The Lochaber Water Power Scheme

AN article on "The Lochaber Hydro-Electric Power Undertaking", in *NATURE* of November 29, 1930 (126, 848-849), described the first and main portion of an engineering scheme of considerable magnitude by which water from a catchment area of 303 square miles in Inverness-shire is being collected and led to a power station at Fort William, near the foot of Ben Nevis, which will have an ultimate capacity of 120,000 horse-power—by far the largest installation of its kind in Great Britain. The first instalment of the undertaking, costing about three million sterling, utilized the natural reservoir in Loch Treig by means of a tunnel pipe line to Fort William, and was completed in 1930. The second in the sequence of three stages of development was commenced shortly thereafter and completed in 1934, at a cost of another million. It forms the subject of a paper read on December 15 before the Institution of Civil Engineers by Mr. A. H. Naylor, who was chief assistant engineer to Mr. B. N. Peach, the resident engineer for the undertaking under Messrs. C. S. Meik and Halcrow of Westminster, the consulting engineers responsible for the design and supervision of the works from their inception. The following information of interest is extracted from Mr. Naylor's paper. Reference should be made to the map of the district which appeared in the issue of *NATURE* mentioned above.

The second stage comprises essentially the collection of the discharges from the Loch Laggan and Loch Ossian catchment areas into a reservoir formed by the construction of a dam at the western end of the former and the diversion of the impounded water through a tunnel to Loch Treig, with the provision of further storage through the construction of a dam at the northern end of Loch Treig. Loch Treig is the

main storage reservoir of the system, and the construction of the dam raises the overflow level from the original height of +784 ft. o.d. to +819 ft. o.d., a capacity of 7,838 million cub. ft. being obtained above the lowest level (+695 ft. o.d.) to which it can be drawn down. By arranging that the Loch Laggan reservoir should be capable of being drawn down to +804 ft. o.d. and should spill at +820 ft. o.d., a further storage capacity of 1,480 million cub. ft. is rendered available. The tunnel connecting the two lochs, constructed almost entirely through rock of good quality, has a fall of 15 ft. in its length of 2½ miles. The cross sectional outline is made up of circular segments, giving a width inside the concrete lining of 14½ ft. and a height of 13½ ft. Three streams passing over the tunnel are diverted into shafts leading into the tunnel.

The Laggan dam is noteworthy as representing the first instance in Great Britain of the embodiment of a large siphon spillway in the design. Six siphon units are installed having shaft diameters of 4 ft. 6 in., fitted with jet dispersers at their outer extremities, the intakes being 3 ft. high by 6 ft. 10 in. wide. By inclining the outlets at 30° above the horizontal, it is calculated that the issuing jet will strike the river bed at about a maximum distance from the toe of the dam and reduce to a minimum the danger to the dam from vibration or undermining.

For the third and final stage of development it is contemplated to divert the waters of the upper Spey westward into the River Pattack which flows into Loch Laggan, so that, whereas originally the River Spean flowed into the River Spey to discharge into the North Sea, under the projected scheme, the Spey will flow into the Spean and discharge into the Atlantic Ocean.

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Forestry Research in the Malay Peninsula

THE annual report for 1935 of the Forest Research Institute of the Malay Forest Department has been recently issued, as also the Programme of Research for 1936 (Kuala Lumpur: Forest Department, 1936). Owing to financial difficulties, these reports are reproduced from typescript.

The Institute has been under Mr. J. G. Watson and Mr. E. J. Strugnell during the year. The cost of maintenance is a charge on the budget of the Forest Department, and this in recent years of financial depression has necessitated considerable economies. It is said that the funds available for apparatus and travelling have been limited, and it has been impossible to provide technical subordinates, to whom a great deal of the routine which has fallen on the shoulders of the senior staff could have been entrusted.

The curtailment of research work has been taking place in many parts of the British Empire; but it is a short-sighted policy where existing unworked and only partially known tropical and subtropical forests

are concerned, which represent a part of the capital assets of the country containing them. It is this want of recognition that the large forest tracts in so many of the Dependencies and Colonies of the British Empire represent an undeveloped capital of considerable potential value upon which funds must be put out if it is to be developed (as in the case of the primary development of a gold or other mines) which is delaying progress; whilst in many cases the forest capital is deteriorating in value under the current and injurious practices of the users.

The report deals with the work of the various branches of the Institute—silviculture, botany, wood technology, timber mechanics, seasoning and wood working, timber preservation and durability, and the investigations carried out in the chemical and entomological branches. A brief description of the education work carried out at the Forest School is appended to the report.

The work described for the year indicates the wide field which is now being covered by the research