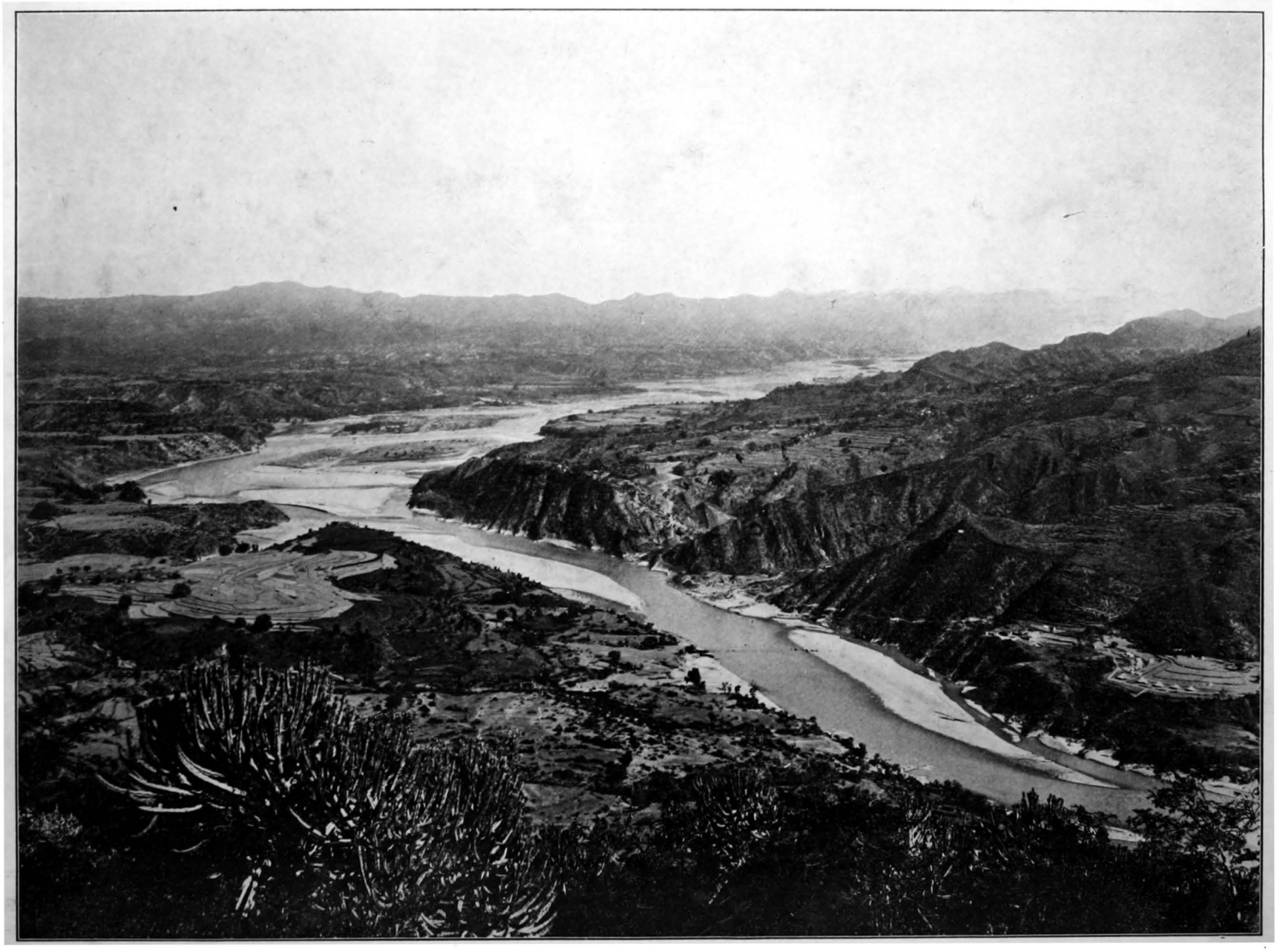

FRONTISPIECE.

PLATE I.

HYDRO-ELECTRIC SURVEY OF INDIA

VOLUME III

TRIENNIAL REPORT

WITH A

Preliminary Forecast of the Water Power Resources of India

1919 to 1921

BY

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INTRODUCTION.

The Report.—This First Triennial Report of the Hydro-Electric Survey of India contains a considerable amount of technical matter which appeared in the Preliminary and Second Reports; the former is now out of date while the latter was of the nature of an *interim* report only. The present volume contains information and directions which will enable the civil and electrical engineers engaged on the practical work of the Survey to size up the potentialities of any possible source of power under investigation. If the explanations in Part I of this Report appear somewhat elementary it must be remembered that the officers in charge of the Survey in the Provinces have had, for the most part, no previous experience of the specialized problem of water-power; and, dealing with immense areas, their subordinate staffs have necessarily had to work largely on their own initiative, with no text books other than the earlier reports. Applications for copies of these reports continue to come in from all parts of the world. The first direct result was seen during the cold weather of 1920-21, when technical representatives of a number of large firms interested in plant for hydro-electric developments visited India to see for themselves what the prospects are and what are the special conditions to be met with on projects which have already been investigated.

An explanation of the change of size and make-up of this Report is obviously called for. The Preliminary Report was issued in foolscap, and the Compiler was told that the public would not read blue books; though in point of fact several thousand copies were actually distributed. The Second Report was consequently printed in quarto, in the style of the reprints of several Government Committees' and Commissions' Reports; this size however does not lend itself to the insertion of maps and diagrams, which when placed in a pocket are often left there. Now that a substantial amount of work has been done, and the speculative "sites" of the earlier reports have in many cases either been written off as useless or found to be of value, an intermediate size of page has been definitely adopted. The earlier reports also cease to be of value, as the present one contains what is still useful from them, so that it is not necessary to bind them together with this volume. The current Report of the Inspector-General of Irrigation is being issued in a similar size, and the two subjects will some day be more intimately connected than they are now.

The list of sites in Part II of the Report is set up in alphabetical order as far as possible, as shown by the full list of contents, but a complete index is also given.

The Survey, Provincial.—As a consequence of the "Reforms" the Government of India decided, in October 1920, that "all outlay on water storage and water power will be Provincial charge, and the necessary provision for hydro-electric surveys should therefore be made in the Provincial estimates from and after the year 1921-22." Consequently the funds required for carrying on the Survey from the 1st April, 1921, have been voted upon in the various Legislative Councils, and in a good many instances reductions were moved. As matters now stand the Survey is in danger of falling between the upper and the nether millstone, as the Government of India is no longer able to provide funds for the continuance of the work. Nevertheless, the slender thread that binds the Chief Engineer to his colleagues in the Provinces has proved to be of good material; and to one and all of those colleagues and their assistants he tenders his heartfelt thanks for their cordial co-operation. It cannot be too plainly urged that the completion of the survey is of the utmost importance to the industrial future of India; and that it will be carried out more efficiently if the work is done quickly and with as few changes in personnel as possible. The subjects of Water Storage, Water-power and Electricity are "Reserved." In technical matters the officers in charge in the Provinces are free, as heretofore, to consult the Chief Engineer on technical questions either by correspondence or when the latter officer is on tour; but they remain under the direction and orders of their own Chief Engineers. In the detailed sections of Part II of this Report the facts stated are taken, in most cases, directly from Provincial reconnaissance and Survey reports; the comments and (in some cases) estimates of power have been added by the present writer.

Personnel.—Mr. F. E. Bull, Chief Engineer, left India preparatory to retirement in March 1921 and was succeeded by Mr. J. W. Meares, Electrical Adviser to the Government of India, who for the second time took over the direction of the Survey in that capacity. During his absence on leave Mr. Meares spent a short time in Sweden and Norway and submitted a separate inspection note regarding the hydro-electric works visited, which has been circulated to all officers concerned.

In Assam, Mr. B. A. Blenkinsop has continued in charge, except for a short part of the summer of 1920 spent on leave in Europe. The survey is proceeding.

In Bengal, no one has hitherto been appointed to the Survey, and no progress has therefore been made; but steps are now being taken to rectify this omission.

In Bihar and Orissa, Mr. Stevens took furlough in 1920 preparatory to retirement and hitherto no whole-time officer has been appointed to take his place; the current duties have however been carried on by Mr. H. Wardle, Superintending Engineer. It is hoped that an Executive Engineer will be appointed during the current cold weather.

In Bombay, Mr. P. L. Bowers, C.I.E., M.C., has remained in charge, except for short leave during the summer of 1920. Three additional officers were selected in England to assist Mr. Bowers, of whom two took over their duties during the cold weather of 1920-21. Meantime, by Public Works Department Order No. C. W.-12193, dated 8th August, 1921, the Government of Bombay has decided that the Survey shall cease forthwith. A separate Report on the work done is being published by the Government of Bombay, and certain rain and river gaugings are to be continued.

In Burma, Mr. H. Nimmo officiated for Mr. B. Raikes during the leave of the latter in 1920. Mr. Raikes took over charge again in the cold weather of 1920-21. Two additional officers were selected in England to assist Mr. Raikes, and they have taken up their duties.

In the Central Provinces, there has been no progress in the survey, the whole staff having reverted to Irrigation owing to famine demands. The present report deals fully with the admirable work carried out by Mr. Powys Davies and his successor Mr. N. C. Bhattacharji during their one working season.

In Madras, Mr. R. T. Sneyd, M.C., officer in charge, retired from Government service during the year; he was succeeded by Mr. J. Tate, Executive Engineer, and the survey is proceeding.

Colonel B. C. Battye, R.E., D.S.O., completed his detailed survey of the Sutlej River Hydro-Electric project and its subsidiaries during 1921, and submitted his Report to the Punjab Government. Except for this project no officer has been appointed in the Province, the enormous potentialities of which are practically unknown. Steps are being taken to start a general reconnaissance this year, if an officer can be spared.

In the United Provinces, Mr. T. M. Lyle continued in charge until he proceeded on leave in May 1921, when Rai Sahib Shanker Das, Assistant Engineer, took over charge from him.

Empire water-power resources.—The final report of the Water Power Committee of the Conjoint Board of Scientific Societies has now been issued. The Report states that while "more or less adequate steps are being taken by various Governments ....., taking the Empire as a whole, no attempt is being made to ascertain the total resources, to secure any uniformity in methods of investigation and recording of data, to encourage such investigations as are being made or to collect information at a central bureau." The following table from the Report shows how matters stand:—

	Hydraulic horse-power.		Per cent. of available now developed.
	Available.	Developed.	
Europe	47,300,000	8,450, 00	18·0
North America (including Canada)	50,800,000	8,805,000	17·3
British Empire (except Canada)	41,200,000	695,000	1·7

From pages 54, 55 of the present Report it will be seen that the probable water power of India for "maximum development" is some 12,680,000 kilowatts, equal to 21½ million water horse power, of which only 1¼ per cent. is developed or in course of development. The proposed "Imperial Water-Power Board" is therefore much needed. Tables 4 and 5 on pages 36, 37 will also repay perusal in comparing India with the rest of the British Empire.

SIMLA, J. W. MEARES.
22nd November, 1921.

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The more important entries are printed in small CAPITALS.

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C—*concld.*

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