the year 1938 the Government of Bombay took up the task of further investigations but the investigations had to be given up because of the outbreak of war.

The scheme was again taken up for investigation when the Government of Bombay established a Grid Department to investigate the possibilities of increasing power supply in the State of Bombay. The site has now been fully investigated by detailed drilling and aerial and terrestrial surveys.

The Works are situated in the Helwak- Pophali area along the Karad-Chiplun Road, about 160 miles south of Bombay and approached by rail from Karad on the Poona-Bangalore Section of the Southern Railway or by sea via. Dabhol port on the western coast.

Salient Features:

Located north-south, the eastern foot of the Ghats is at an elevation of 1900-2000 ft. above mean sea level; the area, for miles to the east of the Ghats, forms the Deccan Plateau at an elevation of about 1800 ft. The Western face of the Ghats has steep slopes ending at a ground level of about 500 feet; the Arabian sea at the Koyna locality is about 35 miles to the west.

This drop of about 1500 ft. between the two sides of the Ghats and a catchment of 346 sq. miles receiving an average annual rainfall of over 200 inches, makes a high head Hydro-electric scheme possible at moderate cost.

The storage will be obtained by a concrete-cum-stone masonry dam, of about 226 ft. height above river bed in the first stage, and 269 ft. in the second. The power house will be located underground, the water being carried by a tunnel and high pressure shafts driven through the Deccan trap, which is hard sound rock for underground installations.

Distribution of power:

Some 1,00,000 K.W. will be necessary for the area in the Deccan for feeding the existing and planned industries at Kolhapur, Satara, Miraj, Sholapur & Bijapur, for rural electrification and for lift irrigation.

The highly industrialised city of Bombay and its surrounding area, at present served by the Tata-Central Railway interconnected system, is experiencing severe power shortage. The first stage of the Koyna scheme will make available 240,000 kilowatts of power (about 1,100 million kilowatt-hours per year) to meet this awaiting demand. This power will be transmitted by 220 KV over two single circuit lines, each about 145 miles long and fed into the Tata System near Bombay.

The power in the second stage will be utilised to further extend supply, industry and rural use in the Bombay and the Maharashtra area.

Irrigation in the first stage will utilise 8,000 million cu.ft nett of storage water and develop lands in the Koyna-Krishna basin. In the second stage, the utilisation will be about 28,000 million cu.ft. nett. This will relieve the food shortage in the Bombay State to some extent.

The Koyna possesses further power potential by way of a tail race plant below the main power house and generation below the dam by utilising the supplies let down for irrigation. These can be tapped in the third stage of construction.

Total Power Potential:

The power proposed to be generated in the first stage will be 240,000 KW at 60% load factor; it will be raised to about 410,000 KW at the completion of the second stage. With the development of third stage, the total generation will be about 500,000 KW.

C O S T

The development has been so planned that each stage is a unit by itself and can be undertaken as needed.

The cost of the first stage developing 2,40,000 KW. is estimated at about 35 crores of rupees.

Rarely has a hydro-electric scheme started with such a block of awaiting power loads as the Koyna would.

Even with a low average bulk supply rate of 0.35 of one anna (less than 0.4 of one pence) per KWH, the scheme will show profit from the third year of its operation and yield a return of about 5½% on the invested capital from about the ninth year of service.

SOME SALIENT FEATURES.

	1st stage	2nd stage	3rd stage
RESERVOIR			
• Catchment area sq.miles	346	346	346
Capacity at F.S.L.million cubic feet	53600	98700	98700
Water spread at F.S.L.sq.m.	25'6	44'6	44'6
DAM			
Hight above riverbed ft.	226	269	269
Length at road level ft.	3050	3050	3050
WATER CONDUITS :			
Head race tunnel length ft	12010	12010	12010
Head pond weir height ft	....	...	40
Pressure shafts length each ft.	2102	2102	2102
POWER HOUSE APPURTENANCES :			
Tail race Length ft.	7200	7200	7200
Approach tunnel length ft	3670	3670	3670
POWER GENERATION (KW) at 60% L.F.			
Main power house	240000	408000	408000
Tail race development	--	--	60000
Dam power house (seasonal)	--	--	30000

(For use of Members only.)

of Deccan Irrigation Circle

A Note to help determine the limited Funds which should be asked for the 5 Major Irrigation works proposed by the Deccan Agricultural Association for inclusion in the First Five Year Plan.

.....000.....

(1) Discussions were carried out with the Superintending Engineer, Deccan Irrigation Circle (Shri. Kaydeo) and the Director of Agricultural Engineer (Shri. Gadkari) both experienced executive Officers on 10-3-1952 to determine the maximum amount that could be usefully utilised on the 5 works, taking into consideration:-

- (a) The stage of preparation of each project.
- (b) Time required for the preliminary works like acquisition of land, preparing work sheds and accommodation, obtaining tenders, quotations etc. and obtaining machinery and supplies from abroad till all arrangements can be made to establish the proper tempo on each work.
- (c) Existing and expected difficulties due to controls, scarcity of materials like cement and steel, paucity of trained and technical hands.
- (d) The fact that progress can be expedited on spread out works like canals but not on concentrated works like dams, aqueducts etc.

(2) It is to be noted that the projects prepared by Mr. Beale, though sufficiently detailed for preliminary reports and in some cases for administrative sanction are not enough for starting the works straightway. Lot of preliminary details and working plans and estimates have to be again worked out for technical sanction and for guidance of executive staff. The Kukadi and Kula Projects are yet to be worked out in this manner and the first year or year and a half may be spent before actual work can be started. Other 3 projects are fairly ready.

(3) The usual practice in Government Departments is the amount provided for a particular period - say 1 year or 5 years, is not carried over if part of it is left unspent; the balance automatically lapses and fresh amounts are to be sanctioned for the subsequent period.

If more amount that can be usefully spent is therefore, demanded, it results in a dog-in-the-manger policy as other works, which could have been sanctioned from the balance unspent if anticipated before hand have to suffer.

(4) The following table gives the estimated figures of costs of each project as reported to the Planning Commission recently by Government and the maximum amounts that can be usefully spent in the first five years (of which 1951-52 has already elapsed) as suggested by the two Officers mentioned above. It would be safe to assume that 1/3rd of the total estimated costs will be the outside maximum that should be demanded in the First Five Year Plan and the remaining 2/3rd in the next five year period.

Sr. No.	Name of work.	Storage M. Cft.	Cost of work Lakhs Rupees.	Area irrigated Acres.	Max. funds Lakhs Rs.
1.	2.	3.	4.	5.	6.

I - Irrigation Projects.

1	Vir Dam.	9,000	420	95,000 addl.	300
2	Khadakwasla.	15,000	450	85,000	300
3	Kukadi.	2,250	1,650	1,80,000	200
4	Mula.	18,000	800	1,28,000	200
5	Girna.	-	970	1,15,500	200
			4,290 Lakhs.		1,200
					or say 1,500 Lakhs.

II - Power-Canal-Irrigated Project.

6	Koyna. (Irrigation)	-	360 Canal & Weir. 248 Dam par 633	36,800 including canal. 29,440	
			3,167	66,240	

Power & Irrigation work Total 3,800 lakhs.

Notes on the above Items.

1. Project ready and work can be started as soon as sanctioned.
2. Shri. Champhekar's revised design for dam is to be sanctioned. Otherwise work can be started. Some canal details beyond Dhond are to be collected.
3. Detailed survey is yet to be made.

- 4. 10,728 M.Cft. Chas. . .
7,131 M.Cft. Wandā

Some survey details are to be collected and estimate is to be revised.

- 5. Project nearly ready but can await.

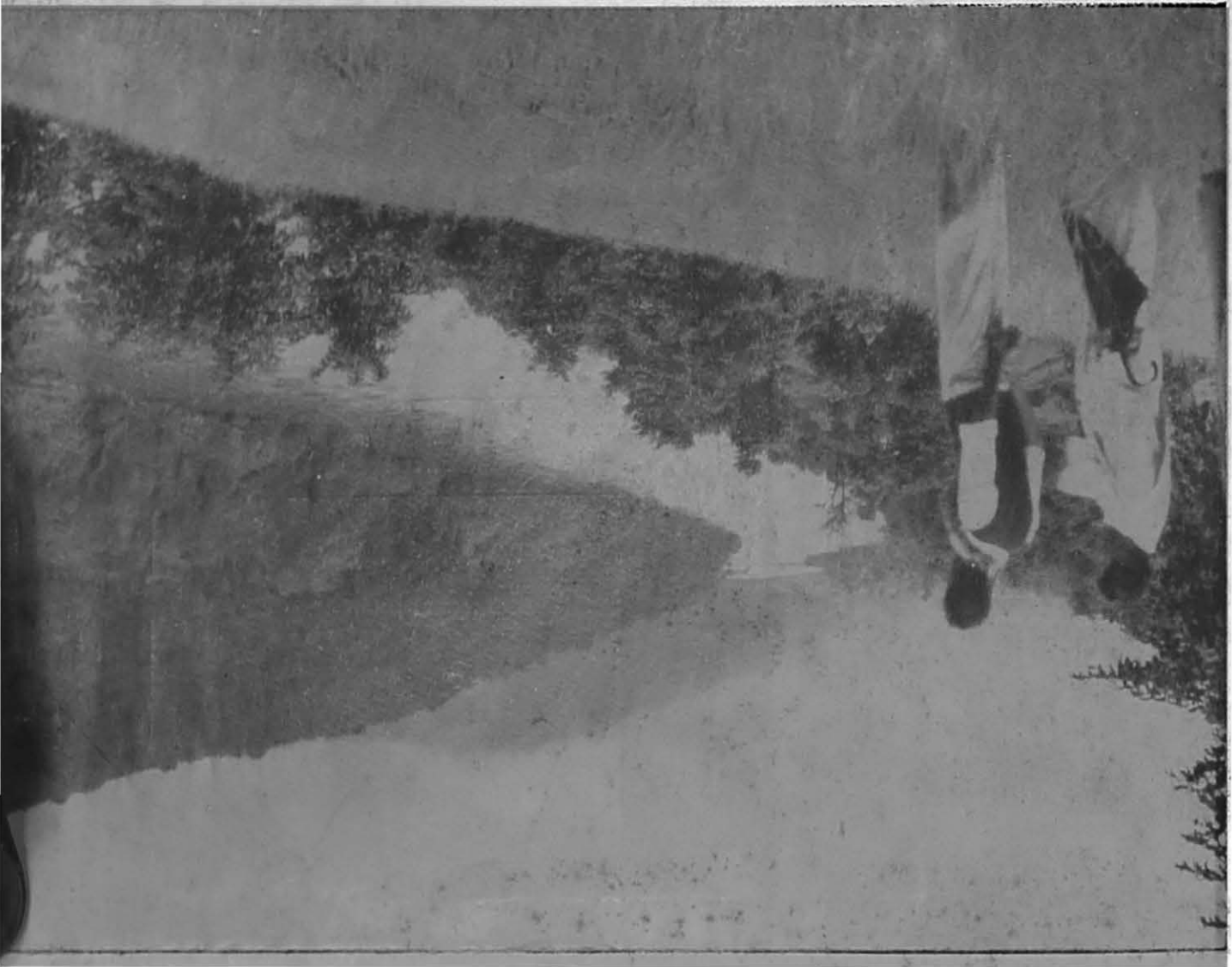
Both are nearly equally balanced and it would take 8 to 10 years to complete each part fully. Hence additional 35 Crores are earmarked for Bombay, They should be distributed in the preparation of 15 and 20 Crores in the 1st five year programme. The rest in next 5 year plan.

B. S. Sawarkar
11/3/52

Hydro-Electric-cum-Irrigation Project

THE KOYNA

SITE OF THE DAM.



Koyna Hy

LOCALE AND HISTORY

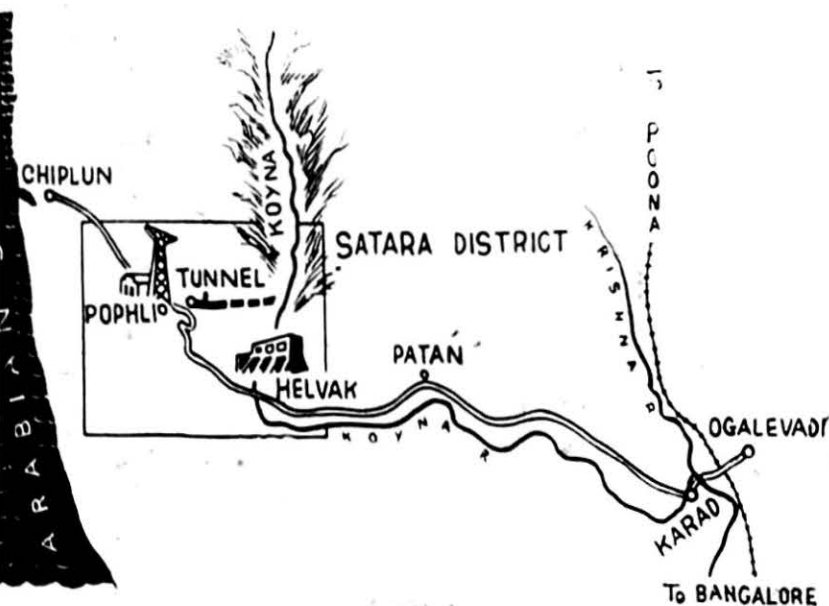
The Koyna River which rises on the Western slopes of the Mahabaleshwar Plateau in the Western Ghats of the Bombay State, offers one of the most suitable sites available for development of cheap hydro-electric power and for providing storage for irrigation.

The first investigations of this Scheme were undertaken in the years 1920-25 by Tatas. Again in the year 1938, The Government of Bombay took up the task of further investigations, but the investigations had to be given up because of the outbreak of war.

The scheme was again taken up for investigation when the Government of Bombay established a Grid Department to investigate the possibilities of increasing power supply in the State of Bombay.

The site has now been fully investigated by detailed drilling and aerial and terrestrial surveys.

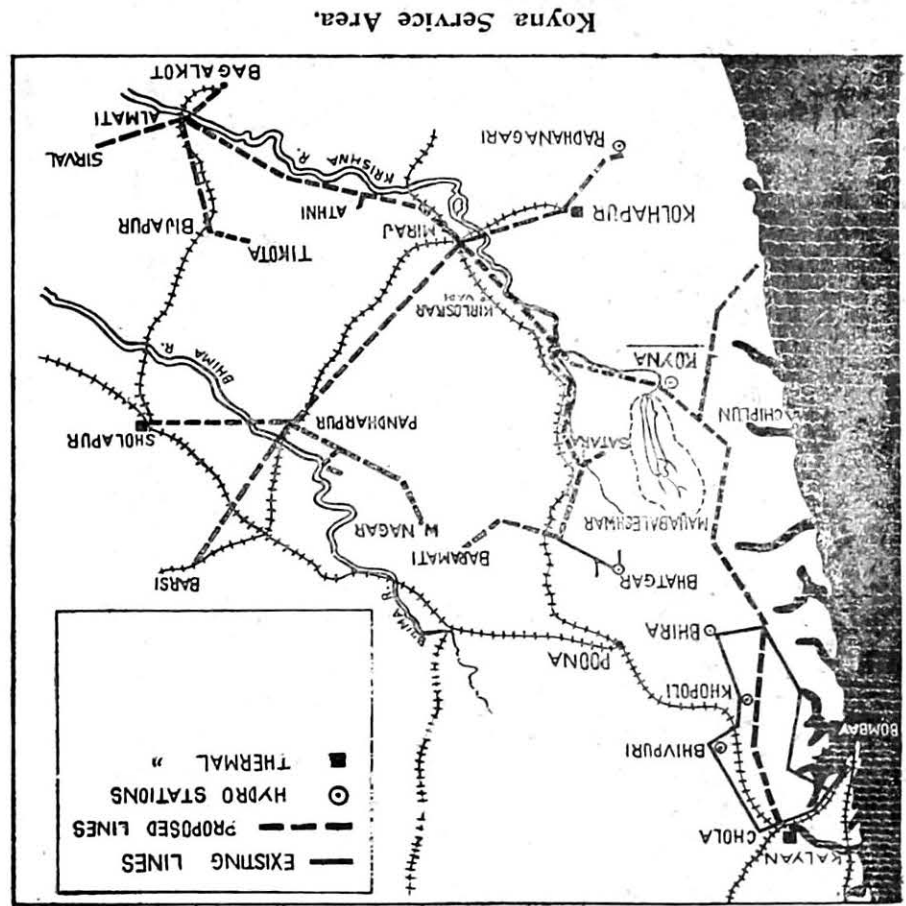
The Works are situated in the Helwak-Pophali area along the Karad-Chiplun Road, about 160 miles south of Bombay and approached by rail from Karad on the Pona-Bangalore Section of the Southern Railway or by sea via Dabhol port of the western coast.



Map of the situation of the works.

RESERVOIR :	
346	346
Capacity at F.S.L., million cubic feet	53,600
Water spread at F.S.L., sq. miles	25.6
44.5	44.6
DAM :	
269	269
Height above river bed, ft.	226
3,050	3,050
Length at road level, ft.	3,050
WATER CONDUITS :	
12,010	12,010
Head race tunnel, length, ft.	12,010
40	...
Head pond weir, height, ft.	...
2,102	2,102
Pressure shafts, length, each, ft.	2,102
POWER HOUSE APPURTENANCES :	
7,200	7,200
Tail race, length, ft.	7,200
3,670	3,670
Approach tunnel, length, ft.	3,670
POWER GENERATION (KW) at 66% L.F. :	
408,000	240,000
Main power house	240,000
60,000	...
Tail race development	...
30,000	...
Dam power house (seasonal)	...

SOME SALIENT FEATURES



Electric-cum-Irrigation Project

PROMINENT FEATURES.

Located north-south, the eastern foot of the Ghats is at an elevation of 1900-2000 ft. above mean sea level; the area, for miles to the east of the Ghats, forms the Deccan plateau at an elevation of about 1800 ft. The Western face of the Ghats has steep slopes ending at a ground level of about 500 feet; the Arabian Sea at the Koyna locality is about 35 miles to the west.

This drop of about 1500 ft. between the two sides of the Ghats and a catchment of 346 sq. miles receiving an average annual rainfall of over 200 inches makes a high head hydro-electric scheme possible at moderate cost.

The storage will be obtained by a concrete-cum-stone masonry dam, of about 226 ft. height above river bed in the first stage, and 269 ft. in the second. The power house will be located underground, the water being carried by a tunnel and high pressure shafts driven through the Deccan trap, which is hard sound rock for underground installations.

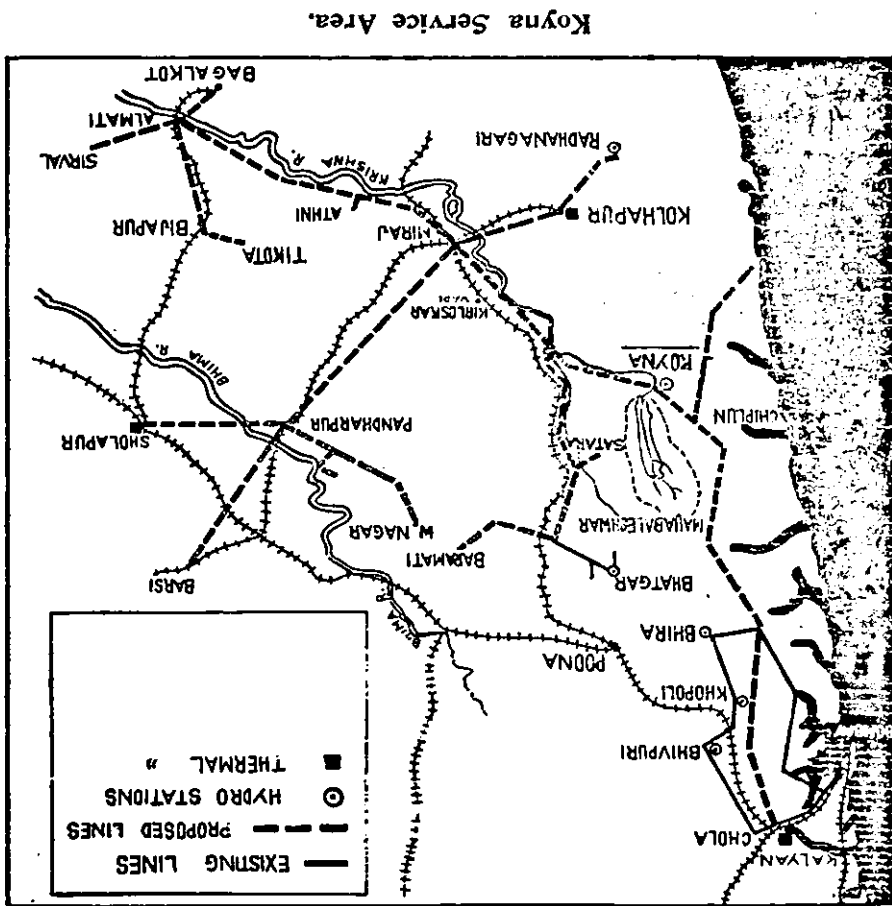
URGENCY OF THE SCHEME

Industry : There is at present great dearth of cheap electric power in the Deccan, with the result that the area is remaining backward from the point of view of industrial and agricultural development.

The Swadeshi movement as well as the ingenuity and the enthusiasm of the local talent has, however, led to the growth of some industries in this region. They include a wide range of products like yarn and textiles, jaggery and sugar, agricultural implements of various kinds, pumps, machine tools, oil engines, power looms, glass and enamelware, leather cloth and leather goods, hand-made paper, paints and distempers, oil and soap, water heaters, gold and silver ornaments, chemical and pharmaceutical products, fertilizers, rice flakes, biscuits, etc.

The great handicap to the further expansion of these industries as also to the birth of new ones is the heavy cost they have to incur in generating electric power for their use. The cost per unit today amounts to three annas, while power is available at nine pies or one anna in places like Mysore and Bombay respectively.

Dam power house (see)
 Tail race development
 Main power house
 (KW) at 66% L.F.
 POWER GENERATION
 length ft.
 Approach tunnel,
 Tail race, length ft.
 APPURTENANCES
 POWER HOUSE
 each ft.
 Pressure shafts, length
 Head pond weir, height
 length ft.
 Head race tunnel,
 WATER CONDUITS
 Length at road level,
 Height above river bed
 DAM :
 sq. miles
 Water spread at F.S.L.
 million cubic ft.
 Capacity at F.S.L.,
 Catchment area, sq. m.
 RESERVOIR :
 SOME SA



um-Irrigation Project

FEATURES.

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