

GOVERNMENT OF INDIA
DEPARTMENT OF INDUSTRIES AND LABOUR
(PUBLIC WORKS BRANCH)

TRIENNIAL REVIEW
OF
IRRIGATION IN INDIA
1927-30



SDILA
GOVERNMENT OF INDIA PRESS
1932

L115DIL

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IRRIGATION IN INDIA.

REVIEW FOR 1927-30.

CHAPTER I.

Results of irrigation operations during the triennium.

Character of the monsoons.—The monsoon of 1927 broke at about the usual time ; its progress was normal, and well distributed rain fell over most of the country. Averaged over the plains of India, the aggregate rainfall of the monsoon season was below normal by 4 per cent. In 1928 also the monsoon broke at about the usual time. Viewed as a whole, it was normally active, but there was a marked deficiency of rainfall in north-west India including the United Provinces where the weather was persistently dry for a considerable period. Averaged over the plains of India, the aggregate rainfall of the season was in defect by 5 per cent. The monsoon of 1929 broke at about the normal time. The chief feature of the rainfall was its excess by more than 100 per cent. in the North-West Frontier Province and Sind. Elsewhere it did not differ largely from the normal amount, the average defect being 1 per cent.

A brief summary of the weather conditions which prevailed in each province, the extent of the rainfall and the demand for irrigation are given in Chapter II.

Total area irrigated.—The average area irrigated in British India by Government works of all classes during the triennium was about 30 million acres, as compared with 27.8 million acres, the average of the previous triennium.

The results obtained in each province are given in the table below :—

Province.	Average area irrigated in previous triennium 1924-27.	Area irrigated in 1927-28.	Area irrigated in 1928-29.	Area irrigated in 1929-30.	Average area irrigated in triennium 1927-30.
	Acres.	Acres.	Acres.	Acres.	Acres.
Madras	7,178,457	7,190,939	7,262,096	7,380,867	7,277,967
Bombay Deccan	437,433	411,050	396,932	412,262	406,748
Sind	3,509,484	3,352,973	3,580,764	3,805,038	3,579,592
Bengal	95,516	102,243	86,195	81,724	90,054
United Provinces	2,678,178	2,332,803	4,092,955	4,493,842	3,639,867
Punjab	10,349,121	10,381,437	11,532,590	11,687,622	11,200,550
Burma	1,872,383	1,948,162	1,981,468	2,053,335	1,994,321
Bihar and Orissa	891,984	940,523	894,491	886,185	907,067
Central Provinces (excluding Berar).	429,911	415,262	410,219	375,834	400,438
North-West Frontier Province.	357,325	391,613	399,145	418,434	403,064
Rajputana	23,272	31,442	32,697	31,813	31,984
Baluchistan	22,070	23,663	21,839	21,720	22,407
Total	27,845,134	27,522,110	30,691,391	31,648,676	29,954,059

In general the results were better than those obtained in the previous triennium and in none of the provinces was there any decrease worthy of note. The increase in the Punjab during the triennium was mainly due to the development of irrigation on the Sutlej Valley project canals.

Taking productive works only, a similar comparison is given in the following table :—

Province.	Average area irrigated in previous triennium 1924-27.	Area irrigated in 1927-28.	Area irrigated in 1928-29.	Area irrigated in 1929-30.	Average area irrigated in triennium 1927-30.
	Acres.	Acres.	Acres.	Acres.	Acres.
Madras	3,732,271	3,773,080	3,795,972	3,896,392	3,821,815
Bombay Deccan	2,699	2,965	2,521	2,424	2,637
Sind	2,894,468	2,489,031	2,712,150	2,783,374	2,661,519
United Provinces	2,462,061	2,237,653	3,783,801	4,096,065	3,372,506
Punjab	9,755,740	10,045,996	11,177,998	11,103,387	10,775,794
Burma	1,531,403	1,368,000	1,352,570	1,414,608	1,378,393
Central Provinces (excluding Berar).	153,942	65,668	..	..	21,889
North-West Frontier Province.	200,413	209,966	203,859	209,425	207,750
Total	20,732,997	20,192,359	23,028,871	23,505,675	22,242,303

It will be seen that the average area irrigated by such works during the triennium was 1,509,000 acres more than in the previous period. The reduction in the area irrigated in the Central Provinces was due to the transfer to the unproductive class of the Mahanadi and Wainganga canals, leaving no works in the productive category in that province.

The results obtained from unproductive works are given in the following table :—

Province.	Average area irrigated in previous triennium 1924-27.	Area irrigated in 1927-28.	Area irrigated in 1928-29.	Area irrigated in 1929-30.	Average area irrigated in triennium 1927-30.
	Acres.	Acres.	Acres.	Acres.	Acres.
Madras	271,455	263,458	260,377	276,712	266,849
Bombay Deccan	277,709	245,228	228,994	243,612	239,278
Sind	527,737	785,435	799,729	910,003	831,722
Bengal	73,381	78,960	64,842	59,605	67,802
United Provinces	207,312	86,576	297,096	374,258	252,643
Punjab	243,613	335,441	354,592	584,235	424,756
Burma	268,110	514,685	538,352	564,722	539,253
Bihar and Orissa	889,738	938,234	891,349	883,325	904,303
Central Provinces (excluding Berar).	230,280	303,466	364,316	332,663	333,482
North-West Frontier Province.	156,912	181,647	195,286	209,009	195,314
Rajputana	23,272	31,442	32,697	31,813	31,984
Baluchistan	22,070	23,663	21,839	21,720	22,407
Total	3,191,589	3,788,235	4,049,469	4,491,677	4,109,793

The general increase and the large fluctuations in the areas irrigated in some of the Provinces are due in the main to changes made during the triennium in the classification of certain of the works.

The areas irrigated by non-capital works in the various provinces during the triennium were as below :—

Province.	Average area irrigated in previous triennium 1924-27.	Area irrigated in 1927-28.	Area irrigated in 1928-29.	Area irrigated in 1929-30.	Average area irrigated in triennium 1927-30.
	Acres.	Acres.	Acres.	Acres.	Acres.
Madras	3,174,731	3,154,401	3,205,747	3,207,763	3,189,303
Bombay Deccan	157,025	162,857	165,417	166,226	164,833
Sind	87,279	78,507	68,885	111,661	86,351
Bengal	22,135	23,283	21,353	22,119	22,252
United Provinces	8,006	8,574	12,058	23,519	14,717
Punjab	349,768	..	..	..	..
Burma	72,870	65,477	90,546	74,005	76,876
Bihar and Orissa	2,246	2,289	3,142	2,860	2,764
Central Provinces (excluding Berar).	45,689	46,128	45,903	43,171	45,067
Total	3,919,749	3,541,516	3,613,051	3,651,324	3,601,963

The disappearance of the area previously shown as irrigated by non-capital works in the Punjab is due to the transfer of the works in question to the capital class.

Returns realised by irrigation and navigation works.—The total capital outlay, direct and indirect, on irrigation and navigation works, including works under construction, amounted at the end of the year 1929-30 to Rs. 13,027 lakhs. The gross revenue for that year was Rs. 1,294 lakhs, and the working expenses Rs. 586 lakhs, the net return on the capital being, therefore, 5.44 per cent. In considering the latter figure it must be remembered that the capital invested includes considerable expenditure upon three projects of the first magnitude [*viz.*, the Sarda canals, the Lloyd (Sukkur) Barrage Project and the Cauvery-Metur Project], which were under construction and contributed little or nothing in the way of revenue. Of the several provinces, the return on the capital invested in productive works was highest in the Punjab, where the canals yielded 15.08 per cent. in 1927-28, 12.52 per cent. in 1928-29 and 13.61 per cent. in 1929-30. In Madras the returns for the three years were 8.90, 7.94 and 7.70, while in the United Provinces, they were 5.56, 4.56 and 5.90.

Comparison of total area sown with the area irrigated.—A comparison of the acreage of crops matured during 1929-30 by means of Government irrigation systems with the total area under cultivation in the several provinces is given below :—

Province.	Area sown.	Area irrigated by Government irrigation works.	Percentage of area irrigated to total area sown.	Capital cost of Government irrigation and navigation works to end of 1929-30 (in lakhs of rupees).	Estimated value of crops raised on areas receiving state irrigation (in lakhs of rupees).
	Acres.	Acres.		Rs.	Rs.
Madras	39,259,000	7,381,000	18·8	1,660	2,819*
Bombay Deccan	34,294,000	412,000	1·2	2,884	319
Sind	4,848,000	3,805,000	78·5		
Bengal	27,833,000	82,000	0·3	469	47
United Provinces	41,575,000	4,494,000	10·8	2,435	2,458
Punjab	30,954,000	11,687,000	37·8	3,294	4,422
Burma	17,775,000	2,053,000	11·5	651	845
Bihar and Orissa	30,387,000	886,000	2·9	628	640
Central Provinces (excluding Berar).	18,060,000	376,000	2·1	643	202
North-West Frontier Province.	2,885,000	418,000	14·5	294	206
Rajputana	344,000	32,000	9·2	35	12
Baluchistan	399,000	22,000	5·4	34	5
Total	248,613,000	31,648,000	12·7	13,027	12,781

*Exclusive of the value of crops raised on some 3 million acres irrigated by non-capital works.

CHAPTER II.

Progress of Irrigation in the various Provinces.

MADRAS PRESIDENCY.

Character of the seasons.—Both in 1927-28 and 1928-29 the season was fairly satisfactory. The rainfall during the south-west monsoon was upto or above average except in a few districts, and the north-east monsoon, which is generally of greater importance to irrigation in this Presidency, was on the whole fair. There were, however, torrential rains for three days in October 1928 over an area extending from Vizagapatam to Cocanada, which caused severe floods and extensive damage to houses, roads, railways and irrigation works. In 1929-30 the rainfall during the south-west monsoon in June, July and August was generally inadequate, but in the latter half of September the rainfall was fairly copious and well distributed throughout the Presidency. The north-east monsoon brought good rain in the south of the peninsula.

Results.—The average area irrigated by State Irrigation works in the province during the triennium compares as shown below with that of the previous triennium :—

	Acres.
Average of the triennium 1924-27	7,178,457
During 1927-28	7,190,939
During 1928-29	7,262,096
During 1929-30	7,380,867
Average of the triennium 1927-30	7,277,967

Works completed.—Several works were completed during the triennium of which the following were the more important :—

- (i) Kattalai South Bank canal. (Cost Rs. 12.07 lakhs.)
- (ii) Construction of Locks and Regulators across the Ellore and Bandar canals in the Kistna delta system. (Cost Rs. 3.40 lakhs.)
- (iii) Improvements to the lower Cauvery from the infall of the Ayyavayyanar to the sea. (Cost Rs. 2.62 lakhs.)
- (iv) Providing scouring sluice to the Grand Anicut and constructing a retaining wall between the Cauvery-Vennar Regulators and the scouring sluices. (Cost Rs. 5.11 lakhs.)
- (v) Construction of a road dam on the left bank of the Cauvery above the Grand Anicut. (Cost Rs. 3.73 lakhs.)
- (vi) Improvements to the Lower Anicut across the Coleroon. (Cost Rs. 7.02 lakhs.)
- (vii) Constructing a bed regulator in the Cauvery above the Grand Anicut. (Cost Rs. 1.83 lakhs.)

Works in progress.—The following projects were in progress during the triennium :—

(i) *Cauvery-Metur Project.*—Of the projects under construction the Cauvery-Metur project is by far the most important. Considerable progress was made on the Project and a revised estimate amounting to Rs. 737 lakhs was sanctioned by the Secretary of State in May 1929. The

water-supply and drainage schemes at the headworks were completed and the broad gauge railway line from Salem to the Metur dam was opened in April 1929, since which time the plant and stores required for the project have been transferred by rail. The dam is being constructed of cement concrete and one of the two concrete placing towers for the dam, the excavation of its foundations, the coffer dam, the cutting for the surplus work in the saddle on the left bank of the Cauvery (called the Ellis Saddle), the surplus bridge on the Ellis Saddle, the head regulator on the Grand Anicut canal, and the excavation of the Grand Anicut canal made good progress. The total expenditure incurred up to the end of March 1930, amounted to Rs. 348 lakhs.

(ii) *Polavaram Island Project*.—This project is estimated to cost Rs. 18.55 lakhs and is designed to irrigate an area of 16,316 acres of fertile land in the Polavaram island in the Godavari delta by means of an extension of the Godavari canal system.

(iii) *Basavannah Channel Improvements*.—This scheme is intended to extend irrigation to an area of 3,349 acres in the Bellary district and is estimated to cost Rs. 5.5 lakhs.

In addition to the above the following important works were in progress during the period :—

- (i) Improvements to the Girisola channel, Rushikulya system. (Estimate Rs. 2.70 lakhs.)
- (ii) Improvements to the upper portion of the Yenamadurru drain, Godavari Delta system. (Estimate Rs. 10.15 lakhs.)
- (iii) Improvements to the Kovvur-Manjair Junction canal. (Estimate Rs. 1.54 lakhs.)
- (iv) Diversion of the Nallamada drain, Kistna Delta system. (Estimate Rs. 10.18 lakhs.)
- (v) Improvements to the Veeranam Tank, Lower Coleroon Anicut system. (Estimate Rs. 3.05 lakhs.)
- (vi) Diversion of the upland drainage above the Cauvery-Vennar Regulator, Cauvery Delta system. (Estimate Rs. 2.02 lakhs.)

Projects—As a result of the recommendation made by the Ganjam District Irrigation Project Committee, the estimate for the Jogudi Reservoir Project was under revision. The investigation of the Seethapalli Vagu Reservoir project above Ramanayyapetah in the Rampa Agency, for the irrigation of about 2,000 to 3,000 acres, was completed and borings were taken to arrive at the approximate cost of the scheme. The installation of the six feet shutters on the Kistna Anicut at Bezwada having considerably improved the condition of the Kistna delta, detailed investigation and preparation of plans and estimates were in progress for the extension of short crop irrigation in the Kistna delta, and for the extension of the East Bank canal to the Divi Island. A preliminary report on the modified Tungabhadra project was prepared. The Upper Bhavani project was abandoned in favour of the Lower Bhavani project and the advisability of having an irrigated dry project in preference

to wet was under examination. In connection with the improvements of the drainage of the Shiyali taluk in the Tanjore district, estimates for improvements to the Nallur and Kittianai Uppanar, and for the formation of the Coleroon diversion bank in the limits of Kattur and Mahendrapalli villages, were under preparation. As regards the Kattalai scheme, orders were issued for the investigation and preparation of detailed plans and estimates for a high level channel to irrigate 19,000 acres and for constructing a bed regulator across the Cauvery at Kattalai.

BOMBAY PRESIDENCY.

(a) DECCAN AND GUJARAT.

Character of the seasons.—In the Deccan the rainfall was sufficient and well distributed during the triennium. Canal water was not there-fore in much demand for seasonal crops. In Gujarat the years 1927-28 and 1928-29 were marked by good rainfall, but in the last week of July 1927 there was an unusually heavy and continuous downpour which resulted in floods all over the country, causing much damage to tanks and canals. The rainfall in the year 1929-30 in Gujarat was much below the average.

Results.—The average area irrigated was 406,748 acres as against 437,433 acres, the average of the previous triennium. The decrease was due mostly to less demand for canal water on account of timely and well distributed rainfall. The areas for each of the three years were 411,050 acres in 1927-28, 396,932 acres in 1928-29 and 412,262 acres in 1929-30.

Works in progress.—The largest work under construction in the Deccan was the Nira Valley Development Project. The scheme comprises the construction of the Lloyd Dam at Bhatgar, a new canal on the right bank of the Nira River about 106½ miles long, the remodelling of the existing canal on the left bank of the river and the construction of a new dam at Vir. The Lloyd Dam was completed in 1928 and the new lake now impounds over 24,000 million cubic feet of water and supplies the old left bank and the new right bank canals. Practically all the earthwork on the main Right Bank canal has been completed and the progress on distributaries and branches is satisfactory. The work of re-modelling the Nira Left Bank canal is in progress.

Projects.—(i) The Godavari canals have now reached the full development possible with the storage available from Lake Beale and investigations have been started for the provision of additional storage with a view to increasing the area irrigated.

(ii) The supply in Lake Fife is insufficient to meet the increasing requirements of the Mutha canals and there is a very keen demand for extension of irrigation in the Mutha Valley. In order to meet this demand and to provide adequate protection to the area commanded by the Mutha canals, investigations were in progress during the triennium for increasing the capacity of the lake formed by the Khadakwasla dam and enlarging the Mutha Right Bank canal.

(iii) A scheme for utilising the waters of the Markandaya river in the Karnatic is under investigation. It is expected to irrigate about 19,000 acres in the Belgaum Collectorate which are badly affected by drought.

Research.—During the triennium under review research work was continued under the following heads, in connection with the several problems connected with the development of the Deccan canals :—

- (1) Soil and sub-soil classification.
- (2) Soil selection.
- (3) Drainage of waterlogged lands and measures to prevent water-logging.
- (4) Reclamation of salt lands.

- (5) Block revision and formation.
- (6) Observation of sub-soil water levels.
- (7) Improvement in distribution and measurement of water.
- (8) Irriculture (*i.e.*, the inter-action of Irrigation and Agriculture).
- (9) Soil-Physics.
- (10) Hydro-dynamic Research.

(b) SIND.

Character of the seasons.—The inundation of 1927 was a bad one, that of 1928 was fairly good, while that of 1929 was on the whole favourable for irrigation. The highest readings on the Bukkur and Kotri gauges, respectively, were 15.3 and 21.5 feet in 1927, 14.2 and 19.3 feet in 1928 and 17.7 and 24.1 feet in 1929. The rainfall during 1927 was scanty in Upper Sind but there were torrential rains in Lower Sind which damaged the crops considerably. In 1928 the rainfall was scanty and was not of material benefit to crops, while in 1929 it was heavy and fell mostly late in the season when the canals were running full.

Results.—The seasonal conditions are reflected in the results obtained from irrigation during the three years of the triennium. The average area irrigated by Government works of all classes during the triennium was 3,579,591 acres as compared with 3,509,484 acres, the average of the previous triennium. The areas for each of the three years were 3,352,973 acres in 1927-28, 3,580,764 acres in 1928-29 and 3,805,038 acres in 1929-30.

Works completed.—Several works such as raising and strengthening bunds, constructing retired loops, etc., were completed during the triennium. The more important works completed were :—

- (1) Raising the banks of the Fuleli canal.
- (2) Construction of head regulators over the 'Ghar Marho and the Panj Gazo canals.
- (3) The Gharkine Canal Project.
- (4) Remodelling the Kander Branch ex-Mahiwah.
- (5) Extension of the Kasimpur Bund.
- (6) Excavation of cuts 1 to 8 of the Nara Supply Channel and of a new head to the Sattah canal.

Works in progress.—The following were among the larger works in progress :—

- (1) Lloyd (Sukkur) Barrage and Canals Project.
- (2) Remodelling and moduling the Fuleli canal and its several branches.
- (3) Construction of a regulator at mile 65 of the Dad canal.

Of the works referred to above, the Lloyd (Sukkur) Barrage and Canals Project is by far the most important. Substantial progress has been made with the excavation of new canals, branches, distributaries, minors and escapes. Much progress has also been made on the new cuts to and the widening of the Eastern Nara. The new embankments along the Eastern Nara are practically finished. The total quantity of earthwork involved

in the whole scheme is about 564 crores of cubic feet, of which about 369 crores of cubic feet were completed by the end of March 1930, leaving a balance of 195 crores of cubic feet still to be done. The total length of main canals, branches, distributaries and minors is 6,116 miles, of which 3,077 miles, mostly of the largest section, were completed upto the end of March 1930. All under water work in connection with the Barrage proper was completed during the period under review and considerable progress was made with the remaining work, *viz.*, the Barrage superstructure, the gate and road bridge arches and the erection and placing in position of the Barrage and Head Regulator gates. The seven Head Regulators which form the flanks of the Barrage proper were practically completed. The total outlay on the project up to the end of March 1930 amounted to Rs. 14 crores against the estimated cost of Rs. 20 crores.

Projects.—A number of comparatively small projects for remodelling the Begari, the Unharwah, the Desert, the Sind, the Pinyari, the Sattah and the Baghar canals and their branches were dealt with during the triennium ; the Ghotki and the Nasirabad canals projects were also under consideration, and surveys for remodelling the branches of the Fuleli canal and for drainage channels along the Hassanali system were completed.

BENGAL.

(a) IRRIGATION.

Character of the seasons.—The average rainfall in the area served by the two irrigation canals in Bengal, *viz.*, the Midnapore and the Eden canals, is about 61 inches. In 1927 the monsoon was weak. The supply of water from the Midnapore and Eden canals was of great benefit to the districts served by those canals, but conditions in the unirrigated tracts in Western and Northern Bengal were serious, due to the failure of the rice crop over large areas. In 1928 the rainfall was above the average but the monsoon retreated rather early and there was a keen demand for water in October; the supply of water from the Midnapore and Eden canals saved the situation in the areas served by them. In 1929 the monsoon was late in appearing, the highest floods occurring in August and October. The local rainfall was not heavy and successful irrigation was done by the Eden canal, good crops being produced in the inundated areas west of the Damodar.

Results.—The average area irrigated during the triennium by the two canals in operation, *viz.*, the Midnapore and the Eden canals, was 90,054 acres, as compared with 95,516 acres irrigated in the previous triennium.

Works in progress.—Work in connection with the construction of the Damodar canal, which was commenced in 1926-27, is expected to be sufficiently advanced to enable the canal to be opened partially in 1932. The works comprise about 230 miles of canals and will supply water on long leases for 180,000 acres of rice land in the Burdwan and Hooghly districts and for 16,000 acres of *rabi* and other crops on short season leases. The Bakreswar irrigation scheme, which is expected to irrigate an area of 10,000 acres, was started in 1927 and is nearing completion.

Works completed.—The Kashinala irrigation scheme to irrigate 2,000 acres in the Birbhum district was completed during the year 1928-29, and a project for the extension of this work was also approved for irrigating an area of about 1,700 acres lying further east and south of the area now commanded.

Projects.—Several small irrigation schemes in western Bengal were in different stages of investigation and preparation. In several districts a demand has arisen for the irrigation of areas which cannot be watered by gravity and the question of supplying pumps is under enquiry.

(b) NAVIGATION.

The Grand Trunk canal project has been kept in abeyance pending further consideration of the scheme; on the Madaripur Bil Route certain training works have been constructed to prevent silting in the Lower Kumar river.

(c) ANTI-MALARIAL AND DRAINAGE WORKS.

The Amiraband project in the Midnapore district, the Nowee Sunthi project in the 24-Parganas and the Arool Bil project in Jessore have been completed. There are several other projects in view, in some of which investigation has been completed, such as Bhairab II, Harihar Mukteswari, Jaleswar Bil and Salimpur-Burronal Bil projects, the Bullee Bil drainage scheme and the Gangakhali-Suadighi scheme. There were also two major

works under construction in the Nadia Rivers Division. One of these, which is designed to flush the Bhairab river in the Meherpur Sub-Division and was started in 1926-27, was completed during 1929-30 ; the sluice in the new cut $1\frac{1}{4}$ miles long connecting the Jalangi and Uttampur with the Bhairab at Natua was opened for flushing the Bhairab river and 60 miles of that river were flushed during the season. The other scheme, which is to flush 40 miles of the Gobra Nala in the Murshidabad district, was also brought into operation by admitting water from the Kalkali through the new cut during the flood period.

(d) FLOOD REMEDIAL MEASURES.

In the Damodar Division the Hoorhoora and Buxi channels acted as efficient flood escapes for the area submerged by floods from the Damodar in the lower spill area. The Hoorhoora channel was excavated to give an additional outlet for the Damodar flood water. The policy of gradually abandoning those protective embankments, which experience has shown to be injurious to the country by obstructing the run-off of the floods, was continued.

(e) GENERAL.

A Committee was appointed in November 1929 with Mr. W. S. Hopkyns, C.I.E., I.C.S., as Chairman, and Mr. D. G. Harris, C.I.E., Consulting Engineer to the Government of India and Mr. J. B. G. Smith, C.I.E., Chief Engineer, Punjab, as Members, to examine the work of the Irrigation Department of Bengal in respect of irrigation, the maintenance of waterways, the resuscitation of rivers, the control of floods and the drainage of water-logged areas, and to advise Government on the desirability of creating a separate Department for waterways or a Provincial Waterways Board for the conservancy of navigable rivers in the Province. The Committee made extensive tours over the major waterways and in March 1930 submitted their report to the Government recommending the creation of a Waterways Trust. The recommendations of the Committee are under the consideration of Government.

UNITED PROVINCES.

Character of the seasons.—The year 1927-28 started normally. The monsoon rains were general and well distributed with short breaks at intervals. The demand for canal water was keen during the early *kharif* but thereafter, owing to favourable monsoon conditions, dwindled and practically disappeared. The rainfall in October enabled *rabi* sowings to be done without the aid of canal water, and, as the winter rains were exceptionally heavy, the demand for canal water never rose high during the season. In August 1927 considerable damage was done by floods to the river training works in connection with the Lower Ganges canal and the Kalanga and Jakhna canals in Dehra Dun, and the canal road bridge and the left down-stream wing wall of the Jagbura syphon on the Sarda Main canal were washed away. The year 1928-29 also opened with normal conditions. During early *kharif* dust storms were frequent, which caused widespread fires which devastated many villages in the northern districts. The monsoon broke early in July and disappeared in the first week of September giving very scanty and unevenly distributed rainfall. Owing to the failure of the monsoon the demand for canal water was generally strong during the *kharif* season. During the entire *rabi* season, following a dry *kharif*, the demand for canal water was keen. The year 1929-30 was on the whole a dry one. Demand for water was keen in early *kharif*, but weakened during the rainy months of July and August; owing to the early cessation of the monsoon it rose again rapidly in September and continued intense to the end of the season. The demand for canal water for *rabi* was also intense everywhere during the early part of the season; there was, however, heavy rain in the middle of December on the Lower Ganges, Sarda and Eastern Jumna canals and further falls later, and these reduced the demand on the first and caused it to cease altogether on the latter two canal systems.

Results.—The area irrigated (excluding an average area of 24,000 acres irrigated in Indian States, during the triennium compares as shown below with the average of the previous triennium :—

Average of the triennium 1924-27	..	..	2,678,178
During 1927-28	..	..	2,332,803
During 1928-29	..	..	4,092,955
During 1929-30	..	..	4,493,842
Average of the triennium 1927-30	..	..	3,639,867

The increase in the area irrigated, as compared with the average of the previous triennium, is due to the failure of the monsoon both in 1928 and 1929, the intense demand during 1929-30, and the irrigation done from the Sarda canal.

Works completed.—The following works were completed during the triennium :—

- (i) Rebuilding of the Dhora dam in the Rohilkhand canals division.
- (ii) A number of protection works carried out in connexion with the Katapathar canal of the Dun canals.
- (iii) Two important structural alterations to the Solani aqueduct at mile 19 of the Ganges canal.

- (iv) Jaiwanti, Khandeha and Aunjhar tanks in the Ken canal division.
- (v) Raipura and Kamalpura tanks in the Dhasan canal division.
- (vi) The Lachura weir in the Dhasan canal division was converted into a solid weir, a ropeway being added to give access to the sluices and interlocking releases for operating the drop gates.

Works in progress.—(a) The most important work in progress during the triennium was the Sarda canal project, the total outlay on the work up to the end of 1929-30 amounting to Rs. 935 lakhs against the sanctioned estimate of Rs. 951 lakhs. By the end of the year 1929-30, the whole system was in working order and only some drains and minors remained to be constructed where experience showed that these could be added with advantage. The floor of the Deoha barrage, which was damaged in 1929, was repaired before the rains of 1930 and another line of steel sheet piling was driven upstream as an additional factor of safety. Extra protection was added downstream of the undersluices and of the six left bays of the Sarda barrage at Banbassa to meet the heavy action through these bays which caused considerable scour during the rains of 1929. Two heavily armoured spurs were built out from the left or Nepal bank of the river to deflect the river from its old course, which bore directly on the left afflux bund, on to the barrage. These spurs have fulfilled their purpose most successfully. The Jagbura reinforced concrete arch bridge of 237 feet span was completed and opened for traffic in January 1930.

(b) After the Sarda canal the next most important works in progress were those in connection with the Hydro-electric Power Development scheme which will utilise the falls on the Ganges canal for the generation of electric power, the power thus obtained being used partly to extend irrigation by means of pumping and partly for domestic and industrial purposes. The scheme constitutes an attempt to bring the benefits of electrical power for domestic and minor industrial purposes within the grasp of the residents of some 66 towns having a population of 5,000 and over within the area of supply which extends over some 10,000 sq. miles of agricultural country ; also within the reach of those cultivators in the rural tract whose land lies outside the area commanded by the canal, thereby affording them the use of cheap electricity for irrigation pumping from rivers, tube wells and the larger open wells, and also for general agricultural purposes. It will further enable water to be pumped into new canals for State irrigation from rivers the supply of which has hitherto remained untapped owing to the physical difficulty of constructing a gravity canal at an economic rate.

In 1927 and 1928, the United Provinces Government sanctioned three projects for the generation of hydro-electric power at the falls at Bahadrad, Bhola and Pulra. Each of these was, originally, a separate scheme. But no sooner had sanction been accorded and construction commenced than applications began to be received from neighbouring towns and rural areas for extensions of the projects until, in course of time, the three areas were practically contiguous. It was consequently decided to link the three projects together, thus enabling any one project to be fed from the other power stations in case of a breakdown of its own ; and it has also been decided to put in hand an additional power station with a view to utilising the power available at the falls at Sumera to meet the growing

demand for current at the southern extremity of the system. Considerable progress was made on these works during the triennium, the expenditure to the end of 1929-30 amounting to Rs. 96 lakhs against an estimated cost of Rs. 138.5 lakhs. The scheme is estimated to earn a gross revenue of Rs. 18 lakhs per annum. The annual debit to the scheme on account of depreciation and maintenance is estimated at Rs. 7.5 lakhs the net revenue anticipated being thus Rs. 10.5 lakhs representing a return of 7.6 per cent. on the capital outlay.

(c) The construction of the Belasagur lake in the Dhasan canal division also progressed satisfactorily.

Projects.—The following projects were under consideration during the triennium :—

- (i) Kandhari reservoir on the Jamni nadi to supplement the supply of the Betwa canal.
- (ii) Batkhara tank project in the Ken canal division, and
- (iii) Kabra tank project in the Dhasan canal division.

PUNJAB.

Character of the seasons.—The monsoon of 1927-28 broke in the beginning of July and gave, in general, normal rainfall over the Province, although distribution throughout the season was uneven. In September and early *rabi* it was considerably in defect, resulting in low river supplies, but a little rain in the latter half of December was beneficial to the standing crops. A special feature of the year was the strong dry winds and dust storms in the beginning of March which did considerable damage to the wheat crop; this necessitated a heavy remission of water rates and land revenue amounting to Rs. 34 lakhs of rupees. In July and the first half of August 1928 the monsoon was less active than usual; but heavy falls at the end of August and in the beginning of September resulted in disastrous floods in the Jhelum, Chenab and Ravi rivers which did some damage to the Upper and Lower Jhelum canals while the damage to crops, cattle and villages in the riverain area of the Jhelum river was considerable. Rain in November and occasional showers in December proved beneficial to the early *rabi* crops and resulted in the sowing of extensive wheat areas. During April, May and June 1929 the weather was normal and good rain was received during July and the early part of August. On the 15th of August the Shyok Glacial Dam burst and on the 18th the Indus at Attock rose to 55 feet on the Khairabad gauge. Dera Ghazi Khan and Muzaffargarh districts were threatened with flooding but fortunately the danger passed without any appreciable damage. Towards the end of August very heavy rainfall in the Himalayas caused record floods in the Indus, Jhelum and Chenab rivers. The Indus at Attock rose to 66.5 feet on the Khairabad Gauge on the 28th of August, which is 6.5 feet higher than the previous record of 1880, and did considerable damage in the Muzaffargarh District on the left bank of the river. The flood embankment in Dera Ghazi Khan District on the right bank held against the river flood but the canals in the district suffered severe damage from floods in the hill torrents coming down from the Suleiman Hills on the west of the district. In the Chenab the flood was very nearly as great as that of the previous year while the flood in the Jhelum was the highest on record. These floods did considerable damage to crops, cattle and villages in riverain areas along these rivers as well as to the neighbouring canals.

Results.—The average area irrigated in the Province by Government irrigation works of all classes was 11-1/5 million acres as compared with 10-1/3 million acres, the average of the previous triennium as shown below :—

	Acres.
Average of the triennium 1924-27 ..	10,349,121
During 1927-28	10,381,437
During 1928-29	11,532,590
During 1929-30	11,687,622
Average of the triennium 1927-30 ..	11,200,550

In addition to this an average of 1,212,620 acres were irrigated by the Bikaner and Bahawalpur State canals of the Sutlej Valley Project and by channels which, although drawing their supplies from the Ghaggar Inundation, Western Jumna and Sirhind canals, lie wholly in Indian State

territory. The increase in the triennium under review is mainly due to the development of irrigation on the Sutlej Valley Project canals.

Works completed.—The important works completed during the triennium were :—

- (a) Several large schemes for the drainage of water-logged areas, the more important being the Aik Sambrial system on the Upper Chenab canal, and the Mona and Wan systems on the Lower Jhelum canal.
- (b) Lowering of the Main Line Lower of the Upper Chenab canal in extensive reaches with the object of reducing water-logging in the vicinity of the canal.
- (c) The Burala Branch, Pir Mahal, and Khiki extensions of the Lower Chenab canal covering approximately 200,000 acres.
- (d) Replacement of the shutters on the supplementary weir at Madhopur and replacement of the gates and gearing on the old head regulator at Madhopur.
- (e) The strengthening of the training works at Khanki, the head-works of the Lower Chenab canal, which were severely damaged by a record flood in 1928.

Works in progress.—(a) By far the most important work under construction was the Sutlej Valley Project which received the sanction of the Secretary of State for India in 1921 and is fully described on pages 170-172 of the Triennial Review of Irrigation in India, 1918-21. A notable feature of this great scheme is the introduction of machinery on a large scale whereby very rapid progress has been achieved. The project consists of (i) British canals namely Pakpattan, Dipalpur, Eastern and Mailsi canals, and (ii) State canals, namely Bikaner, Fordwah, Eastern Sadiqia, Bahawal (including Qaimpur), Abbasia and Panjnad canals. All of them except the last two were in operation during the triennium under review. The Bikaner, Fordwah, Qaimpur and certain channels of the Eastern Sadiqia and Bahawal canals have since been transferred to the State authorities in accordance with the terms of the Agreement with the States of Bikaner and Bahawalpur. The Islam Weir was damaged in 1929, due to a retrogression of levels intensified by the action of the flood of that year, sustaining the loss of a portion of the weir, including piers and superstructure. The necessary repairs were taken in hand at once, and the reconstruction progressed so rapidly that supply was provided to the dependent canals by the end of June of the following year. The Panjnad Weir and its subsidiary works were still under construction. The damage sustained by the Islam Weir indicated the advantages of a modified design for Panjnad and these improvements are being incorporated at that site. The downstream floor of the existing Weir and its protection are being strengthened and 14 extra bays are being added, making 47 in all. These improvements have resulted in the postponement of the opening of the weir until 1932. The Panjnad Headworks will supply the Abbasia canal (Perennial) and the Panjnad canal (non-perennial), the construction of which, together with their branches and distributaries, is nearing completion. The expenditure incurred on the project to the end of 1929-30 amounted to 1,937 lakhs of rupees which includes 1,021 lakhs contributed by the States of Bikaner and Bahawalpur—the co-partners in the project.

(b) The years 1928 and 1929 were marked by the occurrence of very heavy floods in the Chenab and Jhelum rivers ; in the Chenab that of 1928 was a record and that of 1929 closely approached it, and in the Jhelum both floods were in turn records. In 1928 the Jhelum river burst into both the Upper and Lower Jhelum canals below the headworks, and in 1929 this was repeated. In addition, the Mangla regulator was overtopped, considerable damage being done to the flanks though the main work was not affected, and the Rasul weir was also badly breached. To provide against similar happenings in the future both works are being strengthened at considerable expense. The total expenditure on Rasul, for instance, will probably amount to about Rs. 40 lakhs. On the Chenab the damage was not so serious but heavy repairs and strengthening works were necessitated at both headworks in each year.

(c) Heavy repairs were also undertaken to the Inundation canals, which were damaged in 1929 by floods in hill torrents in the Dera Ghazi Khan district and by floods in the Indus and Chenab rivers in the Muzaffargarh district.

Water-logging.—The problem of water-logging to which reference was made in the last triennial review, continued to occupy the attention of Government during the triennium. The capital expenditure incurred on anti-water-logging works in the Province during the last five years has been approximately Rs. 50 lakhs, while the maintenance of these works and those formerly constructed during the same period averaged approximately Rs. 4½ lakhs per annum. The well records show that the water table continues to rise in the Rechna and Chaj Doabs and it may consequently be anticipated that anti-water-logging measures will be necessary to an increasing extent in the future. The reclamation so far effected, has been largely confined to wet areas. The solution of the problem of the reclamation of alkaline areas is still far from being reached but the local Government is devoting considerable attention to it. Recently an extensive policy of research has been adopted and the services of a highly qualified specialist have been engaged to help in guiding the development of this policy. The measures employed to control the situation have consisted chiefly of :—

- (a) The construction of gravity storm water and seepage drains and of seepage drains with pumping outfalls.
- (b) Pumping from village tanks, using the water for irrigation in the nearest canal system. The first installation of this type was at Gujranwala, where satisfactory control of the water table has been secured by pumping on the average about 4 cusecs. Similar installations have been installed at Chuharkana, Sheikhupura, Ajnialwala, Jattanwali and Pindi Lala with equal success.
- (c) *The lowering of canals.*—This has so far only been tried in the case of the Upper Chenab canal where it has been successful in improving the water-logged areas in the vicinity of the canal.
- (d) *Tube Well installations.*—The control of the water table by means of tube wells was tried out in two places—at Gujranwala and at Ferozepur. These installations have not however been particularly successful ; the operation of the tube wells

has therefore been temporarily discontinued pending comparison of the results of the observations made on the sub-soil water movements during the past periods while the wells were working and the subsequent period when they were idle.

- (e) *Restriction of irrigation supplies.*—This has been applied throughout the Lower Jhelum canal and Upper Chenab canal systems, and locally on the Lower Chenab canal. Restrictions have been enforced without appreciably reducing the areas irrigated, but it is difficult to say what the effect has been as this is not directly observable.
- (f) Government is particularly concerned at present with indications of the further spread of water-logging on the Lower Jhelum canal in the vicinity of the Sargodha Remount Depot, on the Lower Chenab canal, in the neighbourhood of Marh Balochan and along the head reach of the Dipalpur canal. Measures to deal with these areas are under consideration.
- (g) With a view to securing the co-operation of the various Departments concerned, Government has constituted a Water-logging Board which meets periodically, reviews progress and advises Government on matters connected with waterlogging. The Water-logging Enquiry Committee referred to in the last triennial review has ceased to exist as such, but the officers comprising it continue on special duty in connection with research and anti-waterlogging measures, their work being periodically reviewed by the Water-logging Board.

Projects.—In March 1929 at a meeting of the Indus Discharge Committee, certain definite conclusions were arrived at which were accepted by the local Governments of the Punjab and Bombay and by the Government of India. The effect on the various Projects is as follows :—

- (a) The Jalalpur Project for the irrigation of the tract between the Salt Range and the right bank of the river Jhelum from Rasul to Khushab has been definitely abandoned on account of engineering difficulties.
- (b) The Thal Project for the irrigation of the Sind Sagar Doab will be held in abeyance for at least 10 years.
- (c) The Haveli Project with Headworks at Trimu below the junction of the Chenab and the Jhelum is being recast. The withdrawals from the Chenab of the supplies necessary for the construction of this project have been agreed to by the Bombay Government.
- (d) The Bhakra Project with a dam 500 feet high to store 4½ million foot acres is under further consideration.

BURMA.

Character of the seasons.—In 1927-28 the rainfall in Upper Burma was normal but unevenly distributed ; the early rains, generally plentiful, were followed by a long break and the late rains were excessive, causing floods in the Kyaukse District. In Lower Burma the rainfall was above normal causing floods during July, September and October, which rendered cultivation impossible in the low lying areas along the embankments in the Irrawaddy Delta. In 1928-29 the rainfall in Upper Burma was exceptionally heavy except in the northern portion of the Meiktila district, where the rains failed almost completely at the end of the season and caused serious crop failures. Floods occurred in the Mandalay, Shwebo and Kyaukse districts with damage to works and crops. In Lower Burma the rainfall was also excessive but failed towards the end of the season. Floods came down the Irrawaddy River in August and October causing losses to cultivation in low lying areas where late planting is customary. In 1929-30 the rainfall in Upper Burma was normal but the distribution was very unfavourable, the early rains being exceptionally heavy and the late rains very deficient, particularly in the Minbu district where some 6,000 acres of crops failed. In Lower Burma the same conditions prevailed, but there were no destructive floods.

Results.—The average area irrigated by all irrigation works was 763,866 acres compared with 771,866 acres, the average of the previous triennium. The average area protected by embankment and drainage works was 1,230,455 acres against 1,100,517 acres, the average of the previous triennium. The increase in the latter is due mainly to extension of cultivation inside the Myanaung and Henzada Embankments and to a revision in the tract shown as protected by embankments in the Pegu district and also to improved drainage by the river training works in the Pyuntaza Plain.

Works completed.—The principal work completed during the triennium was the scheme for training rivers in the Pyuntaza Plain. This project aims at reclaiming large areas of flooded land by training the rivers without the use of embankments, silting up low lying areas and improving drainage by making leading cuts. The scheme has proved beneficial as large tracts of fallow land have been reclaimed and rendered culturable. The total capital expenditure on the project at the end of the period under report was Rs. 20,89,933. Other works completed during the triennium were the Man canals Remodelling, widening and deepening the Pegu Sittang canal, the Tagundaing Tank and rebuilding the Ngapy-aung and Minye weirs which were damaged by the floods of 1928. A spill-way weir was also constructed to reduce destructive floods in the Zawgyi river.

Works in progress.—The following were among the larger works in progress during the triennium :—

- (i) & (ii). *Remodelling of the Shwebo canal and of the Zidaw and Kinda canal.*—Progress on these works, which were under construction in the previous triennium, was slow.
- (iii) *Panlaung River Improvement Scheme.*—A revised project for this work, construction on which was started in 1924-25, was under preparation.

- (iv) and (v). *Remodelling the Salin canals and the North Mon Branch canal.*—An estimate amounting to Rs. 26,83,152 has been sanctioned for remodelling the Salin canals, and another for Rs. 9,60,000 for constructing a new distributory from the North Mon canal. The Salin canals are inundation canals working without a permanent weir across the river and comprise five canals which take off from the right bank of the Salin Chaung and two from the left bank, irrigating an average area of about 26,500 acres annually. Although the Salin canal can command 74,000 acres of land it is not possible, owing to the insufficiency of supplies in the Salin river, to irrigate safely more than 33,000 acres from it. As a result of the new proposals a large part of this area will be irrigated from the Mon river by a new branch of the Mon canal, the balance being fed by a new high level canal taking off above a new weir to be built across the Salin river. The actual area irrigable by the combined scheme will be 51,000 acres. The progress on both works was satisfactory but was delayed in the third year of the triennium under report by labour having to be diverted to the headworks of the Mon canals, which were damaged seriously by a record flood on June 6th, 1929. The reconstruction of the headworks was taken in hand as soon as the river fell and was well on the way to completion.
- (vi) *Bhamini Shwedaungmaw Drainage Scheme.*—The scheme aims at the extension of the protected area in the Maubin Island by an embankment from Bhamini to Shwedaungmaw and an estimate amounting to Rs. 3,67,149 was sanctioned for it. It is estimated to bring a new area of 10,134 acres under cultivation.
- (vii) *Bawle Island Drainage Project.*—The project is for the relief of flooding in Bawle Island and is estimated to cost Rs. 5,04,000. The channels which drained the island had deteriorated, and an effort is being made to improve the conditions by digging out and straightening them, and by blocking the mouths of those through which flood water enters the interior of the island.
- (viii) *Mokkamu Drainage Project.*—The project aims at improving the drainage of an area of 175 square miles at a cost of Rs. 4,44,700.
- (ix) *Restricting the widening of the chord cut of the Twante canal.*—The enlargement of the chord cut of the Twante canal was causing anxiety, and steps were taken to prevent further widening by revetting the north bank near Letpangon at a cost of Rs. 3,86,884. The south bank is not being revetted pending a decision on the proposal to widen the Twante canal.
- (x) *Wundwin Weir.*—A diversion weir is being built on the Wundwin chaung for the improvement of irrigation from the Wundwin canal system, which at present depends on freshets at long intervals. The work is estimated to cost Rs. 1,60,000 and the area affected is about 4,000 acres.

Projects.—Estimates were prepared for the following schemes :—

	Estimated Cost.
	Rs.
Constructing the Daing Weir and Kinda main canal	9.70 lakhs.
Nwadet Link canal	6.00 „
Reconstructing the Kadu Tank	1.49 „
Widening the Twante canal	77.30 „
Myitmaka Valley River Training Project	26.00 „
South Kawa Drainage Scheme	57.53 „
North Kawa Drainage Scheme	2.70 „
Drainage of the flooded area east of the Twante ridge	4.09 „
Reclamation of marshy land in the Kyaukkyi Town- ship.	2.00 „

Preliminary investigation and surveys were also carried out in connection with the drainage of the Myanaung Plain.

BIHAR AND ORISSA.

Character of the seasons.—In the areas commanded by the Orissa canals, the rainfall each year was well distributed and beneficial to the rice crops but both canals and crops were considerably damaged in 1927-28 by exceptionally heavy floods in the rivers of Orissa. In 1928-29 and 1929-30 the floods were moderate. In the area under the Son canals the rainfall was somewhat below normal and badly distributed for the rice crop during 1927-28 and 1928-29 and sufficient during 1929-30. On the Tribeni canal and other canals in the Champaran district the rainfall was generally insufficient for the rice crop towards the end of the monsoon.

Results.—The average area irrigated during the triennium was 907,067 acres, as compared with 891,984 acres of the previous triennium.

Works completed and in progress.—No new construction work of importance was in hand ; only some additional drainage works on existing canals were in progress.

Projects.—The Khora valley project in the Shahabad district was found an unpromising one from a financial point of view and was dropped; the Chandan-Bilasi project in the Bhagalpur district was prepared but was dropped because of the opposition of the land-owners affected. The surveys of a site for a storage reservoir in the hilly catchment of the Son river were completed.

CENTRAL PROVINCES.

Character of the seasons.—In 1927 the rainfall was generally above the average, but there was considerable demand for irrigation especially during September when there was a break of about three weeks. The supply was adequate in the case of practically all works and the demand was met most satisfactorily. In 1928 the rainfall was generally below the average, and there was a keen demand. The supply was adequate from nearly all works and the demand was met satisfactorily. In 1929 the rainfall was generally in excess of the normal except in the south where it was about 10 to 12 per cent. below normal. The demand for water was keen during September and October and it was met satisfactorily. As usual in no year was there any appreciable demand for the irrigation of *rabi* crops, though conditions in 1929-30 were such in the north of the province that the crop would have benefited from irrigation.

Results.—During the triennium the average area irrigated was 4,00,438 acres compared with 4,29,911 acres in the previous triennium.

Works completed.—The Bahoribund and Mala tanks were completed during the triennium.

Works in progress.—The following works were in progress :—

Kharung canal.—The headworks and the right bank canal were practically completed. On the left bank canal the earthwork was practically completed and considerable progress was made on the construction of distributaries and minor distributaries.

Maniari canal.—The closure of the main dam was completed in June 1930 and the earth-work of the main canal and larger distributaries was nearly completed. The progress secured rendered it possible to irrigate on a considerable scale during the rains of 1930.

Tandula canal.—Work on the remodelling of this canal and its distributaries was continued and very satisfactory progress was made.

Projects.—No new projects were investigated. In accordance with the recommendation of the local Irrigation Committee, which was appointed in 1927 and reported in 1929, it has been decided that no further new construction shall be undertaken at present or until existing works are well developed and it is clear that the people appreciate them and are prepared to pay reasonable rates for irrigation.

NORTH-WEST FRONTIER PROVINCE.

Character of the seasons.—The rainfall in 1927-28 was well above the average but it was below normal during 1928-29. In 1929-30 the monsoon was abnormally heavy, especially during the month of August, which damaged the fodder crop to some extent. It seriously damaged canal works, but the drainages so far built worked very well and drained the area rapidly, otherwise great damage would have been done to the *kharif* crop.

Results.—The areas irrigated by the canals were as follows :—

	Average previous triennium.	1927-28.	1928-29.	1929-30.
Lower Swat canal	153,536	161,115	155,918	161,320
Kabul River canal	46,877	48,851	47,941	48,105
Upper Swat canal	156,912	181,647	195,286	209,009
Total	357,325	391,613	399,145	418,434

Works completed.—(a) The Hydro-electric Scheme at Mardan and the project for linking the Maira and Indus Branches were completed.

(b) For some years past special efforts have been made to extend the irrigated area, and in particular that irrigated by the Upper Swat canal. Two large new distributaries have, during the triennium, been added to the Upper Swat canal, *viz.*, the Shamozaï distributary and the Behram Dheri distributary. The Shamozaï distributary was sanctioned in September 1925 at an estimated cost of Rs. 1½ lakhs to protect an unirrigated area of about 9,000 acres; the Behram Dheri distributary, of approximately the same magnitude was sanctioned in 1927 and has also been completed. Steps have, at the same time, been taken to encourage the extension of irrigation from existing channels of the canal. As a result of this policy the area irrigated by the Upper Swat canal has risen from 152,000 acres in 1924-25 to 209,000 acres in 1929-30.

(c) Among the measures to extend the area irrigated in the province is included a comprehensive system of drainage works designed to relieve areas within the canal irrigated tract which have become water-logged owing to the deterioration of their natural drainages. As a result of the schemes undertaken, there has been a considerable fall in spring level throughout the tracts dealt with, and better and heavier crops are being grown than was previously possible, while certain areas which had been lying waste for upwards of twenty years have again been brought under cultivation.

Projects.—The question of the improvement of the district canals in the Dera Ismail Khan, Bannu, Peshawar, and Hazara districts was under investigation. The district canals in the province irrigate some 400,000 acres annually in the aggregate and are of great importance to the well being of the agricultural community, but they are badly aligned, scantily provided with drainage crossings, ill regulated and altogether badly equipped. These canals were previously administered by the Civil Department without any professional knowledge or assistance. Since the close of the triennium, however, their complete management, both technical and revenue, has been transferred to the Irrigation Department as an experimental measure, as it was clear that a trained technical staff could do a great deal at comparatively small expense towards improving their condition and assuring their supplies.

BALUCHISTAN.

Not only have no new schemes been constructed for many years in Baluchistan but there has been a gradual diminution in the supply of water available for the few small projects actually in operation, due mainly to the wasteful drain on the sub-soil water which is inevitable so long as the indigenous system of irrigation from *karez*s persists. The whole question of irrigation development in Baluchistan was reviewed in 1927 and in 1928 a more forward policy was decided upon. As a result, a survey was made of the irrigation possibilities of Baluchistan and an ordered programme of development is being drawn up. The first project on this programme, a scheme for improving the Khushdil Khan canal and the Shebo canal systems which supply water for the irrigation of the Pishin plain has been sanctioned at an estimated cost of Rs. 5,00,000. These two systems of canals were constructed nearly forty years ago, but, as the water available is insufficient to meet the needs of the tract, expansion has been very slow and the present condition of the commanded area is most unsatisfactory; the scheme now sanctioned should materially improve it. One item of the scheme, the provision of a weir for the diversion of the Surkhab floods into the Khushdil Khan Lake, the construction of which was undertaken during the triennium, has been completed at a cost of Rs. 67,500. Two smaller projects, the Surkhab Perennial and Kapip schemes, estimated to cost Rs. 52,000 and Rs. 1,12,000, respectively, were also under construction. Several further schemes, some of some magnitude, are being investigated and many of them promise well, especially those for the utilization of flood water which at present runs to waste.

**Statements showing the Financial
Results of Productive and Unpro-
ductive Irrigation, Navigation,
Embankment and Drainage
Works for, and up to the
end of, the year 1929-30.**

STATEMENT

PRODUCTIVE

Financial results of Productive Irrigation, Navigation, Embankment and

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
IRRIGATION WORKS.						
MADRAS.*						
Cauvery Delta System	1,258	3,205	70,97,320	..	4,35,26,763	70,97,320
Srivaikuntam Anicut System	28	46	17,75,063	..	5,27,569	17,75,063
Godavari Delta System	511	1,996	1,73,99,065	..	11,52,38,238	1,73,99,065
Mehamathur Anicut System	15	9	75,381	..	2,72,480	75,381
Thadapalli Channel	83	..	1,77,446	..	14,43,418	1,77,446
Kalingarayan Channel	61	..	1,80,486	..	5,26,117	1,80,486
Vridhachallam Anicut System	33	16	86,685	..	5,60,689	86,685
Pelandorai Anicut System	39	25	6,92,074	4,91,089	..	11,83,163
Chembrambakkam Tank	11	2	7,64,143	..	4,10,435	7,64,143
Marudur Anicut System	29	7	60,122	..	35,71,444	60,122
Ponnar River Canals System	31	477	67,72,743	..	81,98,210	67,72,743
Arkenkota Channel	24	..	1,44,445	..	31,657	1,44,445
Tirukkoyilur Anicut System	137	28	3,99,190	..	7,10,574	3,99,190
Shtatiatope Anicut System	41	149	10,75,703	..	39,90,780	10,75,703
Palar Anicut System	166	139	24,65,757	4,09,857	..	28,76,614
Cheyyar Anicut System	61	120	5,35,656	..	3,30,307	5,35,656
Cumbum Tank System . . . . .	..	24	86,373	..	35,562	86,373
Poiney Anicut System	104	78	3,03,918	..	12,59,077	3,03,918
Periyar System	145	106	1,07,97,686	..	13,14,210	1,07,97,686
Kistna Delta System	349	2,186	1,92,60,713	..	8,68,11,197	1,92,60,713
Nandyar Channel System	31	..	65,715	44,248	..	1,09,963

NO. I.

PUBLIC WORKS.

Drainage works for, and up to the end of, 1929-30.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
18,77,208	9,61,104	9,16,104	12·91	2,76,251	6,39,853	..	210,032
1,61,096	86,721	74,375	4·19	56,761	17,694	..	21,584
44,04,284	13,77,917	30,26,367	17·39	5,51,656	24,74,711	..	871,351
19,819	7,566	12,253	16·25	2,494	9,769	..	3,742
66,020	24,670	41,350	23·30	5,566	35,784	..	7,504
51,190	14,175	37,015	20·51	5,852	31,163	..	6,252
33,230	16,931	16,299	18·80	2,799	13,500	..	6,526
55,503	25,723	29,780	4·30	22,109	7,671	..	10,670
38,962	6,670	32,292	4·23	21,908	10,384	..	3,059
97,360	11,063	86,297	143·54	2,121	84,176	..	15,051
6,58,550	1,39,606	5,18,944	7·66	1,92,663	3,26,281	..	79,255
21,204	6,493	14,711	10·18	4,681	10,030	..	2,642
73,682	27,544	46,138	11·56	13,364	32,774	..	15,533
1,54,384	37,558	1,16,826	10·86	35,486	81,340	..	32,928
1,57,666	80,578	77,088	3·13	78,598	..	1,510	25,643
83,306	33,013	50,293	9·39	19,165	31,128	..	19,309
-16,131	3,536	-19,667	..	2,793	..	22,460	-1,311
52,316	21,092	31,224	10·27	10,994	20,230	..	6,504
5,84,296	3,72,839	5,11,457	4·74	3,49,336	1,62,121	..	100,746
43,33,676	14,09,435	29,24,241	15·18	6,56,839	22,67,402	..	741,857
11,592	14,334	-2,742	..	2,136	..	4,878	2,905

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-ut-charge (column 7+column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
IRRIGATION WORKS—						
<i>contd.</i>						
MADRAS.						
Ganjam Minor River System	119	225	2,87,210	..	9,41,771	2,87,210
Lower Coleroon Ancient System	383	620	32,31,857	..	1,26,41,879	32,31,857
Divi Pumping System	50	121	26,29,245	3,43,479	..	29,72,724
Toludur Reservoir Project	32	40	25,85,570	8,90,862	..	34,76,432
Polavaram Island Project . . . . .	..	40	15,03,011	1,19,711	..	16,22,722
Cauvery Metur Project . . . . .	..	..	3,48,46,935	34,36,989	..	3,82,83,924
Kattalai Scheme . . . . .	..	..	12,07,476	1,87,829	..	13,95,305
Total Madras*	3,731	9,659	11,65,06,988	59,24,064	28,23,42,367	12,24,31,052
BOMBAY.						
Alibhar Kacheri Canal	59	..	1,07,169	..	2,45,060	1,07,169
Sarfazwah	115	..	1,24,680	..	4,93,766	1,24,680
Ghar Canal	312	..	6,78,303	..	2,73,42,486	6,78,303
Great Marak Canal	170	..	4,58,028	..	24,90,518	4,58,028
Gadikeri Tank . . . . .	..	2	16,918	..	56,475	16,918
Mavinkop Tank . . . . .	..	3	33,504	2,457	..	35,961
Sukkar Canal	129	14	14,84,574	..	4,82,382	14,84,574
Unharwah	119	..	8,09,288	..	33,39,849	8,09,288
Begari Canal	191	58	25,06,445	..	1,04,09,853	25,06,445
Desert Canal	295	38	27,55,056	..	36,24,069	27,55,056
Fuleli Canal	1,040	..	36,63,938	..	1,30,34,629	36,63,938

*Under certain irrigation systems in the Madras Presidency, there is a good deal of old irrigation figures in these statements are exclusive of such irrigation.

NO. I—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
67,128	61,077	6,051	2-11	9,556	..	3,505	17,284
4,36,669	3,10,292	1,26,377	3-91	1,29,409	..	3,032	72,306
2,51,405	1,55,819	95,586	3-64	97,611	..	2,025	30,038
1,05,025	20,384	84,641	3-27	1,08,649	..	24,008	16,180
81,484	5,597	75,887	5-05	76,359	..	472	9,032
..	..	..	..	15,98,031	..	15,98,031	..
49,916	12,057	37,859	3-14	61,040	..	23,181	9,200
1,42,10,840	52,43,794	89,67,046	7-70	43,94,247	62,55,901	16,83,102	2,355,822*
					+45,72,799		
10,878	6,635	4,243	3-96	5,040	..	797	14,604
24,521	24,651	-130	..	3,942	..	4,072	27,143
8,56,277	2,95,077	5,61,200	82-73	23,298	5,37,902	..	266,094
50,038	56,885	-6,647	..	19,343	..	25,990	78,850
2,356	383	1,973	6-44	544	1,429	..	407
1,304	277	1,027	3-06	1,004	23	..	415
2,25,666	1,21,964	1,03,702	6-98	48,398	55,304	..	96,549
2,35,224	1,22,228	1,12,996	13-96	26,459	86,537	..	102,415
8,99,879	5,98,666	3,01,213	12-02	81,846	2,19,367	..	319,513
2,57,282	6,56,622	-3,99,340	..	89,593	..	4,88,933	159,613
5,54,597	2,43,396	3,11,201	8-49	1,38,794	1,72,407	..	405,366

which existed before capital expenditure was incurred and is not a direct result of that expenditure; the

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— <i>contd.</i>	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
<i>BOMBAY—contd.</i>						
Suttah Canal	36	..	1,88,156	..	37,136	1,88,156
Navlakhi Canal	109	15	1,35,678	..	6,16,842	1,35,678
Pinyari Canal	400	..	12,46,655	..	1,58,779	12,46,655
Indus Canals Right Bank	103	..	90,973	..	1,82,671	90,973
Indus Canals Left Bank	195	..	2,67,918	..	1,93,300	2,67,918
Sind Canal and Branches	143	..	8,34,480	..	10,06,443	8,34,480
Rajib, Chitti and Garang	23	..	2,86,824	..	3,82,852	2,86,824
Canals in Rohri	136	14	1,73,010	..	1,34,544	1,73,010
Western Nara and Pritchard	465	9	22,97,134	..	28,39,272	22,97,134
Phitta Canal	37	..	26,136	..	46,142	26,136
Gharo Mahamud	221	..	1,09,785	..	4,45,427	1,09,785
Kari Shumali	165	..	15,793	..	2,48,543	15,793
Nasirwah	128	..	47,157	..	2,23,893	47,157
Indus Canals (other canals Fuli eli Canals Division).	140	..	1,15,928	..	55,533	1,15,928
Dambro	65	..	51,818	..	1,32,277	51,818
Marirwah	15	..	9,737	43,761	..	53,498
Baghar Canal	169	..	7,63,445	..	74,989	7,63,445
Dadu	37	..	28,915	..	57,018	28,915
Shahada Channel.	21	1	1,07,547	..	9,326	1,07,547
Lloyd Barrage and C. C. . . . .	..	..	14,09,37,276	70,75,010	..	14,80,12,286
Gharkino Canal . . . . .	..	..	1,39,301	45,037	..	1,84,338
Total Bombay	5,029	154	16,05,11,569	71,66,265	6,83,64,074	6,76,77,834

NO. I—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
20,907	12,518	8,389	4.46	6,205	2,184	..	40,024
1,19,121	64,246	54,875	40.44	5,019	49,856	..	59,035
2,51,658	1,60,969	90,689	7.27	54,531	36,158	..	95,373
52,296	26,520	25,776	28.33	3,897	21,879	..	26,916
94,487	86,453	8,034	3.00	9,768	..	1,734	30,169
2,72,974	1,47,124	1,25,850	15.08	29,535	96,315	..	76,627
89,444	21,532	67,912	23.68	10,011	57,901	..	21,552
1,61,047	1,51,440	9,607	5.55	6,691	2,916	..	35,196
9,02,819	3,62,381	5,40,438	23.53	80,526	4,59,912	..	272,989
16,443	8,056	8,387	32.09	871	7,516	..	7,209
1,30,100	1,09,469	20,631	18.79	3,791	16,840	..	85,217
59,844	45,071	14,773	93.54	605	14,168	..	41,667
64,164	32,881	31,283	66.34	1,711	29,572	..	34,560
58,383	51,183	7,200	6.21	4,581	2,619	..	29,887
35,019	29,506	5,513	10.64	1,729	3,784	..	15,674
17,943	8,993	8,950	91.92	316	8,634	..	5,722
86,052	50,312	35,740	4.68	35,154	586	..	37,585
34,130	23,111	11,019	38.11	938	10,081	..	10,396
8,201	9,353	-1,152	..	4,143	..	5,295	1,602
..	..	..	..	21,88,970	..	21,88,970	..
..	..	..	..	6,968	..	6,968	..
55,93,054	35,27,702	20,65,352	1.29	28,94,221	18,93,890	27,22,759	2,398,169
						-8,28,869	

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenues.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— <i>contd.</i>	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
BENGAL.						
Damodar Canal . . . . .	..	..	41,38,371	1,28,947	..	42,67,318
Bakreswar Irrigation Scheme . . . . .	..	..	3,48,900	21,470	..	3,70,370
Total Bengal . . . . .	..	..	44,87,271	1,50,417	..	46,37,688
UNITED PROVINCES.						
Ganges Canal	568	3,296	5,20,20,051	..	8,84,79,386	5,20,20,051
Lower Ganges Canal	662	3,162	4,19,64,398	..	2,25,39,049	4,19,64,398
Eastern Jumna Canal	129	796	60,07,838	..	5,77,63,514	60,07,838
Agra Canal	100	902	1,23,71,315	..	16,57,759	1,23,71,315
Rohilkhand Canals . . . . .	..	409	22,83,036	12,98,520	..	35,81,556
Dun Canals . . . . .	..	91	26,86,034	..	2,82,825	26,86,034
Bijnor Canals . . . . .	..	78	5,98,295	..	6,63,036	5,98,295
Garni Canal . . . . .	..	37	9,20,677	49,434	..	9,70,111
Sarda Canal	913	2,662	9,35,47,096	2,05,62,258	..	11,41,09,354
Total United Provinces	2,372	11,433	21,23,98,740	2,19,10,212	17,13,55,569	23,43,08,952
PUNJAB.						
Upper Bari Doab Canal	325	1,548	2,16,68,399	..	9,15,12,436	2,16,68,399
Western Jumna Canal including Sirsa Branch	306	1,747	1,89,39,080	..	7,17,49,994	1,89,39,080
Sidhni Inundation Canal	67	253	13,38,470	..	1,37,84,299	13,38,470
Sirhind Canal	318	1,646	2,63,70,833	..	5,17,61,106	2,63,70,833

NO. I.—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Percent.	Rs.	Rs.	Rs.	Acres.
..	..	..	..	(a)	..	..	..
..	..	..	..	15,390	..	15,390	..
..	..	..	..	15,390	..	15,390	..
					-15,390		
80,01,735	22,19,098	57,82,637	11.12	17,54,636	40,28,001	..	1,621,216
48,80,300	17,76,771	30,83,529	7.35	13,06,443	17,77,088	..	1,057,668
30,65,172	7,03,968	23,61,204	39.30	2,07,599	21,53,605	..	391,013
13,50,055	5,27,525	8,22,530	6.65	3,84,548	4,37,982	..	372,607
4,97,429	2,48,358	2,49,071	10.91	1,02,700	1,46,371	..	92,750
2,18,125	1,25,815	92,310	3.44	1,15,227	..	22,917	19,233
92,025	48,917	43,108	7.21	23,725	19,383	..	23,420
52,084	19,616	32,468	3.53	32,586	..	118	20,051
13,12,246	12,42,341	69,905	0.07	46,66,361	..	45,96,456	600,178
1,94,49,171	69,12,409	1,25,36,762	5.90	85,93,825	85,62,428	46,19,491	4,098,136
					+ 39,42,937		
65,44,731	18,54,213	46,90,518	21.65	7,05,805	39,84,713	..	1,431,867
43,88,658	18,71,055	25,17,603	13.29	6,20,562	18,97,041	..	987,444
7,47,455	1,31,406	6,16,049	46.03	43,255	5,72,794	..	327,488
56,33,880	15,43,434	40,90,426	15.51	8,49,821	32,40,605	..	2,020,295

(a) Shown as direct charges under "Capital."

STATEMENT

General Financial results to end of 1929-30.						
Name of works.	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenues.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
IRRIGATION WORKS—						
<i>contd.</i>						
PUNJAB—contd.						
Central Workshop (Commercial concern).	..	..	5,77,579	..	..	5,77,579
Chenab Inundation Canal . .	229	131	11,63,323	..	1,14,49,625	11,63,323
Lower Chenab Canal . . .	471	2,501	3,83,02,177	..	32,76,52,507	3,83,02,177
Lower Jhelum Canal . . .	181	1,010	1,93,44,394	..	5,61,87,730	1,93,44,394
Upper Chenab Canal . . .	173	1,261	3,73,11,574	22,15,561	..	3,95,27,135
Upper Jhelum Canal . . .	128	638	4,43,78,748	2,22,29,047	..	6,66,07,795
Lower Bari Doab Canal . . .	132	1,244	2,23,94,646	..	5,02,77,400	2,23,94,646
Sutlej Valley Project . . .	908	4,338	9,16,42,369	1,83,25,344	54,97,097	10,99,67,713
Total Punjab . . .	3,238	16,317	32,34,31,592	4,27,69,952	67,98,72,794	36,62,01,544
BURMA.						
Shwetachaung Canal . . .	26	6	6,94,429	..	1,68,901	6,94,429
Man Canals	21	43	12,06,459	..	1,98,937	12,06,459
Nwadet Canal System . . .	33	69	8,64,524	1,15,874	..	9,80,398
Ngapyaung Canal System . .	8	8	1,32,817	17,184	..	1,50,001
Thindwe Canal System . . .	15	16	1,95,609	..	1,798	1,95,609
Minye and Tamok Canal System.	22	37	2,11,025	..	56,962	2,11,025
Zidaw Canal System . . .	21	39	8,62,460	..	2,22,292	8,62,460
Kinda Canal System . . .	42	56	8,59,826	1,02,542	..	9,62,168
Mathwe Canal System . . .	11	35	2,25,520	..	36,395	2,25,520
Kyine Canal System . . .	25	25	4,77,648	..	3,13,110	4,77,648

NO. I—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay. column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
7,824	..	7,824	..	..	..	..	..
5,74,621	2,16,671	3,57,950	30.77	40,528	3,17,422	..	227,944
2,44,59,592	52,53,236	1,92,06,356	50.14	13,46,671	1,78,59,685	..	2,638,234
52,47,258	35,13,435	17,33,823	8.96	6,81,727	10,52,096	..	832,312
41,81,136	23,53,355	18,27,781	4.90	12,45,948	5,81,833	..	626,185
23,63,247	17,95,972	5,67,275	1.28	14,50,653	..	8,83,378	328,451
94,67,395	18,03,137	75,74,258	33.82	7,30,827	68,43,431	..	1,272,696
49,04,836	40,67,541	8,37,295	0.91	46,86,250	..	38,48,955	1,884,950
6,85,20,613	2,44,93,455	4,40,27,158	13.61	1,24,02,047	3,63,49,620	47,32,333	12,577,866
					+ 3,16,17,287		
90,667	33,951	65,716	9.46	22,689	43,027	..	15,355
1,39,524	88,120	51,404	4.26	43,442	7,962	..	20,609
1,15,862	2,20,274	-1,04,412	..	28,890	..	1,33,302	28,023
12,964	1,79,322	-1,66,358	..	4,295	..	1,70,653	3,380
41,052	16,891	24,161	12.35	6,419	17,742	..	9,529
92,415	1,36,562	-44,147	..	7,239	..	51,386	20,143
1,79,191	1,02,204	76,987	8.93	32,971	44,016	..	34,168
71,893	58,323	15,570	1.81	33,094	..	17,524	26,140
36,529	18,997	17,532	7.77	7,365	10,167	..	11,623
1,36,396	48,046	88,350	18.50	16,419	71,931	..	29,540

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— contd.	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
BURMA—contd.						
Htongyi Canal System	8	..	92,849	..	1,859	92,849
Meiktila Lake . . . . .	..	20	9,38,665	..	9,200	9,38,665
Shwebo Canal	76	316	69,40,039	..	57,56,702	69,40,039
Mon Canal	54	130	68,84,227	12,27,054	..	81,11,281
Total Burma	362	800	2,05,85,897	14,62,654	68,56,246	2,20,48,551
NORTH-WEST FRONTIER PROVINCE.						
Lower Swat River Canal	22	173	60,88,044	..	90,08,802	60,88,044
Kabul River Canal	65	13	12,91,609	..	19,63,862	12,91,609
Total North-West Frontier Province.	87	186	73,79,653	..	1,09,72,664	73,79,653
Total Productive Irrigation Works.	14,818	38,549	84,53,01,710	7,93,83,564	1,21,97,93,714	92,46,85,274
NAVIGATION, EMBANK- MENT AND DRAINAGE WORKS.						
BENGAL.						
Grand Trunk Canal . . . . .	..	..	14,36,972	7,21,897	..	21,58,869
Total Bengal . . . . .	..	..	14,36,972	7,21,897	..	21,58,869
BURMA.						
Maubin Island Embankment . . . . .	..	..	12,79,530	..	5,82,283	12,79,530

NO. I—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
9,657	4,363	5,294	5.70	3,079	2,215	..	2,817
70,406	20,689	49,717	5.30	30,936	18,781	..	30,920
8,89,042	3,69,929	5,19,113	7.48	2,34,153	2,84,960	..	175,413
3,68,129	7,17,728	-3,49,599	..	2,37,883	..	5,87,482	57,712
22,62,727	20,13,399	2,49,328	1.21	7,08,874	5,00,801	9,60,347	465,372
					-4,59,546		
8,35,181	3,57,085	4,78,096	7.85	2,05,771	2,72,325	..	161,320
2,40,152	72,915	1,67,237	12.95	44,512	1,22,725	..	48,105
10,75,333	4,30,000	6,45,333	8.74	2,50,283	3,95,050	..	209,425
11,11,11,738	4,26,20,759	6,84,90,979	8.10	2,92,58,887	+3,95,050 5,39,57,690 1,47,33,422		22,084,790
					+3,92,24,268		
..	..	..	..	79,239	..	79,239	..
..	..	..	..	79,239	..	79,239	..
					-79,239		
3,41,922	61,654	2,80,268	21.90	45,132	2,35,136	..	147,275

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenues.	Total sum-charge (column 7+column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
NAVIGATION EMBANKMENT AND DRAINAGE WORKS— <i>contd.</i>	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
BURMA— <i>contd.</i>						
Kyangan Section . . . . .	..	..	1,55,064	..	34,167	1,55,064
Myanaung Section . . . . .	..	..	11,93,776	..	53,82,805	11,93,776
Henzada Section . . . . .	..	..	27,92,607	..	3,10,61,425	27,92,607
Sangin Sagayyi Section . . . . .	..	..	85,125	..	24,46,551	85,125
Thongwa Island Embankment	..	..	2,27,909	..	18,04,409	2,27,909
Twante Canal	22	..	54,13,181	..	20,30,327	54,13,181
Ela Embankment . . . . .	..	..	45,061	1,713	..	46,774
Tamatakaw Sea Wall . . . . .	..	..	1,20,363	22,919	..	1,43,282
Investments in Government Commercial Undertakings.	..	..	38,18,295	..	..	38,18,295
Total Burma	22	..	1,51,30,911	24,632	4,33,40,967	1,51,55,543
Total Productive Navigation, Embankment and Drainage Works.	22	..	1,65,67,883	7,46,529	4,33,40,967	1,73,14,412
GRAND TOTAL PRODUCTIVE WORKS.	14,840	38,549	86,18,69,593	8,01,30,093	1,26,31,34,681	94,19,99,686

NO. I—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay. column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
7,280	4,171	3,109	2.00	4,996	..	1,887	4,297
1,63,091	56,381	1,06,710	8.94	38,725	67,985	..	116,414
10,21,715	5,52,439	4,69,276	16.80	95,908	3,73,368	..	588,290
71,186	10,115	61,071	71.74	3,193	57,878	..	31,383
76,683	36,421	41,262	18.10	7,402	33,860	..	39,066
5,20,997	48,471	4,72,526	8.73	1,77,675	2,94,851	..	..
4,993	4,927	66	0.15	2,158	..	2,092	6,658
9,965	11,268	-1,303	..	5,450	..	6,753	13,174
1,10,681	7,68,352	-6,57,671	..	..	..	6,57,671	..
23,28,613	15,53,199	7,75,314	5.12	3,80,639	10,63,078	6,68,403	946,857
23,28,613	15,53,199	7,75,314	4.68	4,59,868	+ 3,94,675 10,63,078	7,47,642	946,857
11,34,40,251	4,41,73,958	6,92,66,293	8.04	2,97,18,755	+ 3,15,436 5,50,20,768	1,54,81,064	23,031,647
					+ 3,95,39,704		

STATEMENT

UNPRODUCTIVE

Financial results of Unproductive Irrigation, Navigation, Embankment

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenues.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
IRRIGATION WORKS.						
MADRAS*.						
Kurnool-Cuddapah Canal	418	295	2,33,87,114	3,60,05,410	..	5,93,92,524
Barur Tank	11	26	4,43,113	3,76,653	..	8,19,766
Vallur Anicut	6	8	76,282	18,454	..	94,736
Madras Water Supply and Irrigation System.	11	..	18,60,428	26,46,150	..	45,06,578
Rushikulya System	80	151	52,77,361	39,05,523	..	91,82,884
Muniyeru System	61	7	6,01,059	3,60,882	..	9,61,941
Dundapad Tank . . . . .	..	7	1,40,004	1,54,626	..	2,94,630
Yerur Tank . . . . .	..	..	63,353	32,615	..	95,968
Sagileru Tank	12	..	4,64,727	5,66,743	..	10,31,470
Atmakur Tank . . . . .	..	5	1,23,379	75,733	..	1,99,112
Jangamahe Swarapuram Tank	..	5	71,664	45,630	..	1,17,294
Ananiasamudram Beraperu Tank.	..	3	73,573	59,055	..	1,32,628
Hajipuram Tank . . . . .	..	4	3,11,883	1,84,433	..	4,96,316
Ponnalur Tank . . . . .	..	7	2,18,649	1,74,951	..	3,93,600
Markapur Tank	8	..	1,29,340	69,239	..	1,98,579
Nagavalli River System	65	47	17,22,778	4,09,688	..	21,32,466
Venkatapuram Tank	3	..	3,84,921	2,31,648	..	6,16,569
Bhavani Tank	6	..	2,65,491	1,44,575	..	4,10,066
Yellanur Tank . . . . .	..	4	2,69,707	1,26,935	..	3,96,642
Kochesuvu Tank . . . . .	..	1	1,35,734	95,061	..	2,30,795

NO. II.

PUBLIC WORKS.

and Drainage works for, and up to the end of, 1929-30.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
3,34,649	1,54,242	1,80,407	0.77	7,84,420	..	6,04,013	83,398
20,206	8,826	11,380	2.57	13,945	..	2,565	3,305
4,851	979	3,872	5.08	2,695	1,177	..	1,129
57,370	19,213	38,157	2.05	55,325	..	17,168	3,374
2,06,897	1,77,783	29,114	0.55	1,63,788	..	1,34,674	52,451
33,519	9,146	24,373	4.06	19,045	5,328	..	7,667
763	78	685	0.49	4,149	..	3,464	207
3,416	220	3,196	5.04	2,053	1,143	..	1,293
3,468	6,612	-3,144	..	14,867	..	18,011	1,149
3,010	628	2,382	1.93	3,656	..	1,274	777
-273	29	-302	..	2,038	..	2,340	255
-1,873	228	-2,101	..	2,384	..	4,485	-49
3,949	683	3,266	1.05	9,270	..	6,004	634
4,770	3,220	1,550	0.71	6,966	..	5,416	856
1,967	6,314	-4,347	..	4,301	..	8,648	839
84,977	21,890	63,087	3.66	56,805	6,282	..	11,128
369	696	-227	..	12,919	..	13,146	69
5,823	1,974	3,849	1.45	10,022	..	6,173	666
3,519	617	2,902	1.08	8,329	..	5,427	864
-379	667	-1,046	..	4,325	..	5,371	-100

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect)	Accumulated arrears of interest.	Accumulated surplus revenues.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— contd.	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
MADRAS—contd.						
Panchapathi Reservoir . . . . .	..	2	3,39,276	1,70,444	..	5,09,720
Siddapur Tank	7	9	8,04,486	4,45,923	..	12,50,409
Nagavaram Anicut and Supply Channel.	2	..	1,09,890	46,340	..	1,56,230
Mopad Reservoir System	17	84	22,89,697	12,12,061	..	35,01,758
Kanniampalayam Anicut	10	..	1,25,234	73,405	..	1,98,639
Thippayapalem Project . . . . .	..	..	77,664	18,521	..	96,185
Basavannah Channel . . . . .	..	..	4,20,218	45,531	..	4,65,749
Total Madras*	717	665	4,01,87,025	4,76,96,229	..	8,78,83,254
BOMBAY.						
Kasurdi Tank . . . . .	..	2	45,590	1,20,071	..	1,65,661
Chikhli Canal	7	..	57,442	1,14,606	..	1,72,048
Hathmati and Karicat Canal	60	83	13,18,729	13,22,308	..	26,41,037
Dambal Tank . . . . .	..	3	63,980	78,245	..	1,42,225
Medleri Tank . . . . .	..	6	81,392	1,62,351	..	2,43,743
Hartala Tank	39	75	73,382	80,422	..	1,53,804
Mhaswa Tank . . . . .	..	7	1,38,956	2,63,367	..	4,02,323
Madag Tank	9	..	1,67,598	3,65,599	..	5,33,197
Asundi Tank . . . . .	..	5	74,995	1,16,331	..	1,91,326
Ekrak Tank	48	2	13,40,386	6,64,549	..	20,04,935
Muchkundi Tank	6	2	1,58,707	2,57,105	..	4,15,812

* Under certain irrigation systems in the Madras Presidency, there is a good deal of old irrigation figures in these statements are exclusive of such irrigation.

NO. II--contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Ra.	Ra.	Ra.	Per cent.	Ra.	Ra.	Ra.	Acres.
124	2,137	-2,013	..	12,494	..	14,607	..
4,558	1,145	3,443	0.43	26,389	..	22,946	520
600	52	548	0.50	3,568	..	3,020	29
26,772	16,862	10,910	0.48	84,196	..	73,286	4,036
4,003	2,478	1,525	1.22	6,052	..	4,527	208
..	..	..	..	3,772	..	3,772	..
..	..	..	..	19,422	..	19,422	..
8,07,085	4,35,619	3,71,466	0.92	13,37,195	13,930	9,79,659	174,605*
					-9,65,729		
1,201	1,175	26	0.06	1,357	..	1,331	129
1,642	1,771	-129	..	1,789	..	1,918	510
45,008	42,191	2,817	0.21	41,407	..	38,590	3,698
2,103	686	1,417	2.21	2,023	..	606	478
930	1,029	-99	..	2,605	..	2,704	39
1,261	1,026	235	0.32	1,694	..	1,359	176
1,838	1,372	466	0.34	4,282	..	3,816	664
2,144	1,921	223	0.13	5,362	..	5,139	468
1,074	1,235	-161	..	2,020	..	2,181	270
1,51,946	20,597	1,31,349	9.80	40,837	90,512	..	5,051
164	1,666	-1,502	..	4,663	..	6,165	22

which existed before capital expenditure was incurred and is not a direct result of that expenditure; the

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenues.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
IRRIGATION WORKS—						
<i>contd.</i>						
BOMBAY—contd.						
Bhadalwadi Tank . . . . .	..	10	2,27,422	3,45,445	..	5,72,867
Bhatodi Tank	5	5	3,79,707	7,29,710	..	11,09,417
Karegaon Tank	4	..	39,189	96,527	..	1,35,716
Krishna Canal	84	..	9,49,807	5,06,940	..	14,56,747
Upper Man River Works	18	7	4,39,286	8,68,806	..	13,08,092
Maini Tank	9	8	4,96,330	7,56,979	..	12,53,309
Ashti Tank	28	3	8,41,708	11,20,002	..	19,61,710
Rewari Canal	10	..	59,811	53,877	..	1,13,688
Shrisufthal Tank . . . . .	..	13	2,24,568	3,96,010	..	6,20,578
Lower Panjhra River Works . . . . .	..	45	4,68,621	4,75,697	..	9,44,318
Yerla River Irrigation Works	33	4	7,81,508	13,51,861	..	21,33,369
Parsul Tank . . . . .	..	5	2,14,995	2,66,656	..	4,81,651
Mutha Canals including Motoba Tank	88	84	65,55,233	37,98,489	..	1,03,53,722
Goklak Canal 1st Section and Storage Works	16	35	14,66,673	4,57,906	..	19,24,579
Eastern Nara Works	716	..	88,31,482	..	15,61,188	88,31,482
Mhaswad Tank	66	43	20,96,016	27,08,471	..	48,04,487
Jamrao Canal	228	488	1,01,25,558	8,86,408	..	1,10,11,966
Jamda Canal . . . . .	..	6	10,51,360	25,62,347	..	36,13,707
Pathri Tank	5	3	6,42,846	4,82,587	..	11,25,433
Victoria Tank . . . . .	..	..	62,183	51,072	..	1,13,255
Budhibal Tank . . . . .	..	..	5,11,681	4,15,481	..	9,27,162
Nira Left Bank Canal and Shetphal Tank	100	146	1,28,02,462	..	95,622	1,28,02,462

NO. II—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
1,180	4,062	-2,882	..	7,087	..	9,969	1,390
8,460	6,860	1,600	0.42	11,727	..	10,127	643
2,520	2,223	297	0.76	1,261	..	964	570
58,717	18,715	40,002	4.21	29,970	10,032	..	6,183
6,689	7,818	-2,129	..	13,827	..	15,956	1,385
9,726	6,218	3,508	0.71	15,815	..	12,307	2,713
24,299	8,940	15,359	1.82	25,463	..	10,104	4,701
4,326	3,696	630	1.05	1,888	..	1,258	962
5,082	6,237	-1,155	..	7,056	..	8,211	1,326
24,190	6,679	17,511	3.74	14,810	2,701	..	3,403
22,923	22,232	691	0.09	24,784	..	24,093	6,361
8,759	1,727	7,032	3.27	6,917	115	..	1,500
4,37,773	1,34,496	3,03,277	4.63	2,08,080	95,197	..	14,933
62,912	17,865	45,047	3.07	47,602	..	2,555	11,437
2,41,650	3,73,006	-1,31,356	..	3,16,098	..	4,47,454	232,251
53,198	17,309	36,889	1.71	66,688	..	30,799	6,925
4,55,286	6,50,860	-1,95,574	..	3,48,336	..	5,43,910	227,473
11,043	12,263	-1,220	..	33,489	..	34,709	1,612
13,759	5,529	8,230	1.28	20,876	..	12,646	1,148
..	..	..	..	2,121	..	2,121	..
..	..	..	..	16,451	..	16,451	..
8,14,907	3,16,107	4,98,800	3.90	5,17,567	..	18,767	71,965

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenues.	Total sum-at-charge (column 7+column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— <i>contd.</i>	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
BOMBAY— <i>contd.</i>						
Hasanaliwah	90	..	3,11,548	..	1,10,302	3,11,548
Dad Canal	288	128	27,09,218	10,49,632	..	37,58,850
Nasrat Canal	217	66	18,84,585	8,00,412	..	26,84,997
Kadwa River Works	24	14	10,35,876	14,19,947	..	24,55,823
Wangroli Tank	17	..	2,93,295	2,52,568	..	5,45,863
Tranza Nagrama Tanks	8	..	2,80,635	2,57,379	..	5,38,014
Savli Tank	8	1	2,55,210	2,51,338	..	5,06,548
Chankapur Tank	19	21	20,56,431	16,18,481	..	36,74,912
Sahjat Tank	9	2	1,84,029	2,67,067	..	4,51,096
Suki River . . . . .	..	..	15,524	9,454	..	24,978
Godavari Canals	122	112	1,03,25,861	33,34,009	..	1,36,59,870
Futelao Tank	4	..	1,16,461	76,706	..	1,93,167
Sheharwah . . . . .	..	..	26,356	15,573	..	41,929
Kalri Canal	89	..	1,01,572	61,230	..	1,62,802
Dharma Canal	19	12	97,832	1,02,784	..	2,00,616
Mahiwah	216	87	14,98,101	23,71,631	..	38,69,732
Gokak Canal Survey . . . . .	..	..	1,03,509	39,268	..	1,42,777
Nira Right Bank Canal	106	150	3,85,56,534	1,67,53,336	..	5,53,09,870
Prawara River Works	115	148	1,50,07,048	76,04,870	..	2,26,11,918
Gokak Canal 2nd Section . . . . .	..	..	1,90,284	3,43,290	..	5,33,574
Navlakhi (Abandoned Project)	..	..	5,145	4,668	..	9,813
Total Bombay	2,910	1,831	12,78,44,657	5,85,09,868	17,87,112	18,63,54,525

NO. II—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
34,789	38,960	—4,171	..	9,989	..	14,160	22,107
1,50,371	2,10,314	—59,943	..	87,674	..	1,47,617	124,508
1,53,579	1,71,060	—17,481	..	61,018	..	78,499	129,948
45,757	38,198	7,559	0.73	32,398	..	24,839	2,869
9,756	6,806	2,950	1.01	8,135	..	5,185	1,815
1,561	1,932	—371	..	7,915	..	8,286	..
6,571	7,571	—1,000	..	7,787	..	8,787	1,664
43,638	60,452	—16,814	..	69,028	..	85,842	3,920
4,991	4,307	684	0.37	5,269	..	4,585	1,235
..	..	..	..	503	..	503	..
5,21,046	3,47,909	1,73,137	1.68	3,32,348	..	1,59,211	23,996
487	1,279	—792	..	3,570	..	4,362	31
..	..	..	..	1,374	..	1,374	..
45,626	61,161	—15,535	..	3,954	..	19,489	16,957
191	1,975	—1,784	..	3,375	..	5,159	5,723
1,02,009	1,32,292	—30,283	..	48,303	..	78,586	85,802
..	..	..	..	5,259	..	5,259	..
1,29,621	2,51,556	—1,21,935	..	17,50,587	..	18,72,522	16,146
4,75,098	3,07,791	1,67,307	1.11	6,21,040	..	4,53,733	37,030
..	..	..	..	5,863	..	5,863	..
..	..	..	..	170	..	170	..
42,00,801	33,41,074	8,59,727	0.67	49,11,411	1,98,557	42,50,241	1,084,137
					—40,51,684		

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— <i>contd.</i>	Miles	Miles.	Rs.	Rs.	Rs.	Rs.
BENGAL.						
Midnapur Canal	70	255	84,92,053	1,63,99,186	..	2,48,91,239
Total Bengal	70	255	84,92,053	1,63,99,186	..	2,48,91,239
UNITED PROVINCES.						
Betwa Canal	168	667	84,92,418	93,70,791	..	1,78,63,209
Ken Canal	86	249	60,63,146	48,43,489	..	1,09,06,635
Dhasan Canal	87	187	50,82,488	49,15,520	..	99,98,008
Ghagar Canal	67	113	41,56,030	26,78,321	..	68,34,351
Fahuj and Garhman Canals . . . . .	..	65	8,22,186	7,20,932	..	15,43,118
Lakes and Tanks in Jhansi District.	..	57	2,09,828	3,06,164	..	5,15,992
Majhgawan Tank . . . . .	..	32	4,28,230	2,30,402	..	6,58,632
Lakes and Tanks in Hamirpur District.	..	21	1,62,096	1,26,786	..	2,88,882
Tanks in Banda District . . . . .	..	16	5,46,228	3,07,162	..	8,53,380
Seori Lakes . . . . .	..	14	1,86,315	1,55,101	..	3,41,416
Sukhra Canal . . . . .	..	7	2,30,351	1,57,738	..	3,88,089
Ghori Nadi Scheme . . . . .	..	11	4,21,218	4,21,040	..	8,42,258
Kitham Reservoir . . . . .	..	..	2,48,332	1,31,743	..	3,80,075
Barwar Lake and Canal . . . . .	..	22	7,78,639	4,51,050	..	12,29,689
Bela Sagar Lake . . . . .	..	35	5,56,039	70,522	..	6,26,561
Jaiwanti Tank . . . . .	..	18	10,01,927	2,98,897	..	13,00,824
Kamalpur Tank . . . . .	..	6	3,34,641	36,871	..	3,71,512
Raipura Tank . . . . .	..	10	3,85,675	1,09,896	..	4,95,571

NO. II--contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
2,30,927	2,35,740	-4,813	..	2,76,156	..	2,80,969	64,830
2,30,927	2,35,740	-4,813	..	2,76,156	..	2,80,969	64,830
					-2,80,969		
5,26,881	3,22,596	2,04,285	2.41	2,74,392	..	70,107	194,884
2,44,497	2,54,770	-10,273	..	1,95,706	..	2,05,979	119,007
1,07,282	1,57,358	-50,076	..	1,64,359	..	2,14,435	39,680
94,037	1,22,282	-28,245	..	1,48,670	..	1,76,915	23,358
23,611	21,284	2,327	0.28	26,624	..	24,297	7,691
11,724	28,545	-16,821	..	6,871	..	23,692	2,446
13,546	14,115	-569	..	14,808	..	15,377	5,854
7,769	13,458	-5,689	..	8,041	..	13,730	2,925
7,944	8,602	-658	..	20,829	..	21,487	2,718
7,607	10,542	-2,935	..	6,736	..	9,671	2,206
1,787	18,504	-14,717	..	7,860	..	22,577	738
3,575	13,479	-9,904	..	14,049	..	23,953	1,117
1,180	3,102	-1,922	..	12,984	..	14,906	..
2,489	7,878	-5,189	..	35,107	..	40,296	3,343
74	1,892	-1,818	..	26,666	..	28,484	2,904
144	8,894	-8,750	..	53,257	..	62,007	48
41	..	41	0.01	16,128	..	16,087	93
1,629	7,848	-6,219	..	20,147	..	26,366	1,301

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— <i>contd.</i>	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
UNITED PROVINCES— <i>contd.</i>						
Batkbara Tank . . . . .	..	..	3,52,844	1,92,973	..	5,45,817
Aunjbar Tank and Canal . . . . .	..	7	4,57,422	1,12,561	..	5,69,983
Bundelkhand Irrigation Survey	..	..	1,83,361	3,39,403	..	5,22,764
Belan Canal . . . . .	..	..	36,155	24,036	..	60,191
Total United Provinces	408	1,437	3,11,35,569	2,60,01,388	..	5,71,36,957
PUNJAB.						
Indus Inundation Canal	441	269	33,77,007	26,66,890	..	60,43,897
Shahpur Canal	116	117	2,26,175	..	13,86,039	2,26,175
Ghaggar Canal	44	34	3,88,435	6,92,965	..	10,81,400
Muzaffargarh Canal	446	610	19,90,812	..	88,94,485	19,90,812
Total Punjab	1,047	1,030	59,82,429	33,59,855	1,02,80,524	93,42,284
BURMA.						
Nyaungyan Minhla Tank . . . . .	..	35	15,56,344	2,05,265	..	17,61,609
Kyaukse Tank . . . . .	..	8	5,89,222	76,891	..	6,66,113
Salin Canals	34	..	10,76,442	40,086	..	11,16,527
Mandalay Canal	42	126	59,12,185	..	6,36,714	59,12,185
Ye U Canal	64	185	62,56,602	31,29,528	..	93,86,130
Panlaung River Improvement	..	..	12,43,644	2,38,354	..	14,81,998
Total Burma	140	354	1,66,34,439	36,90,123	6,35,714	2,03,24,662

NO. II—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
..	..	..	..	15,704	..	15,704	..
..	..	..	..	23,590	..	23,590	..
..	..	..	..	5,263	..	5,263	..
..	..	..	..	1,108	..	1,108	..
10,55,817	10,12,949	42,868	0.14	10,98,899	..	10,56,031	410,313
						-10,56,031	
5,81,443	8,56,978	-2,75,535	..	1,16,029	..	3,91,564	1,95,803
1,02,533	2,06,817	-1,04,284	..	7,358	..	1,11,642	66,858
9,615	29,374	-19,759	..	12,764	..	32,523	8,043
4,57,561	8,53,812	-3,96,251	..	75,706	..	4,71,957	313,531
11,51,152	19,46,981	-7,95,829	..	2,11,857	..	10,07,686	584,235
						-10,07,686	
50,653	34,233	16,420	1.06	51,233	..	34,813	20,154
19,374	67,937	-48,563	..	19,330	..	67,893	6,311
85,978	79,803	6,175	0.57	43,247	..	37,072	23,178
4,59,289	1,19,217	3,40,072	5.75	1,94,159	1,45,913	..	77,417
2,84,013	2,56,218	27,795	0.44	2,44,212	..	2,16,417	94,685
..	..	..	..	59,856	..	59,856	..
8,99,307	5,57,408	3,41,899	2.05	6,12,037	1,45,913	4,16,051	221,745
						-2,70,138	

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
IRRIGATION WORKS—						
<i>—contd.</i>						
BIHAR AND ORISSA.						
Son Project	358	1,236	2,68,41,621	1,26,30,358	..	3,94,71,979
Orissa Project	327	1,299	2,71,87,299	5,43,12,935	..	8,15,00,234
Dhaka Canal	19	33	6,05,467	3,62,785	..	9,68,252
Tribeni Canal	61	185	81,39,469	58,71,013	..	1,40,10,482
Ghorakatora Reservoir . . . . .	..	..	469	232	..	701
Total Bihar and Orissa	765	2,763	6,27,74,325	7,31,77,323	..	13,59,51,648
CENTRAL PROVINCES.						
Khapri-Aranda . . . . .	..	28	3,68,987	72,368	..	4,41,355
Marowda . . . . .	..	24	3,95,073	2,66,722	..	6,61,795
Pindraon . . . . .	..	19	2,33,261	1,15,395	..	3,48,656
Rumal . . . . .	..	19	3,15,559	2,35,648	..	5,51,207
Ramtek Reservoir . . . . .	..	209	29,25,967	19,18,835	..	48,44,802
Khairbunda . . . . .	..	59	8,00,400	6,53,680	..	14,54,080
Chandpur . . . . .	..	74	6,92,116	3,47,023	..	10,39,139
Asola-Mendha . . . . .	..	142	18,32,151	11,38,789	..	29,70,940
Niwar-Tar Ametha Reservoir . . . . .	..	19	3,82,688	1,79,165	..	5,61,851
Barera Kalan with Mohari Feeder . . . . .	..	21	2,30,365	1,11,507	..	3,41,872
Jamunia . . . . .	..	38	5,49,600	2,55,668	..	8,05,268
Kattangheri . . . . .	..	16	2,03,875	1,24,944	..	3,28,819
Ghorajheri . . . . .	..	89	11,57,815	7,26,109	..	18,83,924
Tundula Canal	69	513	1,13,10,027	58,54,131	..	1,71,64,158

NO. II--contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
26,69,004	11,63,872	15,05,132	5.60	8,60,837	6,44,295	..	548,916
8,66,887	7,33,675	1,33,212	0.49	8,86,738	..	7,53,526	234,856
54,824	29,239	25,585	4.22	20,214	5,371	..	16,225
2,69,600	2,66,637	2,963	0.03	2,78,079	..	2,75,116	83,328
..	..	..	..	29	..	29	..
38,60,315	21,93,423	16,66,892	2.65	20,45,897	6,49,666	10,28,671	883,325
					-3,79,005		
28,378	8,393	19,985	5.42	11,617	8,368	..	7,393
11,065	3,729	7,336	1.86	12,504	..	5,168	2,837
12,260	5,518	6,742	2.89	8,373	..	1,631	3,814
7,092	5,837	1,255	0.40	10,380	..	9,125	2,467
33,541	41,178	-7,637	..	92,894	..	1,00,531	7,640
14,617	29,836	-15,219	..	25,833	..	41,052	3,774
12,227	24,027	-11,800	..	22,420	..	34,220	6,085
63,571	42,281	21,290	1.16	61,441	..	40,151	14,668
1,431	6,898	-5,467	..	12,690	..	18,157	668
7,001	9,196	-2,195	..	7,983	..	10,178	2,353
7,676	9,828	-2,152	..	18,965	..	21,117	1,755
2,284	6,507	-3,223	..	6,830	..	10,053	488
81,784	29,728	2,056	0.17	42,032	..	39,976	6,433
2,20,685	2,08,560	12,125	0.11	4,38,734	..	4,26,609	94,425

STATEMENT

General Financial results to end of 1929-30.						
Name of works.	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— <i>contd.</i>	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
CENTRAL PROVINCES—contd.						
Naleshwar . . . . .	..	39	7,15,586	4,61,586	..	11,77,171
Chorkhamara . . . . .	..	67	9,97,356	5,15,359	..	15,12,715
Bodalkassa . . . . .	..	56	6,90,708	3,48,515	..	10,39,223
Borina Nala . . . . .	..	8	6,72,824	3,11,030	..	9,83,854
Wainganga Canal	27	263	53,57,527	23,74,796	..	77,32,323
Mahanadi Canal	193	711	1,59,42,392	95,29,393	..	2,54,71,785
Pariat . . . . .	..	28	19,09,927	8,57,878	..	27,67,805
Jagwa . . . . .	..	10	4,02,559	1,59,733	..	5,62,292
Kusserla . . . . .	..	10	3,90,144	1,45,334	..	5,35,478
Kumhari . . . . .	..	22	6,74,007	2,76,928	..	9,50,935
Chandia Nala . . . . .	..	12	6,09,106	1,95,274	..	8,04,380
Amari . . . . .	..	10	4,99,784	2,04,506	..	7,04,290
Bori . . . . .	..	23	10,61,860	2,97,410	..	13,59,270
Baharibund . . . . .	..	25	13,21,541	4,51,387	..	17,72,928
Mala . . . . .	..	13	7,22,199	3,31,623	..	10,53,822
Surkhi Pondi . . . . .	..	..	1,66,115	72,445	..	2,38,560
Simrar Nala . . . . .	..	..	1,89,840	78,349	..	2,68,189
Kharung	R.B.C. 18 L.B.C. 40	43 90	52,09,909	12,76,233	..	64,86,142
Managarh . . . . .	..	..	508	225	..	733
Maniari . . . . .	..	..	47,32,957	6,28,663	..	53,61,620
Katni River . . . . .	..	..	4,74,462	94,678	..	5,69,140
Suspense . . . . .	..	..	1,39,014	..	..	1,39,014
Total Central Provinces	347	2,690	6,42,78,207	3,06,11,328	..	9,48,89,535

NO. II—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
11,071	19,324	-8,253	..	29,401	..	34,654	2,408
15,219	27,854	-12,635	..	41,739	..	54,374	4,913
7,870	29,040	-21,170	..	27,638	..	48,308	2,479
2,153	5,257	-3,104	..	29,421	..	32,525	739
1,11,013	1,43,342	-32,329	..	2,02,941	..	2,35,270	22,666
2,39,370	4,50,831	-2,11,261	..	6,87,857	..	8,99,118	107,301
9,254	14,422	-5,168	..	94,075	..	99,243	2,277
1,740	4,862	-3,122	..	20,133	..	23,255	1,205
1,263	4,274	-3,011	..	19,265	..	22,276	510
13,995	5,403	8,592	1.27	33,262	..	24,670	4,582
2,285	2,802	-517	..	30,332	..	30,849	1,152
976	6,962	-5,986	..	24,959	..	30,945	932
877	10,183	-9,306	..	53,307	..	62,613	5,274
3,724	19,966	-16,242	..	66,509	..	82,751	4,279
4,753	4,396	357	0.05	35,969	..	35,612	2,367
451	..	451	0.27	8,390	..	7,939	..
98	15	83	0.05	9,571	..	9,488	..
6,758	16,468	-9,730	..	2,46,447	..	2,56,177	14,769
..	..	..	..	25	..	25	..
..	..	..	..	2,17,594	..	2,17,594	..
..	..	..	..	23,425	..	23,425	..
..	..	..	..	8,532	..	8,532	..
8,66,482	11,95,737	-3,09,255	..	26,80,488	8,368	29,98,111	332,663
						-29,69,743	

STATEMENT

General Financial results to end of 1929-30.						
Name of works.	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-at-charge (column 7 + column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
IRRIGATION WORKS— concl'd.	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
NORTH-WEST FRONTIER PROVINCE.						
Upper Swat River Canal	138	403	2,10,65,185	1,06,49,666	..	3,17,14,851
Faharpur Canal . . . . .	..	..	9,20,749	11,61,064	..	20,81,813
Total North-West Frontier Province.	138	403	2,19,85,934	1,18,10,730	..	3,37,96,664
RAJPUTANA.						
Tanks in Ajmer Sub-Collectorate.	..	..	18,61,805	19,19,630	..	37,81,435
Tanks in Beawar Sub-Collectorate.	..	..	11,94,229	8,62,730	..	20,56,959
Tanks in Todgarh Sub-Collectorate.	..	..	4,78,789	2,61,443	..	7,40,232
Total Rajputans . . . . .	..	..	35,34,823	30,43,803	..	65,78,626
BALUCHISTAN.						
Shebo Canals	5	19	8,32,268	2,19,289	..	10,51,557
Khushdil Khan Canals	2	40	19,29,462	..	80,387	19,29,462
Nari Weir	3	12	6,41,317	1,45,101	..	7,86,418
Total Baluchistan	10	71	34,03,037	3,64,390	80,387	37,67,427
TOTAL UNPRODUCTIVE IRRIGATION WORKS.	6,552	11,489	38,62,52,498	27,46,64,223	1,27,63,737	66,09,16,721
NAVIGATION, EMBANKMENT AND DRAINAGE WORKS.						
MADRAS.						
Ganjam Copsalpur Canal . . . . .	..	..	1,55,493	2,17,246	..	3,72,739
Vedaranniyam Canal	35	..	1,36,432	5,83,708	..	7,20,140
Buckingham Canal	262	..	90,63,663	1,90,30,938	..	2,80,94,591
Total Madras	297	..	93,55,578	1,98,31,892	..	2,91,87,470

NO. II—contd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Ra.	Ra.	Ra.	Per cent.	Ra.	Ra.	Ra.	Aores.
9,21,487	6,28,201	2,93,286	1.39	7,14,044	..	4,20,758	209,009
..	..	..	..	30,108	..	30,108	..
9,21,487	6,28,201	2,93,286	1.33	7,44,152	..	4,50,866	209,009
					-4,50,866		
46,696	52,886	-6,189	..	59,598	..	65,787	} 31,813
46,248	27,840	18,408	1.54	39,302	..	20,964	
25,350	14,263	11,087	2.32	15,188	..	4,101	
1,18,294	94,988	23,306	0.66	1,14,148	..	90,842	31,813
					-90,842		
324	6,033	-5,709	..	27,602	..	33,311	..
31,069	17,793	13,276	0.69	66,551	..	53,276	2,231
23,697	10,304	13,393	2.09	28,990	..	15,697	19,489
55,090	34,130	20,960	0.62	1,23,143	..	1,02,183	21,720
					-1,02,183		
1,41,66,767	1,16,76,250	25,10,507	0.65	1,41,55,383	10,16,434	1,26,61,310	4,018,395
					-1,16,44,876		
6,106	337	5,769	3.71	4,758	1,011	..	..
1,093	7,551	-6,458	..	4,412	..	10,870	..
88,089	3,28,090	-2,40,001	..	2,86,233	..	5,26,234	..
95,288	3,35,978	-2,40,690	..	2,95,403	1,011	5,37,104	..
					-5,36,093		

STATEMENT

Name of works.	General Financial results to end of 1929-30.					
	Mileage in operation.		Total Capital outlay (direct and indirect).	Accumulated arrears of interest.	Accumulated surplus revenue.	Total sum-at-charge (column 7+column 8).
	Main canals and branches.	Distributaries.				
1	2	3	4	5	6	7
NAVIGATION, EMBANKMENT AND DRAINAGE WORKS—concl. BENGAL.	Miles.	Miles.	Rs.	Rs.	Rs.	Rs.
Hijli Tidal Canal . .	50	..	26,14,318	43,32,594	..	69,46,912
Cal. and East Canal . .	834	..	69,86,458	..	1,19,96,305	69,86,458
Sunderban Steamer Route .	350	..	18,32,803	32,29,224	..	50,62,027
Madaripur Bheel Route . .	38	..	82,76,705	12,96,959	..	95,73,664
Purchase of Dredger . .	..	..	61,67,081	32,96,104	..	94,63,275
Dredging Bidyadhari . .	..	..	11,13,648	3,51,119	..	14,64,767
Dredger "Ronaldsbay" . .	..	..	54,63,931	28,12,193	..	82,76,124
Total Bengal . .	1,272	..	3,24,54,944	1,53,18,283	1,19,96,305	4,77,73,227
BURMA.						
Pegu-Sittang Canal . .	38	..	75,52,776	7,53,778	..	83,06,554
Paghine Embankment . .	..	..	8,122	..	5,99,501	8,122
Pegu River Embankment	..	..	82,806	..	9,958	82,806
Zwebat Moyingyi Embankment	..	..	3,36,055	48,408	..	3,84,463
Sittang Embankment . .	..	..	10,68,822	2,09,866	..	12,78,688
Yandoon Island Embankment	..	..	13,62,490	3,88,153	..	17,50,643
River Training Works in the Pyuntaza Plain.	..	..	19,64,254	3,24,847	..	22,89,101
Mokkamu Drainage Scheme .	..	..	1,91,555	11,197	..	2,02,752
Diversion of the Delanan and Pagsing Choungs.	..	..	1,84,842	21,054	..	2,05,896
Total Burma . .	38	..	1,27,51,722	17,57,303	6,09,459	1,45,09,025
Total Unproductive Navigation, Embankment and Drainage Works.	1,607	..	5,45,62,244	3,60,07,478	1,26,05,764	9,14,69,722
Grand Total Unproductive Works.	8,159	11,489	44,08,14,742	31,15,71,701	2,53,69,501	75,23,86,443

NO. II—concl'd.

Financial results of the year 1929-30.							
Gross receipts (direct and indirect).	Working expenses (direct and indirect).	Net Revenue.	Percentage on capital outlay, column 7.	Interest.	Net profit.	Net loss.	Area irrigated.
8	9	10	11	12	13	14	15
Rs.	Rs.	Rs.	Per cent.	Rs.	Rs.	Rs.	Acres.
87,668	1,04,286	-36,618	..	84,820	..	1,21,438	..
4,47,400	6,31,408	-1,84,008	..	2,08,907	..	3,92,915	..
64,750	1,01,868	-37,118	..	65,239	..	1,02,357	..
3,41,220	5,37,192	-1,95,972	..	3,67,894	..	5,63,866	..
..	53,754	-53,754	..	3,49,793	..	4,03,547	..
..	..	..	..	63,151	..	63,151	..
..	71,357	-71,357	..	3,12,419	..	3,83,776	..
9,21,038	14,99,865	-5,78,827	..	14,52,223	..	20,31,050	..
						-20,31,050	
2,71,985	1,68,173	1,03,812	1.37	2,89,279	..	1,85,467	47,124
1,75,988	23,099	1,52,889	..	289	1,52,800	..	96,912
11,766	4,665	7,101	8.58	3,675	3,426	..	7,126
18,212	75,864	-57,652	..	12,433	..	70,085	1,145
82,969	1,44,103	-61,134	..	39,402	..	1,00,536	59,220
87,261	1,59,900	-72,729	..	64,386	..	1,37,115	69,280
1,37,993	3,21,586	-1,83,593	..	93,797	..	2,77,390	62,170
..	..	..	..	7,935	..	7,935	..
..	..	..	..	12,771	..	12,771	..
7,86,174	8,97,480	-1,11,306	..	5,23,967	1,56,026	7,91,299	342,977
13,02,500	27,33,323	-9,30,823	..	22,71,593	-6,35,273 1,57,037	33,59,453	342,977
					-32,02,416		
1,59,89,257	1,44,09,573	15,79,684	0.35	1,64,26,976	11,73,471	1,60,20,763	4,361,372
						-1,48,47,292	