

BOMBAY MARCHES ON.

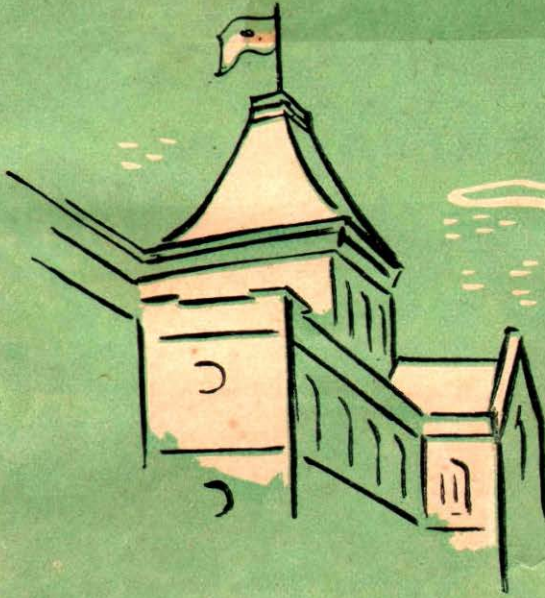
(Irrigation project)



Dhananjayrao Gadgil Library



GIPE-PUNE-031979



Bombay Marches on...

IRRIGATION PROJECTS

(26). 221
J1
31979

ISSUED BY THE DIRECTORATE OF PUBLICITY, GOVERNMENT OF BOMBAY



Dr. Jivraj N. Mehta, Minister for Public Works and Housing

BOMBAY MARCHES ON...

*A Review of the Work and Activities of the Government
of Bombay during the quinquennium 1946-1951*

IRRIGATION PROJECTS

Price One Anna

Issued by

THE DIRECTORATE OF PUBLICITY, GOVERNMENT OF BOMBAY,
BOMBAY

1951

CONTENTS

	PAGE
Irrigation Projects	1
Introductory	1
Top Priority Given	2
Irrigated Acreage	2
Existing Works	4
Nira Right and Left Bank Canals	4
Mutha Canals and Matoba Tank	5
Godavari Canals	5
Girna Canals	6
Pravara Canals	6
Hatmati and Khari Cut Canals	7
Gokak Canal	8
Works—Contemplated, Undertaken and Executed ...	9
Works Taken up	10
Gangapur Dam Project	11
Vir Dam Project	13
Ranand Tank	14
Meshwa Canal Project	14
Mahi Canal Project	15
Tapi Project	16
Ghataprabha Project	18
Merged Area Schemes	19
The Kolchi Weir	19
Radhanagri Scheme	20
Projects under investigation in Bombay State ...	21
Koyna Hydro-Electric-cum-Irrigation Project	21
Narmada Projects	22
Sabarmati Irrigation Project	23
The Operation of Irrigation Works	24
Canal Advisory Committees	24
Important Legislation	25
Committee's Report	26
Betterment Levy	26
Dividing Flows of Water	27
Minor Irrigation	29
Two Programmes	29
Over 40 Works Completed	30
Loan Programme	30
Demand Exceeds Capacity	31

First Published: October 1951

IRRIGATION PROJECTS

INTRODUCTORY

The rainfall in India in general and Bombay State in particular is notoriously irregular—irregular in every sense of that word. In matter of distribution, for example, we find in Bombay State areas like the Western Ghats ridge receiving as high an annual rainfall as 270 inches and over, as against the tracts like Bijapur, and Banaskantha districts where the average rainfall never exceeds the limit of 20 inches a year. Seasonwise also, the spread-over is most uneven. Most of the rain of the whole year falls during the period when the South West monsoon is most active i.e., between June and October, while some erratic rainfall is received at the commencement and at the end of the rainy season, due to disturbances in the Bay of Bengal, leaving the remaining period of the year to the tender

mercies of a dry winter and a rainless summer. Added to this, is the liability to serious deficiency in rainfall or heavy downpours followed by absolutely dry spells.

The remedy against these ills and uncertainties lies in making the Indian farmer feel assured of water-supply for his fields. In other words, the most effective insurance against the vagaries of monsoon is the provision of adequate irrigation facilities. The larger the area under irrigation, the lesser the dependence of the cultivator on rainfall for growing crops, resulting in an assured yield from the land.

TOP PRIORITY GIVEN

Viewed against this background, the importance of irrigation works in Bombay State, both major and minor, cannot be over-emphasised. Among the development schemes in the post war reconstruction programme of the Government of Bombay, Major irrigation Works have been given top priority, with the purpose of effecting improvement in the economic condition of agriculturists and overcoming at the same time a part of the deficit in the foodgrain supply of the State.

IRRIGATED ACREAGE

Considering the limitations of rainfall and topography, Bombay State ranks ninth among the States in India in respect of the irrigated crop area. The actual acreage irrigated annually is a little over a million acres, out of which three-fifths depend on wells, the oldest device for supplying water to the crops, one-fifth on the canals and the remaining one-fifth on the tanks. The area irrigated constitutes only 4.6 per cent. of the total cropped area in the State.

About 85 per cent. of the area irrigated by canals lies in the Deccan tracts, the rest being distributed equally between Gujarat and Karnatak. The reason for the excessive concentration of canal system in the Deccan area, as compared to the other two areas, is two-fold. The Deccan plateau receives an uncertain rainfall and particularly its eastern parts are liable to periodical scarcity and

famines. It was, therefore, in this region that irrigation works of a major type were undertaken as an anti-famine measure. Besides, this area lent itself better for undertaking major irrigation works in that, this tract falls away gradually from the watershed of the Western Ghats towards the east and this configuration coupled with the heavy rainfall in the Ghat region, made it possible to construct a number of storage works in the narrow valleys of the rivers, leading down from the hills. From the lakes so constructed, the canals can draw a perennial supply of water mainly by flow. This explains the existence of almost all the major canals in the Deccan.

EXISTING WORKS

When the present Government assumed office, the main canal systems which existed in Bombay State were the Nira Right and Left Bank Canals, the Mutha Canals, the Godavari Canals, the Girna Canals and the Prawara Canals in Maharashtra, the weir canals of Hatmati and Khari Cut in Gujarat and the Gokak Canal in Karnatak. These works have been briefly described in the paragraphs that follow :

NIRA RIGHT AND LEFT BANK CANALS

This system consists of a reservoir at Bhatgar, pick-up weir at Vir and a Canal taking off from either end of the weir. Originally the capacity of Bhatgar dam was only 5,300 M. Cft. ; but it was raised to 24,000 M.Cft. in the year 1928. While the Left Bank Canal has been in operation since 1885-86, the Right Bank Canal started functioning in 1924-25. The whole scheme has been carried out at a cost of Rs. 560 lakhs.

The length of the Nira Right Bank Canal is 106 miles and it commands about 4.5 lakh acres of land in the Satara North, and Sholapur Districts. Its designed discharge at the head is 1,500, cusecs. The annual average area irrigated is 85,000 acres.

Nira Left Bank Canal, about 100 miles long, together with the tail tank, commands culturable area of 2.25 lakhs of acres. The designed discharge at the head is 720 cusecs. About 80,000 acres are irrigated annually on an average, on this system.

MUTHA CANALS AND MATOBA TANK

This system came into operation in 1874-75. The canals were constructed at a cost of about Rs. 65½ lakhs, including the cost of a large ghat fed storage reservoir (Lake Life) on the Mutha River at Khadakwasla, about 12 miles from Poona. The dam is 10 feet high, spanning the valley of the Mutha. The system comprises of two canals, the Mutha Right and Left Bank Canals, 70 and 18 miles long respectively. The maximum designed discharges of the two canals at their heads were 412 and 38 cusecs, but the present maximum discharging capacity due to constant running for town water supplies and consequent weed and silt growth is about 300 cusecs and 20 cusecs respectively. It is not possible permanently to improve the capacity of the Mutha Right Bank Canal until a separate pipe line is provided from the dam to the city for town water supply. Both the canals take off direct from the lake which has a storage capacity of 3,091 million cubic feet of which 500 million cubic feet cannot be utilised on account of the Poona Water Supply System which requires a margin of safety in the event of replenishment being received late. The Matoba Tank is the tail tank receiving the surplus supply of the canal during the monsoon months. On an average 21,500 acres are irrigated annually on this system.

GODAVARI CANALS

This is one of the major irrigation works undertaken in the Deccan for the protection of areas liable to famine. It was started in 1907 and completed in 1915-16 at a cost of about one crore of rupees. This system comprises of:—

(a) A storage reservoir (Lake Beale) on the Darna river, a tributary of the Godavari situated about 20 miles from Nasik;

(b) A pick-up-weir at Nandur-Madhmeshwar on the Godavari, 47 miles below the Darna Dam, which impounds the water released from the storage reservoir; and

(c) Two canals, the Right Bank Canal, 69 miles long which serves the northern tracts of the Ahmednagar District and the Left Bank Canal, 48 miles long which irrigates lands north of the Godavari in the Nasik and Ahmednagar Districts.

The length of the Darna Dam (inclusive of its waste weir) exceeds a mile and the dam has a maximum height of 92 feet above its lowest foundation level. The lake has a storage capacity of 7,763 million cubic feet and the catchment area is 156 square miles. The weir at Nandur-Madhmeshwar is 3,618 feet long, inclusive of the Right and Left Bank Canals regulators. It has a maximum height of 34 feet above the level of the river bed. Scouring sluices have been constructed close to the head regulators of the two canals, with the object of keeping the approach channels to the latter clear of silt. The total area under the command of the canals is 2,32,390 acres. The two canals (Right and Left) are designed to discharge 384 and 228 cusecs at their heads respectively, with full supply depth of seven feet and six feet respectively. An area of about 62,000 acres is irrigated annually on this scheme.

GIRNA CANAL

This is a comparatively small irrigation system, situated in the Nasik District, having its storage reservoir at Chankapur, fed from a catchment of 100 square miles in extent and its pick-up-weir at Thengoda, situated further downstream on the Girna River from which weir the Girna Canal (19 miles in length) takes off. The tank is situated on the Girna river, a tributary of the Tapi and has been formed by the construction of a masonry dam 140 feet high, which impounds 1,550 million cubic feet of water. The dam and the canal (up to mile 13) were completed in 1909-10 and the Canal had been in operation since then. The extension of this canal, designed to carry about 40 cusecs up to mile 19, was completed in 1920-21. The designed discharge of the canal at its head is 90 cusecs and at its tail 15 cusecs, the corresponding full supply depth being four and a half feet and two feet respectively. The total area under command of the canal is 29,182 acres and the irrigable area is 8,500 acres.

PRAVARA CANALS

The canal system which was constructed at a cost of one and a half crores of rupees comprises of the following :—

- (a) The Wilson Dam at Bhandardara across the

Pravara River. This dam which impounds the water of the Lake Arthur Hills is one of the highest dams in India, having a height of 282 feet. It is 1,600 feet in length and the lake formed by the dam has a storage capacity of some 11,189 million cubic feet.

(b) A pick-up-weir, 890 feet long, situated at Ozar, 53 miles downstream from Lake Arthur Hill and about eight miles east of Sangamner; and

(c) Two canals, the Pravara Right Bank Canal, 23 miles and the Pravara Left Bank Canal, 48 miles long, taking off at the weir at Ozar.

These canals irrigate lands in the Ahmednagar District and command an area of 2,28,729 acres. The designed discharges of the two canals (Pravara Right and Pravara Left) at head are 152 and 530 cusecs respectively, the corresponding full supply depths being five feet and nine feet. The construction of the Wilson Dam, which impounds the water of Lake Arthur Hill, was commenced in 1911 and completed in 1926. The catchment area of the Lake is 47 square miles. It is situated in the ghats and has an assured run-off. The dam is designed to impound a maximum depth of water of 270 feet and is constructed across a gorge in the valley of the Pravara River. At present water is impounded to a depth of 265.70 feet giving a storage of 11,189 million cubic feet. An area of about 86,000 acres is irrigated annually on this system.

HATMATI AND KHARI CUT CANALS

This is the most important canal system in Gujarat. The Hatmati Canal irrigates a tract of land, lying between the Sabarmati and Khari rivers and this system in addition to irrigating the area dependent on it, is designed to pass surplus water, when available, first into the Bokh Reservoir and then into the Khari River direct via the Bhujwa Channel. The Bokh reservoir does not provide any direct irrigational supplies, but only acts as a storage reservoir for the Khari Cut Canal. Further downstream on the Khari River are situated two small irrigation systems and these utilise the natural flow of river and also any surplus water which can be made available from the Hatmati canal. The Khari water is abstracted at the so called "Khari Sluices" for direct irrigational purposes, while the surplus water from the Hatmati is diverted through an artificial

cut called "the Khari Cut" into a natural channel and this in its turn supplies a system of distributaries, several small tanks and the large Chandola Tank situated near Ahmedabad. The system was first opened in 1873-74 and has cost more than Rs. 13 lakhs. Annual average irrigation is about 11,000 acres, subject to normal rainfall. The area in Kalambandi villages of the Kaira District, which used to receive water from this system, has been now transferred to Meshwa Canal.

GOKAK CANAL

The Gokak Canal system is the only important irrigation work in Karnatak (Belgaum District), with its reservoir formed by a masonry weir across the river Ghataprabha at Dhupdal. It consists of 16.13 miles of main and branch canals and 35.43 miles of distributaries. Total commanded area under the system is 18,668 acres with an irrigable area of 17,627 acres. The Dhupdal storage reservoir is mainly meant for irrigation, but a major quantity of water is supplied to the Gokak Mills Limited in accordance with the agreement between the Government and the Company. The Company pays an amount of Rs. 14,313 annually to the Government in two instalments, one in January and the other in July, for the water supplied to it from the Reservoir, subject to a rebate in the event of supply falling short of the quantity of water contracted for.

WORKS—CONTEMPLATED, UNDERTAKEN AND EXECUTED

When the present popular ministry took reins of office in the year 1946, 17 major irrigation works were contemplated. The works proposed were in the following order of priority and the estimated cost of each of the projects has been indicated against the item :—

	Rs.
1. Meshwa Canal Project	50 lakhs
2. Gangapur Storage Project	3,34 lakhs
3. Wardala Tank Project	12 lakhs
4. Ghataprabha Valley Development Project (Daddi Dam Project) (Stage I).	5,45 lakhs
5. Mahi Canal Project (Stage I)	4,25 lakhs
6. Vir Dam Project	4,20 lakhs
(a) Dam proper	
(b) Improvements to Nira Right Bank Canal.	
(c) Tisangi Tai Tank	
7. Ranand Tank	22 lakhs
8. Patdungri Tank	42 "
9. Watrak Canal Project	1,95 "
10. Dudhihal Tank	26 "
11. Girna Project	9,70 "
12. Kukadi Project	6,00 "
13. Mula Project	4,00 "
14. Wasdara Tank	64 "
15. Undirgaon Tank	17 "
16. Raising Ghankapur Dam	6 "
17. Tapi Valley Project, Stage I	12,16 "
	53,44 lakhs

WORKS TAKEN UP

Owing to lack of technical staff, however, it was possible to take up the work of preparing detailed plans and estimates on the following seven big projects only :—

Maharashtra : (1) The Gangapur Storage Project, (2) The Vir Dam Project, and (3) The Ranand Tank Project.

Gujarat : (1) The Meshwa Canal Project, (2) The Mahi Canal Project, Stage I, and (3) The Tapi Valley Project, Stage I (This work is, however, being done by C. W. P. C.).

Karnatak : The Ghataprabha Left Bank Canal Project (i.e., Stage I of the Ghataprabha Valley Project).

The total financial commitments on account of the projects actually under execution in the different parts of the State amount to Rs. 26.43 crores, and they would, when fully developed, irrigate 8,90,000 acres of land producing 1,78,060 tons of foodgrains.

On the need of more staff being realised for irrigation works, the number of Irrigation Circles under the charge of the Superintending Engineers as they are called in the Engineering Department, was increased from one to three (viz., the Deccan, Karnatak and Gujarat Irrigation Circles). Likewise were increased the number of Irrigation Divisions under the charge of the Executive Engineers from 5 to 15 and the number of Irrigation Sub-Divisions from 21 to 69. However, before the P. W. D. Organisation could be expanded as detailed above, the retrenchment drive began and the number of Irrigation Sub-Divisions which were really responsible for the execution of projects, had to be curtailed. Thus, the number of Irrigation Divisions were reduced to 13 and Sub-Divisions to 62. The number of Circles, Divisions, etc., quoted above are exclusive of the Tapi Construction Circle and its three divisions working under C. W. P. C. for Kakrapara scheme and Koyna Irrigation Circles with the complementary staff. The latter circle which was temporarily sanctioned for investigating the irrigation part of the Koyna scheme has been since closed, except its two sub-divisions designed to carry out the soil and contour survey of the area under command which are attached to the Karnatak Irrigation Circle. The effect of the retrenchment was felt not only in a reduction in the personnel, but also in the amount of funds necessary for carrying out the various irrigation works. The con-

struction work has thus been considerably delayed, extending the time-period previously fixed for their execution. Every effort is, however, being made to speed up the work.

This detailed progress so far made in respect of the various projects and when these projects are expected to be completed are given below:—

GANGAPUR DAM PROJECT

The Scheme for storage on the Godavari River near Gangapur, had been under investigation since the year 1907 to supplement the existing supplies on the Godavari canals, when there was a large demand for water. A project was sanctioned by the Government of Bombay in 1947 for constructing a composite Dam with a storage capacity of 5,500 M. cft. The cost of the original sanctioned project was very high and in order to be able to reduce the cost, the possibility of an earthen dam was investigated. An earthen dam was found feasible and cheaper and hence this was adopted in the revision of 1948. The whole of the project was recast and the canals have now been planned to take off directly from the Dam and to irrigate new areas near Nasik, in addition to supplying a small quantity of water to the city of Nasik for water supply purposes and also to the Godavari canals. The project is estimated to cost Rs. 3,34 lakhs.

Site.—The Godavari River takes off about 20 miles upstream of the dam site which itself is located about eight miles away to the west of Nasik.

Capacity.—The Dam will be an all earthen structure, 12,500 feet long and 123 feet high above the river-bed or 140 feet above foundations at its deepest. Top-width of the Dam would be 30 feet. It will contain about five million cubic yards of earthwork. It will store 5,500 million cubic feet of water with open waste weir and 7,200 million cubic feet in the second stage when waste weir gates are installed. The waste weir gates could be fitted after 5 to 10 years when the demand for irrigation will have established and increased. The Dam, however, is being constructed to its final height.

Choice of earthwork.—The question of the construction of the entire dam in earth was influenced not only by the consideration of low cost but also by labour-consideration.

It is becoming difficult to get labour for hard manual work. If the Dam were constructed in masonry, it would have required a labour strength of over 5,000 people. As there is not sufficient local labour available, it was thought expedient to undertake the work with the help of modern earth-moving machinery. This change-over has resulted in reduction of housing for labour and has also speeded up the programme.

Irrigation canals.—Two canals will take off directly from the Dam, one on the right bank and the other on the left bank. The Right Bank Canal will be a high level canal with a capacity of 130 cusecs and a total length of 25 miles. It will flow for eight months only and will supply water mostly to foodcrops. It will help replenish sub-soil water in the areas near Nasik and thereby development of well irrigation will be possible. This canal is proposed to be lined for a mile near Nasik town to prevent percolation which might create unhealthy conditions in the town.

The Left Bank Canal is proposed to be perennial with a capacity of 350 cusecs.

Both canals will together irrigate about 50,000 acres of land and are estimated to cost about Rs. 1,10,00,000.

General.—The construction work began in February 1949 with only a skeleton of earth-moving machinery. Most of the earth-moving equipment was received by November 1949. The equipment consists principally of 12 motor scrapers and 15 tractors.

Compaction is being done by sheeps-foot rollers.

Considerable part of the machinery has been obtained from Disposals. The machinery so received is over-hauled and repaired in the workshop put up on the site.

The work which is in full swing is going on in two continuous shifts and one mid-night servicing shift.

Great difficulty was experienced in the beginning as trained personnel was not available for operating and maintaining the machinery. Operators had to be trained on the job itself. The situation is improving now.

The work is expected to be completed by 1957, the total expenditure incurred to end of March 1951, being Rs. 100.18 lakhs.

VIR DAM PROJECT

The Nira valley is located in the Bombay Deccan and a small storage of about 5,300 million cubic feet was constructed at Bhatghar, supplying water to the Nira Left Bank Canal. For a full development of the Nira valley, a project was prepared in 1922, called the "Nira Valley Development Project of 1922" which included—

- (1) Construction of the New Bhatghar Dam.
- (2) Construction of the New Vir Dam.
- (3) Construction of the Nira Right Bank Canal.
- (4) Re-modelling work of the old Nira Left Bank Canal.

The New Bhatghar Dam was completed in the year 1927 and the capacity of the lake thus formed is 24,198 million cubic feet. The Nira Right Bank Canal has been constructed and is functioning properly. Re-modelling work of the Nira Left Bank Canal is also completed.

After completion of the three main works mentioned above, there remained the construction of the New Vir Dam for the full development of this River Valley Project, which was postponed with a view to watching the irrigation development on the Nira Right Bank Canal. Due to the establishment of four large Sugar Factories and one Gul Factory on the two canals, the demand for water has increased considerably, both for cultivation of sugarcane, as also for all other kinds of crops and it has now become practically impossible to meet the demand for water for food and fodder crops. It is keenly felt, therefore, that the construction of the New Vir Dam should be taken up at the earliest convenience to help the "Grow More Food" campaign.

This new dam is proposed to be constructed just about 300 ft. below the pick-up weir at Vir. The dam site is about 10 miles to the east of the Shirwal village and about 18 miles from Bhatghar in Poona district.

Main features.—This will be a composite Dam having the masonry portion 2,624 feet and earthen bank 7,950 feet in length. The maximum height of the Dam will be 117.5 feet above the lowest foundation and the maximum width at the bottom of foundation for masonry structure will be

about 75 feet. The storage capacity of this lake will be 9,400 million cubic feet. The length of the Lake formed by the construction of the New Dam will be about 18 miles and the full supply water-level will almost touch the lowest sluices of the Bhatghar Dam.

The area at present under irrigation on Nira Canal system is 1,56,525 acres annually. This will be increased to 2,74,175 acres on account of the construction of the Vir Dam.

The Nira Right Bank Canal is not able to carry more than 1,000 cusecs at present and hence the work of re-modelling the first fifty miles has been started in advance of the main scheme and it is expected to carry the required maximum discharge after completion of the work. The estimated cost of the remodelling work is about Rs. 20 lakhs and an expenditure of Rs. 9.11 lakhs has been incurred on this, up to end of March 1951.

RANAND TANK

The Ranand Tank is estimated to cost Rs. 21.5 lakhs, and would irrigate 2,700 acres in the Satara North district. As originally scheduled, it is expected to be completed in 1953. The work which is being done through the contractors has, however, been slow and the expenditure incurred up to the end of March 1951 has amounted to Rs. 3.08 lakhs only. Orders regarding the commencement of the work were issued on July 26, 1949.

The village Ranand is situated in the interior, away from the towns, like Satara and Pandharpur. The great handicap, therefore, is that even for small repairs to the pumps and tractors, a visit to the nearest towns is necessary. Endeavours are being made to push up the progress of the work.

MESHTA CANAL PROJECT

The Meshwa Canal Project was estimated to cost Rs. 50 lakhs, irrigating 18,000 acres in the Kaira district. It is now near completion, the expenditure incurred amounting to Rs. 36.15 lakhs, by March 31, 1951. Irrigation has started on it from the monsoon of 1950. It was very helpful in raising bumper crops of paddy last year. Besides having direct irrigation on the canal, it also supplies water

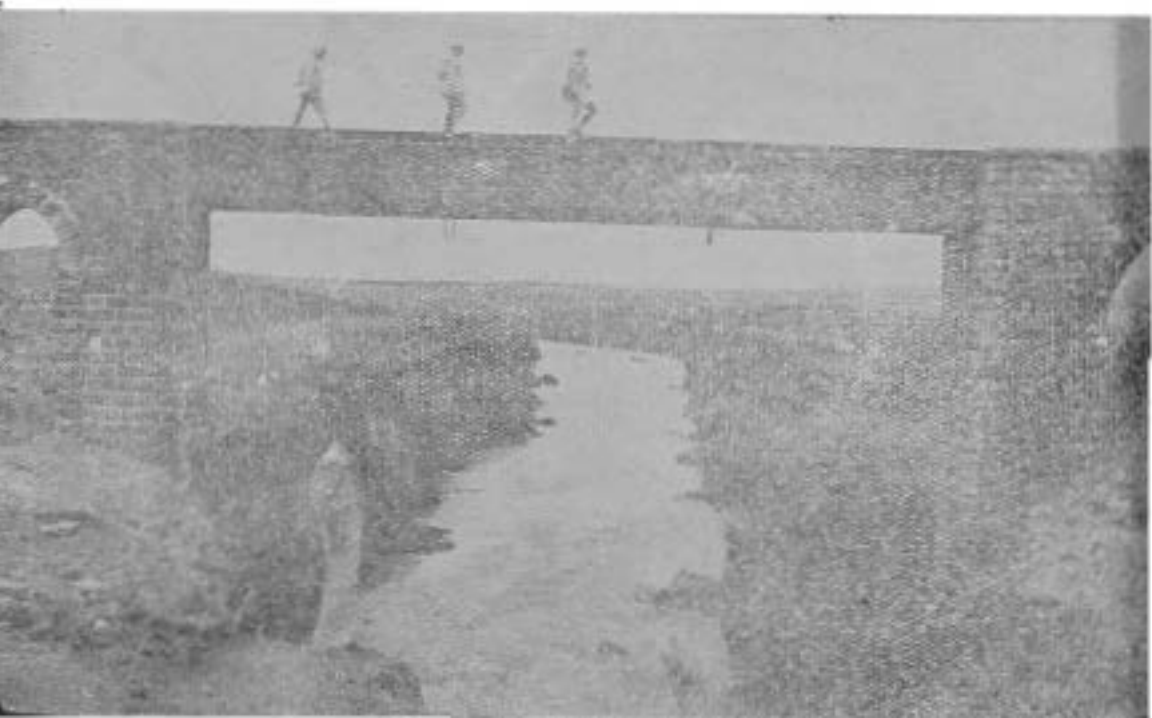


Dr. Jivraj N. Mehta, Minister for Public Works Department and Housing, is seen laying the foundation stone of the Nipal Aqueduct in mile 18 of the Ghataprabha Left Bank Canal in December 1949.



A view of the waters of the Ghataprabha river flowing down across the weir.

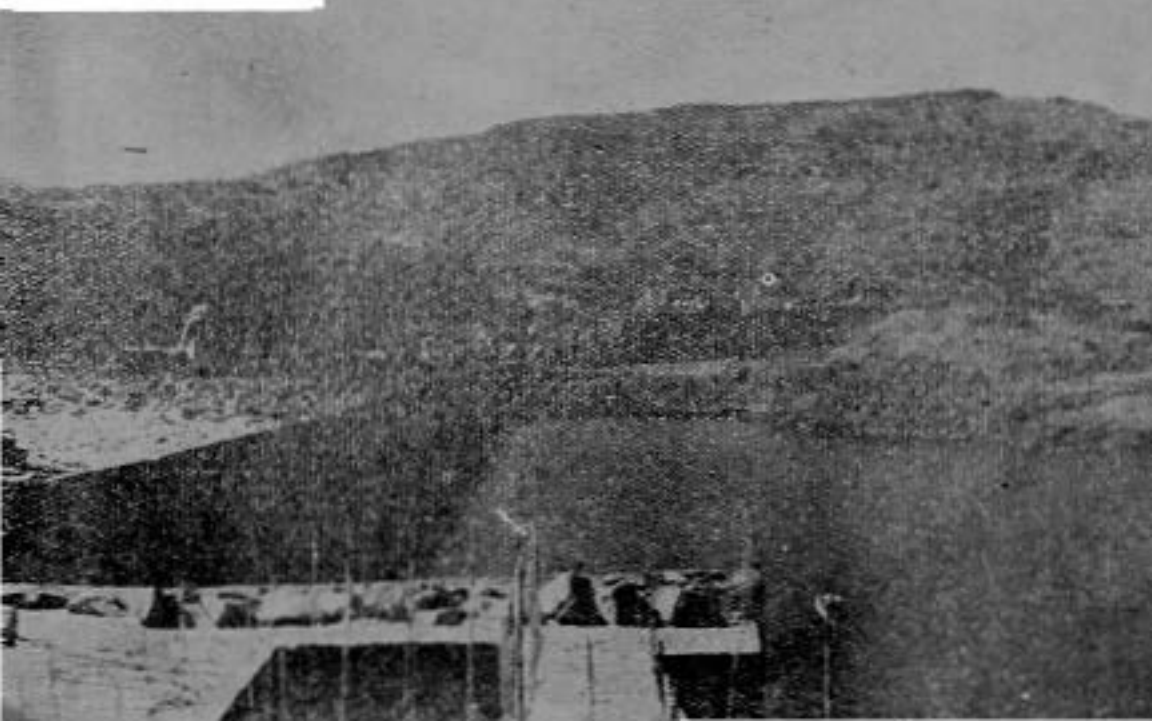
A view of the Ghataprabha Left Bank Canal excavated very recently.



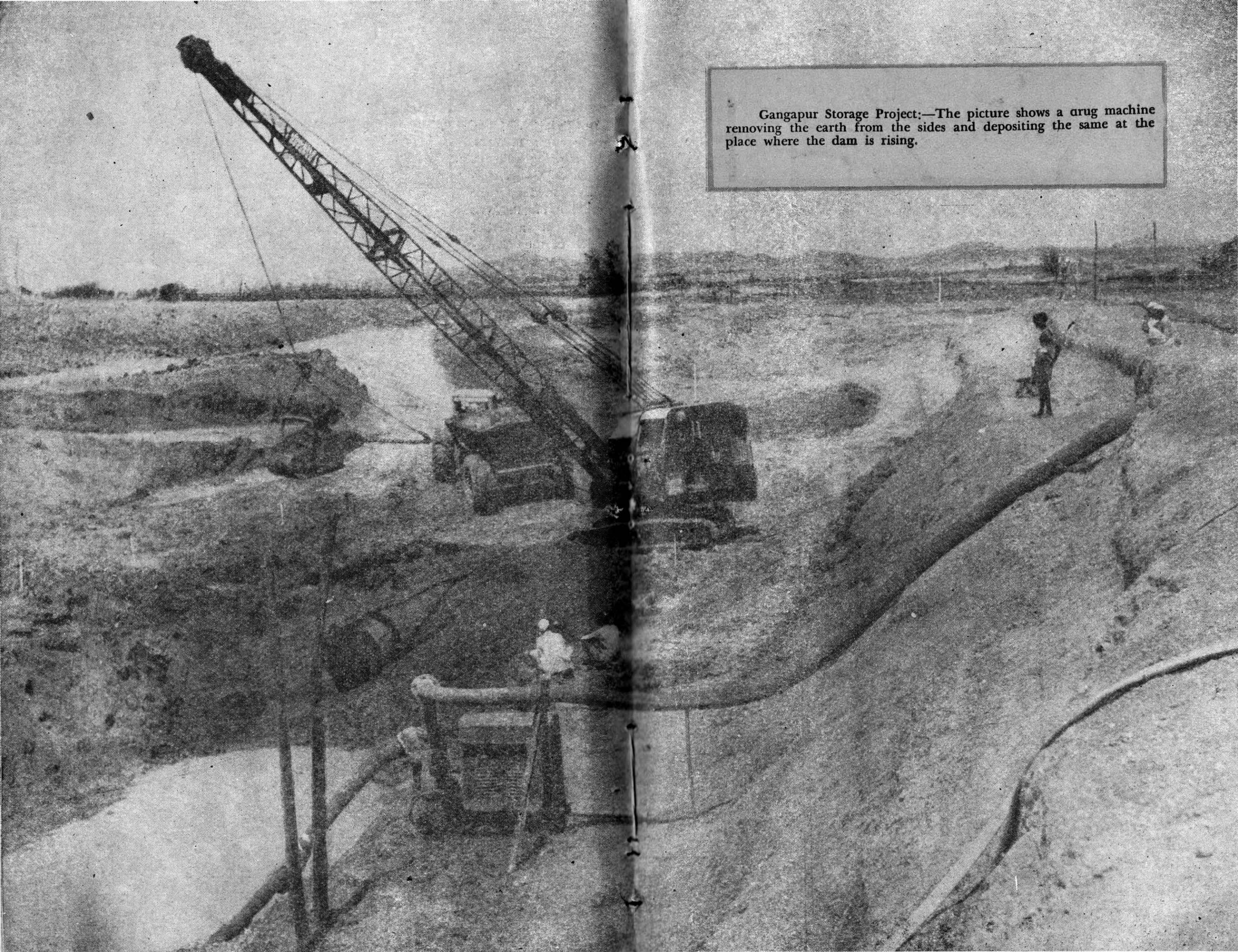
Dr. Jivraj N. Mehta,
Minister for P. W. D.
and Housing and **Dr.**
M. D. D. Güder, for-
merly holding the
portfolio of P.W.D.,
looking at a relief
model of the Ghata-
prabha Valley Deve-
lopment Scheme when
they visited Belgaum
District in June 1931.



A view of the dam
under construction for
the **Radhanagri**
Hydro-electric Works
in the Kolhapur Dis-
trict.

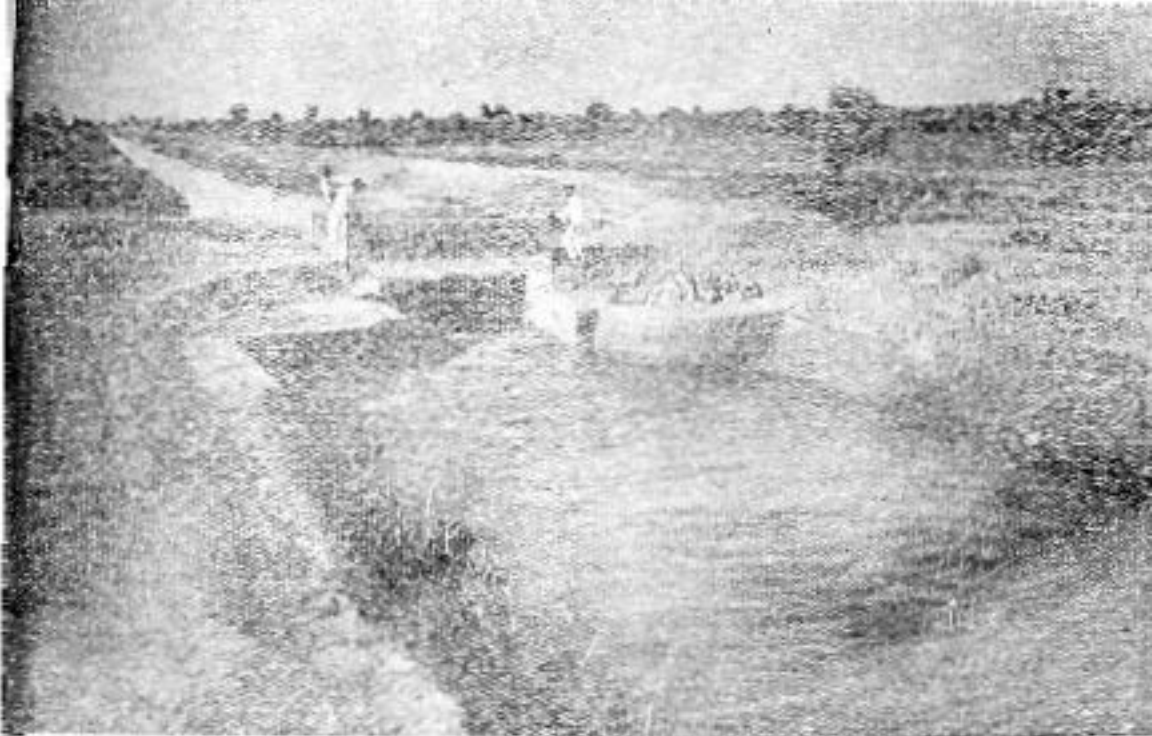


Gangapur Storage Project:—The picture shows a drag machine removing the earth from the sides and depositing the same at the place where the dam is rising.



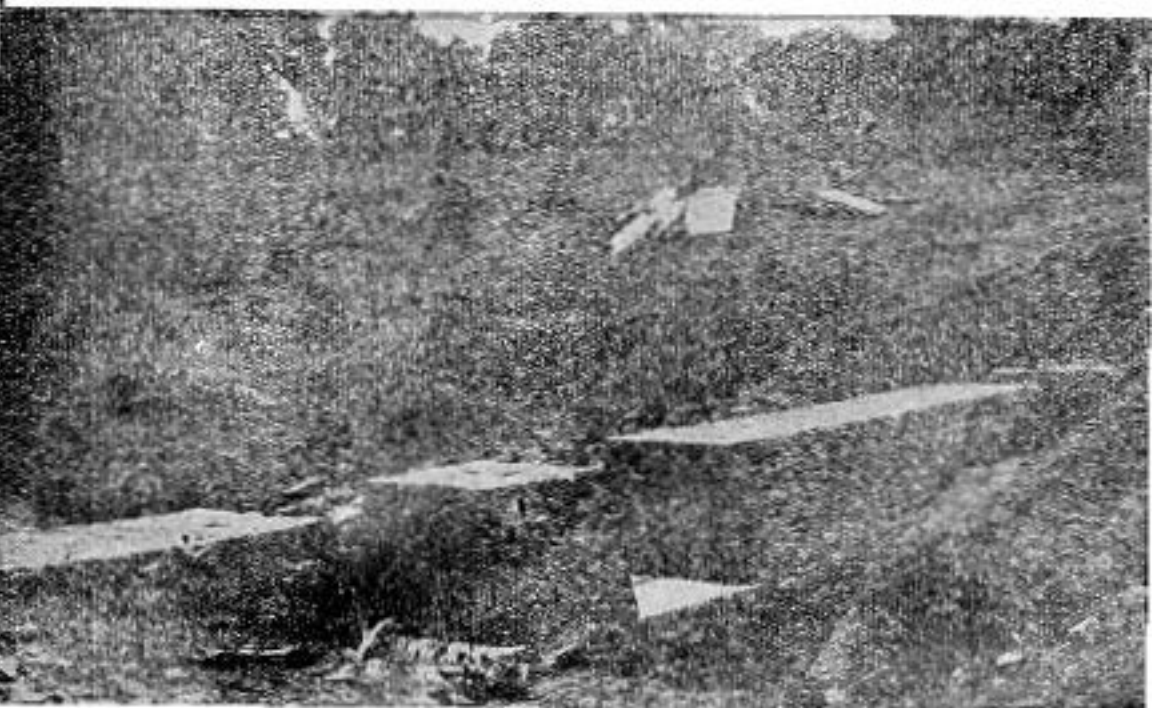


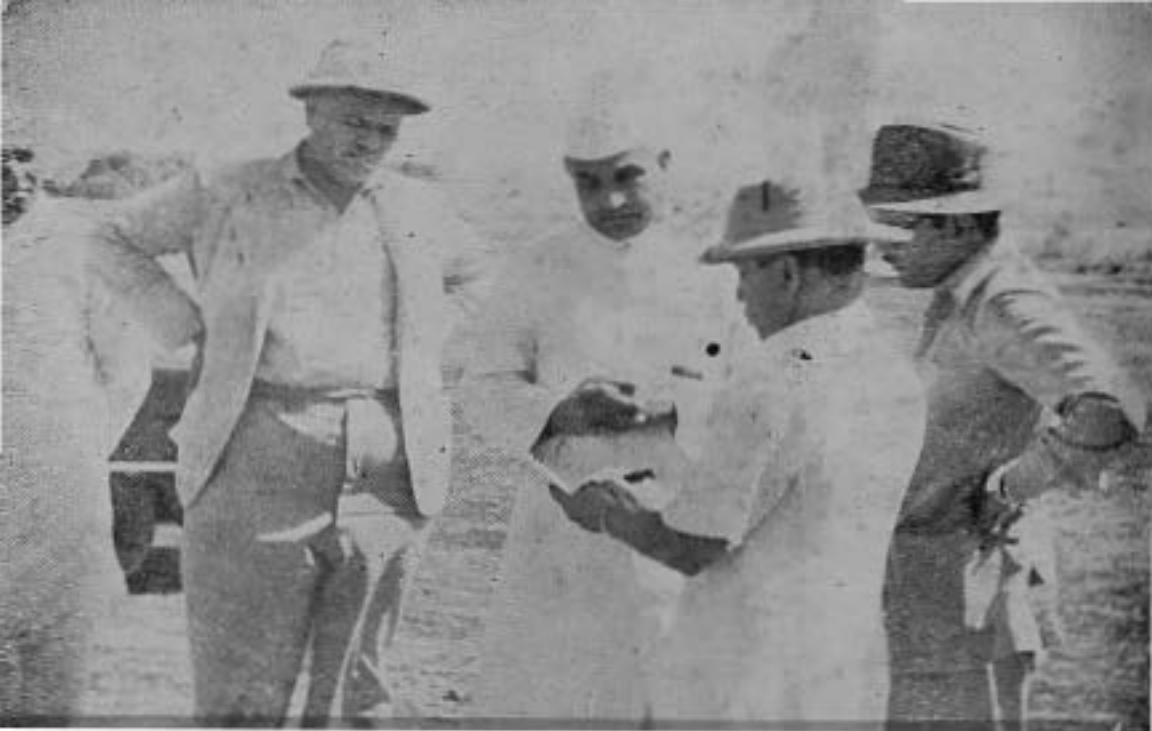
Gangapur Storage scheme:—Picture shows excavation of a rock to cut off trenches designed to let out the surplus water.



A view of the Fatewadi canal and a road bridge (Ahmedabad District) crossing the canal.

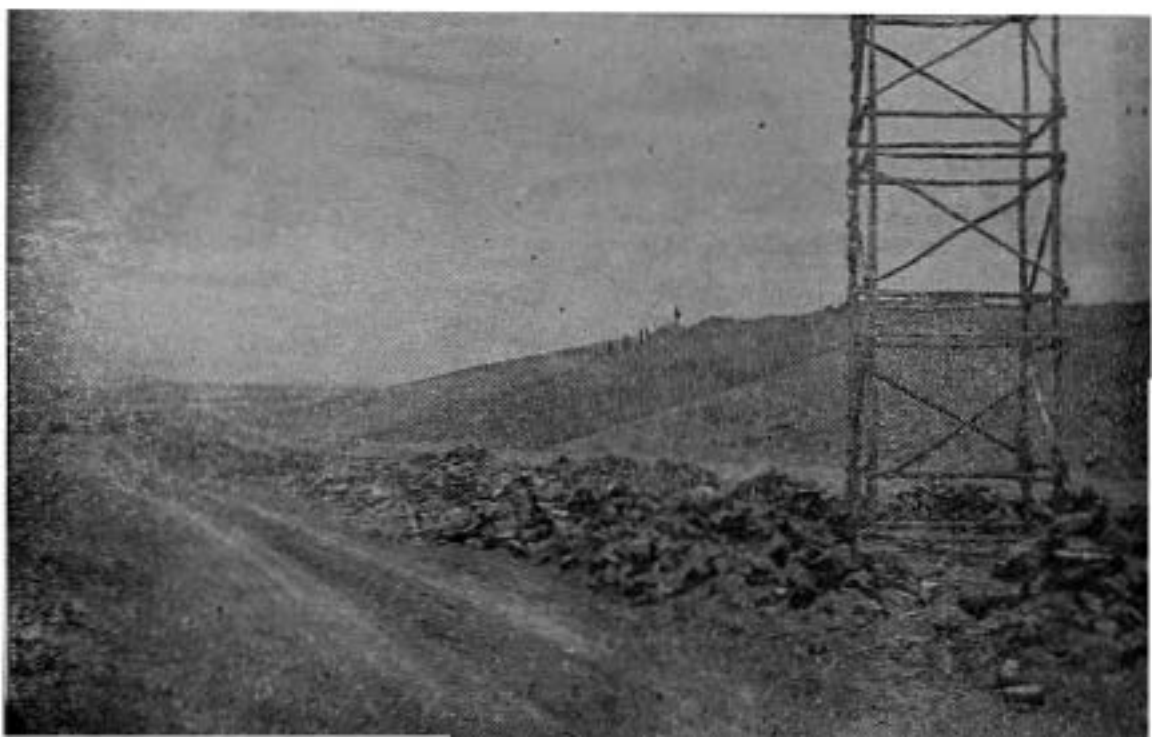
Belgaum District will have a number of Bandharas constructed under the Minor Irrigation Scheme of the Bombay Government. The picture below shows such a Bandhara constructed at Hattargi in Hukeri Taluka.





Dr. Jivraj N. Mehta is deeply engrossed in discussing certain aspects of the Gangapur Storage scheme with the Chief Engineer, P. W. D. and the Executive Engineer for the Gangapur Storage scheme.

A view of the rip rap work going on at the Gangapur dam site. This rip rap, i.e., arrangement of the stones in a particular fashion on the inner side of the dam, is designed to protect the dam against the wash-out by water.



to the lands settled on the tail of the Khari Cut Canals. It may be incidentally mentioned here that with a view to serving the irrigation needs of the remaining area on the Khari system properly and efficiently, work of repairing and remodelling Khari system has been undertaken at an estimated cost of about rupees one lakh.

This project in the Kaira district is the first one to be put into commission under the post-war reconstruction and development programme for Major Irrigation Works in the State. The project comprises of a solid pick-up weir 545 feet in length across the river Meshwa, the main canal being about nine miles long, a branch canal about 15 miles long and various distributaries. The river Meshwa is a non-perennial and alluvial river having a catchment area of 670 square miles at the pick-up weir site.

The project was administratively approved by the Government in the year 1947. The work of the main canal was started by October 1948 and that of the pick-up weir by November 1949.

MAHI CANAL PROJECT

As originally conceived, the first stage of the Mahi canal consisted in constructing a weir at Wanakhori and a Right Bank Canal, irrigating the Kaira district up to the main Anand-Ahmedabad Railway line, at a cost of Rs. 424 lakhs and irrigating 105,000 acres. The second stage was to construct a dam at Kadana, providing a reservoir with 1,00,000 million cubic feet of water with a Right Bank Canal and irrigating 6,50,000 acres of land in the Kaira and Baroda districts. But, as the construction of the Dam at Kadana would sub-merge large tracts of fertile lands and a large number of villages and two towns, the idea is now to construct a dam at Khel on the Panam river with a storage capacity of 17,000 to 21,000 million cubic feet of water; and ultimately also to construct a smaller dam at Kadana and later on another on the Anas river. The weir and the storage reservoir at Khel together with the construction of the Canal and distributaries are estimated to cost over rupees six crores in construction which with the centage charges would amount to about rupees eight crores. To meet a part of this expenditure, the beneficiaries in the Kaira district are planning to raise a loan of Rs. 2½ crores locally. This project is expected to be completed in 1959.

the necessary funds being available. The amount on this project spent up to 31st March 1951 came to about Rs. 24 lakhs. The work is done departmentally with the aid of machinery, some of which has already been received from the Disposals Department. An order for a part of the remaining machinery is already placed.

TAPI PROJECT

The Tapi River Valley Project, otherwise known as the Kakarapar scheme, consists of two stages, the first one involving a cost of Rs. 1,216 lakhs to irrigate 5,90,000 acres of land in the Surat district; 50,100 acres being for perennial irrigation and the balance for periodic irrigation, i.e., for the monsoon and the winter crops. Expenditure incurred on this project up to 31st March last, came to Rs. 66.65 lakhs.

The investigations for the multi-purpose projects in the Tapi river basin were undertaken in 1948. Extremely meagre data were available regarding the topography and the hydrology of the basin and it was necessary to make a start from scratch.

The report on the preliminary reconnaissance surveys was examined, and its recommendations were accepted by the Government of India and sanction was accorded by the Government of Bombay. Detailed investigations were undertaken on behalf of the latter Government by the C.W.I.N.C. (Central Water Irrigation and Navigation Commission) which is now replaced by the Central Water and Power Commission, at an estimated cost of Rs. 19,95,000.

Air Photography.—The investigations included a topographical and contour survey of the reservoir basin, covering an area of over 1,00,000 acres, a detailed survey for the canal system commanding an area of 8,00,000 acres, a geological examination of the dam site at Kakarapar, observations of discharges, silt and gauges at a number of stations along the river and a study of the rainfall, rainstorms and run-offs in the basin.

The work of surveying the reservoir basin was entrusted to the Survey of India Department which has completed the work, using the quick modern methods of air photography with ground control.

An extensive programme of soil surveys was also undertaken. Over 20,000 soil samples were taken out, classified and analysed. In addition to this work, a large number of soil samples were taken from Khar lands in the commanded area and analysed to determine the feasibility of reclaiming those lands for agricultural purposes. The laboratory work in connection with these investigations was carried out mostly in a laboratory set up at Surat and a part of the work, was done in the Central Water and Power Commission's laboratory at Hirakud.

Study of rainfall.—On the Hydrology side, rainfall records for the past 60 years from 62 Meteorological stations in the catchment area and 14 others, close to the border of the catchment area, were studied. Discharge and silt observation sites were established at Burhanpur, Bhusawal and Kathor bridge. Arrangements were made to read gauges at these sites every four hours and more frequently during floods. In addition, a number of gauging stations were established at strategic points, where observations were taken daily during the monsoon months. Small laboratories were set up at each of the discharge sites to carry out silt analysis. The results of the analysis of the run-off and the rainfall data have been recorded in three volumes by the Hydrology section of the Central Water and Power Commission.

Sufficient data had been collected within one year to enable the submission of the Project report and estimates for the Kakrapar Weir and Canals scheme to the Government. The investigations were carried out in a remarkably short period. The Weir and Canals Project estimated to cost Rs. 626 lakhs received the administrative approval of the Government of Bombay in June 1949. The inauguration ceremony of the work was performed by the Honourable Dr. Jivraj N. Mehta, Minister for Public Works and Housing, in November of the same year and the construction of canals was started soon thereafter. As a result of further investigations, the Chairman of CWPC recommended construction of a dam instead of a weir at the site to make the scheme multi-purpose, providing for perennial irrigation, generation of power, navigation and water supply to cities like Surat, etc. This recommendation was accepted; but as the cost of the full scheme was very high (viz., Rs. 30 crores approximately) it was decided to develop the scheme in two stages. Stage I provides for the

construction of the dam to R. L. of above 225 (final top would be about R. L. 280), power house to generate 24,000 kw, the construction of over 800 miles of main canals, branches, distributaries and minors and a large number of major and minor cross drainage works, regulators, bridges, etc. The estimated cost of the completion of stage I is Rs. 12,16 lakhs as already mentioned.

Speedier transport.—The first stage of this project is expected to be completed in 1957. In addition, the work so far done includes the construction of a large number of distribution canals, 300 miles in length, and excavation of over 75 million cubic feet of earth. As the work is to be carried out departmentally, quarters had to be constructed for a large number of the staff required for the works. This is being done at Kakarapar. For the speedier transport of cement, iron and steel, and other materials required for the construction of the dam, enormous quantities of the material would need to be carried, thus necessitating improvement in the transport available. A railway line near the site of the dam is, therefore, under construction. Considerable amount of machinery has been secured from the Disposals Department and is being steadily brought to the site, overhauled and repaired. This has led to a considerable reduction in the cost of the machinery required for the project. A good workshop is provided at Kakarapar and a Mechanical Engineer's Division created for attending to the machines.

Local loan.—To surmount the difficulty created by the paucity of funds, a local loan of rupees two crores was issued, but the subscriptions realised amounted to Rs. 70 lakhs. The response was less than what was expected, but this was due to various reasons which were not foreseen. However, as a result of the experience thus gained, the Government has thought of various ways and means by which the difficulties noticed in raising the loan for this scheme would be minimized, while raising local loans for Irrigation and Power projects in other areas.

GHATAPRABHA PROJECT

The major project in Karnatak under construction is the Ghataprabha Left Bank Canal Project estimated to cost Rs. 5,45 lakhs. This work would irrigate 1,25,000 acres in Belgaum and Bijapur districts. It is also expected to be completed in 1957, the total expenditure incurred up to 31st March 1951, having amounted to Rs. 100.03 lakhs. This

project differs from the project like Mahi or Meshwa in that, being an old irrigation project, a weir already exists. It requires canals to divert the available water to distant areas. The main canal would extend to 44 miles. In several places deep rock cutting has to be done, and in places large aqueducts will have to be constructed to carry the canal water over other river streams and nallahs.

The work of cutting the canals is being done through contracts; and as it was not possible to obtain labour in concentrated areas for the work, contracts for digging the canal and constructing the aqueducts were given not in one stretch of the length of the canal, but in different miles, with the result that the work has been done in patches. This procedure was adopted with a view to expediting construction, but owing to the financial difficulties it has now been decided to concentrate on the first 18 miles only. The work costing to the extent of about Rs. 30 lakhs, carried out beyond that mileage, would have to wait completion to better times.

Proposal for local loan.—To facilitate and expedite this work, a proposal for raising a loan locally is under consideration. At present the canal irrigates 25,000 acres, out of which 23,500 was already being done by the original Gokak canal. With an expenditure of Rs. 50 lakhs more, the additional area to be irrigated would rise to 30,000 acres; and efforts are being made to concentrate on this portion of the work. The second stage which would consist of constructing dams at Shetihalli and Ajra, and the construction of the Right Bank Canal, when completed, would ultimately irrigate 6,30,000 acres at a cost of about Rs. 30 crores. The object of this scheme is to ameliorate the conditions in the scarcity-stricken tracts of the Ghataprabha valley, by irrigating land. It is the most important major irrigation work in Karnatak.

MERGED AREA SCHEMES

Besides these seven projects, the following two projects undertaken by the merged States, are being carried to completion by the Government of Bombay:—

THE KOLCHI WEIR

The Kolchi Weir Scheme in the former Ramdurg State, now merged with the Bijapur district, is being completed, at an estimated cost of Rs. 20.41 lakhs. It will irrigate

3,651 acres in the Bijapur and Dharwar districts and is expected to be completed in 1957. The expenditure incurred on this project up to March 31, 1951, amounted to Rs. 11.37 lakhs.

RADHANAGARI SCHEME

The then Rulers of Kolhapur State, realising the necessity of providing irrigation facilities for raising economic crops like sugarcane, turmeric etc. in the Panchganga valley, undertook the construction of a Dam (115 feet high and impounding 6,000 M. cft. of water) across the river Bhogavati (a tributary of Panchganga) about 34 miles to the south-west of Kolhapur town and started its construction in the year 1908. The Dam was raised to a height of 40 feet in the river bed portion and further work was stopped in about 1918, on account of the financial stringency resulting from the First World War.

The Scheme was revived and revised (estimated to cost Rs. 57 lakhs) in the year 1940, for constructing a dam, so as to impound 8,450 M. cft. of water generating 5,000 K.W. power at the downstream toe of the dam, and letting down water into the river for water supply to Kolhapur town and also for being pumped up for lift irrigation along the banks of the Bhogawati river.

No appreciable progress could be made till 1945, for various reasons. It is only from that year that the work has been in rapid progress and as it is now programmed: the scheme is expected to be completed in all respects by the end of 1953. On account of the sharp rise in the price of machinery and materials and in labour wages, the cost of the project has increased to Rs. 252 lakhs (including Rs. 12 lakhs, the cost of the old dam built in 1908-18). The expenditure incurred up to the end of March 1951, has come to Rs. 136 lakhs.

The irrigation part of the scheme consists of constructing masonry weirs across the Bhogawati river at suitable sites and installing 100 electrically operated pumps (50 of one cusec capacity each and 50 of 2 cusecs' capacity each) on the banks of the river up to Kolhapur and to bring under irrigation 7,000 acres of sugarcane by lift. The estimated cost of the irrigation works (excluding the proportionate cost of the dam) is Rs. 25 lakhs.

PROJECTS UNDER INVESTIGATION IN BOMBAY STATE

The other big projects in the Bombay State are at different stages of investigation and preparation, the most important of them being the Koyna Valley, the Narmada and Sabarmati Schemes. They have been described in brief in the following paragraphs. It has also been decided to take up the survey work in the Banas River valley.

KOYNA HYDRO-ELECTRIC-CUM-IRRIGATION PROJECT

The Koyna hydro-electric-cum-irrigation Project, which would be the largest of its kind in the Bombay State, consists essentially of a dam across the Koyna Valley near Helwak in the Satara North district, to store water, a power station (in Konkan) about 1,600 feet below the level of the lake to generate electricity and a system of lift irrigation schemes on the Krishna River in the Satara South, Belgaum and Bijapur districts.

Detailed exploratory field work and hydrological and other studies for project report, have been completed. The Committee of technical experts which was appointed by the Government, has advised the development of the project consisting of a concrete dam and an underground power house, in stages.

Due to the huge amount, viz., about Rs. 92 crores, required for the completion of the whole project, the Government has decided to carry it out by stages. The first stage, which is expected to cost about Rs. 35 crores, is meant (i) to augment power supply which is very precarious in Bombay-Poona area and (ii) to introduce irrigation facilities. It provides for the diversion of water down the ghats for running five effective machines of

60,000 K.W. each and 8,000 M. cft. of water for irrigation in the upper reaches of the Koyna and Krishna Valley. The final stage provides for the diversion of 67,000 M. cft. of water down the ghats for power generation and 30,000 M. cft. for irrigation. The first stage of the Project is expected to be completed after about seven years from the date of commencement of the work. The estimated cost of the final stage has yet to be worked out.

NARMADA PROJECTS

Several projects in the Narmada River Valley are under investigation by the Central Water and Power Commission. The Bombay State is concerned with the Punasa Hydro-Electric Project and the Broach Irrigation Project.

Punasa Project.—The scheme envisages the construction of a dam about 300 feet high across the Narmada River near Punasa in the Madhya Pradesh to impound 23.84 M. acre feet of water (i.e., 10,36,500 M. cft.). The scheme is meant for the production of hydel power to the extent of 1,86,700 K.W. and for flood control to prevent damages caused by flood waters in the Broach district. There will be no direct irrigation from this lake.

Broach Irrigation Project.—This project provides for the construction of a dam about 160 feet high across the Narmada river near Navgam in the Broach division and about 200 miles of irrigation canals on both banks, bringing under command an area of about 18,00,000 acres between the Kim and Mahi rivers. The Punasa and the Broach projects are inter-dependent to the extent, that the former supplies the requisite storage capacity and by a regulated discharge enables both irrigation and production of hydel power at the latter. The Power expected to be generated at the Broach site is 96,800 K.W.

The detailed survey of the dam sites at both the places have been completed. Contour survey above the Punasa dam is in progress. Exploration of founds at the Punasa dam site is in progress and out of 32 borings proposed to be taken, 12 have been completed so far and 14 more are expected to be completed by December 15, this year. In the case of the Broach dam, foundation exploration by

means of borings is yet to be undertaken and will be taken up after the work at Punasa is finished and the rock drilling machines are available.

Survey of the commanded area in the case of the Broach Project is completed to the extent of 75 per cent of the area under command and the work is in progress. The analysis of the typical soil samples in the commanded area is being carried out at Hirakud.

The projects are still under investigation and survey and have not yet reached the design stage.

SABARMATI IRRIGATION PROJECT

The Project is under investigation by the Central Water and Power Commission. It is proposed to construct a dam 120 feet high above river bed at Dharoi across the Sabarmati river. The capacity of the lake would be one million acre feet or 43,000 M. cft. The storage proposed is much in excess of the run-off in average years and is intended to provide as much of carry over capacity as possible to make up the deficiencies in cycles of poor rainfall which are common in this catchment.

It is considered possible to generate some 2,000 K.Ws. of continuous power at the dam site and most of this power could be utilised for lift irrigation in the Mehsana district, where good supply of underground water is said to be available at depths of 40 feet to 60 feet and where the area is also fertile. The remaining power could be utilised for rural electrification and cottage industries.

It is proposed to irrigate about 1,00,000 acres by means of a canal taking off above a pick-up weir across the Sabarmati somewhere near Ransipur. In addition to the irrigation, a discharge of about 100 cusecs would be made available for the Ahmedabad City Water Supply. The preliminary details like the above show that the Project is attractive. Full details will have to be worked out after the surveys and investigations are completed.

THE OPERATION OF IRRIGATION WORKS

The operation of the Irrigation Works in the State involves (1) the distribution of canal water and (2) the fixation of water rates given for agricultural and non-agricultural purposes.

The Government has allowed free use of water by *bona-fide* irrigators for agricultural purposes from the rivers and stream vesting in the Public Works Department, on which the Government has not incurred any expenditure. This concession is not allowed for commercial and industrial purposes or for sugar companies.

For the increased production of foodgrains, the Government had laid down a ratio of two acres of foodcrops for every acre of sugarcane, but since there is a shortage of cotton and sugar, the restriction has been relaxed. With a view to encouraging lift irrigation and utilisation of pazar water in the Deccan canal areas, the Government has declared that non-foodcrops such as sugarcane, cotton, groundnut, and also fruit would be allowed on the pazar flow or lift irrigation, without any restriction regarding the growth of foodcrops. This concession also applies to the lift irrigation concessions granted to the sugar companies.

CANAL ADVISORY COMMITTEES

With a view to bringing the Government officials and cultivators into closer touch, so that they may have a better understanding of each other's difficulties and work together more harmoniously for the common good, the Canal Advisory Committees on the principal canal systems and water panchayat committees on all canals have been appointed under the chairmanship of the Executive Engineer of the Division concerned. The Committees are usually composed of the following members :

(1) The Executive Engineer (Chairman); (2) One representative of the Agriculture Department; (3) One representative of the Revenue Department; (4) One representative of the Sugar factories, nominated by the Deccan Sugar Factories Association and (5) Two local members of the legislature.

A cut of 25 per cent. was imposed in the sugarcane block areas—compact areas—exclusively reserved for the cultivation of sugarcane in the year 1945. With a view to increasing the sugarcane plantation, however, the cut was later removed in the revision on the Godawari and Pravara canals. The Government has decided to allot this areas to the owner irrigators, provided they agree to form concentrated blocks of not less than 30 acres each (i.e. not less than 10 acres of cane cultivation) in a compact area.

Permission was not granted till 1948 to start new sugar factories in the Bombay State. After the merger of the smaller states, however, the Government of Bombay has changed its policy and permission to start new sugar factories is now being given.

IMPORTANT LEGISLATION

Irrigation enriches the land and the farmers in the Deccan areas, for example, where the irrigation works were started as early as 1868, to meet the situation arising out of the recurring famines in those areas, have benefited to a considerable extent. With the various new irrigation projects either nearing completion or under construction, it is essential that the benefits so secured to the farmers as a result of State efforts, should to some extent also accrue to the State. An important piece of legislation has, therefore, been enacted last year in connection with the irrigation projects, with a view to stabilising the financial condition of the existing Major Irrigation Works, which have hitherto resulted in a financial loss to the Government and also to provide a nucleus of a fund necessary for speeding up the undertaking of new irrigation projects in future.

This problem had engaged the attention of the successive Governments in the past. The programme of the post-war reconstruction projects drawn up by the present Government, however, brought the things to a head and made it

necessary to pursue the question. A cabinet sub-committee consisting of the then Honourable Minister for Public Works (Dr. M. D. D. Gilder), the Honourable Minister for Finance (Shri V. L. Mehta) and the Honourable Minister for Agriculture (Shri M. P. Patil) was, therefore, appointed in April 1947, to consider the question.

COMMITTEE'S REPORT

The committee submitted a report recommending that in order to stabilise the financial condition of the existing major irrigation works, and to help the Government, in the speeding-up of the future irrigation schemes, it was necessary to introduce a combined system of Betterment Levy, Irrigation Cess and Water Rates. The report was published in December 1948 for eliciting public opinion and the views of the Irrigators' Association were specially invited through the local officials. After carefully considering these views, the detailed proposals made in the report were accepted by the Government and are being implemented. The Bombay Irrigation (Amendment) Act, 1950, providing for the levy of Betterment charges, Irrigation Cess and Water Rates as recommended in the report, has been passed with this object in view.

The legislation aims at the introduction of a system of Betterment Levy, Irrigation Cess and Water Rates. The Betterment Levy is a tax on the unearned increment in land values following the construction of an irrigation Project. The Irrigation Cess is a small annual fee to be paid by every land-owner under the irrigable command of a canal system, whether he uses the water or not, and is primarily meant to meet the working expenses of the canal system, while the Water Rates are paid for the actual use of water and are primarily meant to meet the interest charges on the capital invested in an Irrigation Project. The amount to be paid depends upon the quantity of water used. Irrigation cess would be levied not only on the new Projects, but also on the old works as well.

BETTERMENT LEVY

As regards the betterment levy, it will be levied in the case of land benefiting from the new Irrigation projects

taken in hand in recent years. So far as the old irrigation works in the Deccan and elsewhere are concerned, it would be difficult to levy any such tax, as the land has changed hands in several cases, at high cost. The Government is, however, looking into this matter and a committee of the officials of the P. W. D. has been appointed to investigate and ascertain in what way the State could realise a portion of the benefits that have accrued to the land-owners of the areas irrigated by the older Irrigation Works.

DIVIDING FLOWS OF WATER

In the matter of River Valley projects, it has got to be remembered that a project higher up in the basin of a River would affect irrigation in the lower reaches of the River. A number of States are thus interested in any River Valley project or projects. In Bombay State, two important rivers rise which flow eastwards to the Bay of Bengal, receiving tributaries during their course. These are the Krishna and the Godavari. As Bombay and other States have under consideration various projects in the river valleys of the Krishna and the Godavari, a conference was recently held in New Delhi under the auspices of the Planning Commission, when besides the C. W. P. C., the States of Bombay, Madras, Madhya Pradesh, Hyderabad and Mysore were represented. The possible flows of water along these rivers were calculated, and the quantities already utilised or likely to be utilised in the various projects functioning or under actual construction, were calculated. It may be mentioned that while in the Godavari basin, the contemplated projects had almost sufficient water available for them, in the Krishna Valley, the contemplated projects, if completed, would have required double the quantity of the balance of water flowing through that river basin. The demands in Krishna Valley of each of the States participating in the conference had thus to be substantially cut down, and the balances of the estimated supplies divided among them, on the basis of the likely effective projects in these river valleys. This would result in prosecuting those irrigation and power projects only, which are really beneficial to the respective states, and which would involve relatively less

expenditure and give correspondingly better economic results.

The Government of Bombay has assured itself with that much flow of water in the Koyna (the important tributary of Krishna) valley, which would ensure sufficient electrical energy to meet the needs of motive power in Bombay-Poona area and the districts of Satara South, Sholapur and Bijapur and some irrigation in Maharashtra and Karnatak. Similarly supply has been assured for irrigation in the Godavari basin where there are irrigation projects only, but no power projects.

MINOR IRRIGATION

The Minor irrigation projects in Bombay State consist of a large number of tanks and bandharas. Some of them which are big ones have been classified as the First Class Minor Irrigation Works and are under the Public Works Department for maintenance and control. They number 25 and irrigate nearly 72,000 acres of land. Besides, there are 12,828 tanks and bandharas, under the Revenue Department, irrigating approximately 1,40,000 acres. These are classed as 2nd class Irrigation works. The Revenue Officers look after them according to the funds available. In case of major repairs, however, the work is entrusted to the P. W. D.

The subject Minor Irrigation Works was under the control of the Revenue Department until 1947, in which year it was taken over by the Agriculture and Forests Department. After March 1949, it was transferred to the Public Works Department. It must, however, be remembered that though the Minor Irrigation Works are carried out or repaired by the Public Works Department, they are in administrative charge of the Revenue Officers.

TWO PROGRAMMES

The Government has launched the following two programmes of minor irrigation works, both to be completed by the end of march 1952 : (1) the Post-War Reconstruction Programme and (2) the special programme of Minor Irrigation Works.

The former is being financed from the State funds, while for the latter, a loan of one crore of rupees has been made available by the Government of India.

In the Post-War Reconstruction Programme, a provision of Rs. 150 lakhs was originally made for minor irrigation works viz., tanks and bandharas. In the Directorate of Agricultural Engineering, which was formed in May 1947 a separate Minor Irrigation Circle comprising of five Executive Divisions with headquarters at Ahmedabad,

Broach, Poona, Belgaum and Dharwar, was created for executing the above programme. When the State Post-War Reconstruction Programme was later on curtailed from Rs. 91.04 crores to Rs. 73.08 crores, the allocation for Minor Irrigation Works was reduced from Rs. 150 lakhs to Rs. one crore. After the scheme was transferred to the Public Works Department in 1949-50, the Minor Irrigation Circle referred to was also abolished.

OVER 40 WORKS COMPLETED

Out of the 60 works estimated to cost Rs. one crore, earmarked for the Post-War Reconstruction Programme, over 40 works have so far been completed. These works will irrigate nearly 26,000 acres of land, bringing an additional food production of 9,000 tons. The expenditure incurred on this scheme up to the end of March 1951 came to Rs. 72 lakhs. Important works that have been or are being carried out under this scheme are shown in the statement below :—

S. No.	Name of the work.	Estimated cost	Area likely to be irrigated	Whether completed or in progress,
		Rs.	Aores.	
1	Tank at BadiPadwa, Ghogo Mahal, District Ahmedabad.	10,00,629	1,800	Completed.
2	Eight months canal ex. Subarmati river near Fatewadi, District Ahmedabad.	13,00,000	8,500	In progress.
3	Tank at Limjiwadi, Taluka Shri-goada, District Ahmednagar.	4,79,367	575	Completed.
4	Tank at Palasdeo, District Poona	6,53,237	1,380	In progress.
5	Tank at Madanwadi, District Poona.	9,83,869	1,690	In progress.
6	Tank at Parewadi, District Sholapur.	5,64,788	1,735	Completed.
7	Tank at Sangvi, District Sholapur.	4,93,544	1,086	Completed.
8	Bandhara at Mamdapur, District Belgaum.	5,46,165	3,400	Completed.

LOAN PROGRAMME

Under the special programme to be financed from the loan of Rs. one crore obtained from the Government of India, 227 minor irrigation works have been completed.

The area that will be irrigated by these works is approximately 25,041 acres, bringing an additional food production of nearly 7,091 tons. In addition, 480 works, which are in progress, will irrigate nearly 62,337 acres, thus enriching the granaries of the State to the tune of 17,562 tons.

As a result of the drive since the summer of 1950, for the improvement of minor irrigation works, proposals have been received for as many as 2,486 works, 450 out of them being new constructions, almost all Bandharas and 2,036 repairs to old works. They would entail a cost of Rs. 290 lakhs. For those of them that cost Rs. 50,000 and more, no contribution is asked for from the beneficiaries, who have however to pay betterment charges after the completion of works. Where the cost of any individual work is below Rs. 50,000, a contribution is being asked to the extent of one-fourth the cost of repairs or construction in case of tanks and one-third in case of bandharas. But where the beneficiaries are Backward Class people, the contribution to be recovered is one-sixth only, either in cash or in labour. Likewise, a smaller contribution towards the cost of the repairs is being asked for in areas where famines have occurred in two successive years. The contribution in this case need not necessarily be paid prior to starting the work. If it is not paid beforehand, the beneficiaries have only to give an undertaking in writing that the contribution would be paid when money is realised from the sale of foodgrains raised subsequent to the carrying out of the necessary repair works. The work is then taken in hand immediately.

DEMAND EXCEEDS CAPACITY

While there was a strong opposition to start with, the idea of making any contribution towards such works, it was soon realised by the prospective beneficiaries that it was in their interest to take advantage of such an offer, with the result that the Government is now faced with more demands for such works, than can be coped up with. Though the present Rs. one crore loan obtained from the Central Government for minor irrigation purposes is durable for works carried out up to the end of March 1952, it is hoped that the Government of Bombay may be given for the same purpose a further loan extending up to a further period of three years.

The following statement will indicate the overall number of the minor irrigation schemes which have been completed so far and are actually irrigating the fields, in addition to the projects under construction and proposed to be constructed in the important regions of the Bombay State :—

Regions	No. of works completed	Irrigable acreage of completed works	Additional tonnage of foodgrains
Maharashtra ...	76	7,005	1,791
Gujarat ...	84	12,323	4,298
Karnatak ...	67	5,023	1,002
Total ...	277	25,041	7,091

Regions	No. of works under execution	Irrigable acreage of works under execution	Additional tonnage of foodgrains for the works under execution
Maharashtra ...	74	16,203	3,853
Gujarat ...	111	18,529	7,375
Karnatak ...	295	27,805	5,834
Total ...	480	62,337	17,562

Regions	No. of works proposed	Irrigable acreage of works proposed	Additional tonnage of foodgrains for the works proposed
Maharashtra ...	378	71,729	14,346
Gujarat ...	366	70,853	14,170
Karnatak ...	1,035	59,985	11,997
Total ...	1,779	2,02,567	40,413

CORRIGENDA

- (1) Page 5, line 5—
Please read "130 feet" for "10 feet".
- (2) Page 20, line 2—
Please read "1953" for "1957".
- (3) Picture Plates—
Gangapur Storage Project : First line of the caption—Please read "drag line machine" for "drug machine".
- (4) Picture Plates—
Gangapur Storage Scheme : Please read "Picture shows excavation in a rock for cut off trenches below the seat of the dam" for "Picture shows excavation of a rock to cut off trenches designed to let out the surplus water".