

## Impounding Six Billion Gallons of Water for Manila

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 New Water Supply System 100,000,000 Gallons Daily



**John Gordon**  
 of Gordon & Haley Building  
 Impounding Dam at Novaliches

Manila now has a maximum daily water supply of 22 million gallons, and needs more than twice that volume, as has been the case for many years. The Metropolitan Water District is therefore building a new water system, with the proceeds of P12,000,000 of bonds sold in the United States.

It was ten years ago that the manager of the water district, A. Gideon, then city engineer—for the publicly owned corporation had not then been organized—cited the growing scarcity of water and urged the building of a new and adequate system. When the weather was dry some attention was given his counsel; then it would rain and the mains would run full, and the city fathers would postpone action, though, in their favorite way, accepting the project in principle.

For this reason and some others, Manila suffered a water famine during the dry season broken only late in May. It will however not be long before permanent relief is provided by completion of projects in the new system now under construction. The Montalban system, the one supplying

### THE MAN RESPONSIBLE

*A. Gideon, manager of the Metropolitan Water District, who left Manila June 2 and may not return at the end of his leave, is the man to whom the new water system must be credited—whom Manila owes a lasting debt.*

*Gideon is a Cornell man, class '95. He came to Manila in 1904, 23 years ago, to a position in the bureau of public works, having previously been chief engineer of the Havana (Cuba) Sewerage System. In Manila he was given charge of administration of water service and sewers. In 1912 he became chief engineer of the Department of Sewer and Waterworks Construction, to which position that of City Engineer was added in 1916. When the Metropolitan Water District was organized, July, 1919, he went to the post as manager, which he still holds.*

the city and district at present, furnishes a maximum of 22 million gallons per day; the new system will provide 80 millions more, making 100 million gallons altogether and relieving all anxiety as to an adequate supply of water for at least fifty years. Gordon and Haley are now building the big

impounding dam on the Novaliches river. The cost is in the neighborhood of P1,300,000 and the job is to be finished, it is contemplated, before the next dry season becomes severe. This dam will be connected with the Montalban pipeline and even prior to the drawing of water from the Angat river it will afford a considerable extra supply of water.

The Novaliches dam will impound six billion gallons of water when finally connected with the Angat conduit. It will stretch across the Novaliches gulch as shown in one of the illustrations. The first step required was the construction of a triple-barrel aqueduct to take care of the river flow while the dam is under construction. This, as is seen in the pictures, is nearly completed, and the concrete wall to prevent seepage is also well along. The dam itself will be of mixed clay and endorated material found adjacent to the site of the dam. A half million cubic meters of this material must be placed, after the present soil has been removed.

Units of principal importance in the new water system, known as the Angat system, are:

A gravity spillway dam on the Angat river below the mouth of the Ipo, emptying into the Angat. This dam will be 50 feet high and 500 long; it will require 40,000 cubic yards of masonry and is estimated to cost P1,200,000.

An aqueduct-tunnel from the mouth of the Ipo to the San Juan reservoir. Four kilometers of the conduit and two kilometers of the tunnel comprising portions of this aqueduct are being constructed by J. B. Findley, the contract involving about P1,000,000. The aqueduct will be 31 kilometers long when completed. Its height, inside, will be five feet, and width five feet. The cost is estimated at P4,000,000.

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Settling basins and sand filters capable of treating 50,000,000 gallons of water per day must be provided. These auxiliaries are expected to cost about P2,500,000.

Enlargement of the San Juan reservoir will cost some P500,000. Extension of the distributing system in Manila will cost P1,000,000, with a similar cost for extension and improvement of the sewer system.

yet a large portion of the Manila press was never happier than when disparaging his efforts—chiefly, perhaps, because he insisted that the city pay the water district the charges due for water furnished.

He probably saved the public another huge sum by rejecting the hydroelectric project coupled with the original plans. He believed this would be a failure, involving

"What we do require is a fairly large river with a minimum flow of more than 50 million gallons per day—located as near Manila as possible and with little or no population on the watershed. The river bed must be of sufficient elevation so that we can cheaply construct a gravity aqueduct system with settling basins and sand filters, and still maintain the same water pressure as we now have in the city. The Angat river comes nearest to fulfilling all these desired requirements, and we have found, after a careful comparative study of every other available source, that it offers the only solution to our problem."

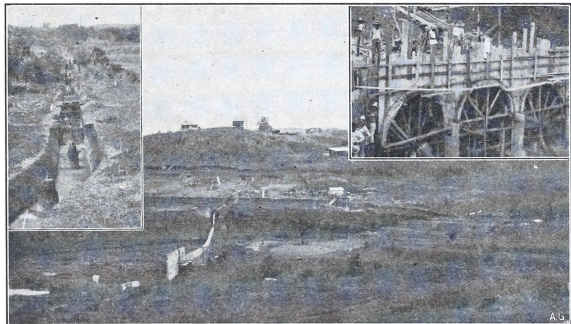
The Pagsanjan river was rejected because of its distance from Manila.

The authorized bonds are only disposed of as money becomes necessary for the purchase of materials or payment for work. The original indebtedness for the Montalban project was P8,000,000; the Angat project adds not more than P12,000,000; highest, around P18,000,000, and by 1950 it will be down again to P10,000,000. The net profits of the water district, unless lowered under new management, are sufficient to take care of all charges of operation and maintenance, interest and sinking fund.

Even with the Angat system operating it will still be necessary to maintain the Montalban system, the godsend to Manila built under the administration of Colonel J. F. Case, back in 1903, because the Marikina valley towns are in the water district and entitled to the water service.

But the Montalban reservoir leaks, leaks like a sieve; the expectations that the crevices and faults in the limestone would silt in, the silt forming a sort of cement, were not fulfilled, so that the minimum flow is many millions of gallons daily below the estimates of the engineers. (Andostie is the formation at the projected Angat dam, and less leakage is anticipated.)

Of the Montalban system Gideon says: "The whole system was proportioned for a maximum draft of 20,500,000 gallons per day. Provided the storage had been what it was originally intended to be and no leakage occurred at the dam, and the minimum stream flow had been 11,000,000 gallons per day, barring accidents the system would probably have been sufficient till the end of 1921. . . . The engineers made a remarkably good estimate of future consumption. They would not have been justified in providing for much more than



Views of the New Waterworks Showing Concrete Curtain Across Base of Impounding Dam, Rowaliches River: Left Inset, View of Tunnel Near Impounding Dam; Right Inset, Head of Triple-Barrel Aqueduct for River Flow While Dam is Under Construction.

River control, supervision, etc., and the building of 31 kilometers of highway along the aqueduct, will absorb another P800,000.

The project was authorized by the Legislature under Act 2852, carrying a provision for bonds in the sum of P12,000,000. But it was the opinion in the United States that these bonds would be taxable; they therefore would have carried an interest rate of perhaps seven per cent. There was further delay until amendments could be made. The bonds bear interest at five per cent, and sold at the rate of 4.72 per cent. They mature in 30 years. By effecting the changes alluded to, Gideon saved the public of the water district some P8,000,000 in interest charges alone. He devoted himself tirelessly to every phase of the project,

an annual deficit on operations and maintenance of about P350,000. Another scheme was to supply Manila with water from artesian wells. He exploded it.

"If each well flowed 70,000 gallons daily," he said, "then 800 wells would be required to supply 56,000,000 gallons of water. The cost would be P6,000 per well, or P4,800,000, besides maintenance and operation costs. The wells are not properly speaking artesian wells at all; they do not flow, but require pumps. The proposition is so full of risks that no reputable engineer would dare risk the possible waste of public money that it involves.

four times the then daily consumption of water in a period of twenty years.

"The watershed of the Angat river is located due north and adjacent to the Mariquina watershed. It occupies practically the whole of the eastern side of Bulacan province, adjacent to Tayabas. At Pared (the town near the projected dam) it covers an estimated area of 280 square miles, 173,200 acres, or about 2.6 times the area of the Mariquina watershed at Montalban dam. It is of a rugged nature, similar to the Mariquina watershed, has no lakes, ponds or swamps or large areas of level land. . . The dam at Pared is to be located in a deep gorge with sharply rising walls, and is more or less favorable for the location of a high dam. The gorge is quite narrow at this place, which means a very much shorter dam and consequently less masonry than would be needed for a dam of similar height elsewhere: on the Angat river."

But think of a city of Manila's population using 50 million gallons of water a day! It actually would do so, if the water could be supplied; and it does use 25 million gallons, with all services metered and wastage estimated lower than in American cities, not more than 25 per cent. In 1933 there were 3,000 services; in 1918, 8,000, and now there are 20,000. In accordance with the Carriedo will, water is furnished free to the poor. To Santa Clara convent and the Franciscans. The city is charged for its water, and on these grounds it is a customer of the water district, and the water system is maintained by the charges for the service, not by taxation.

The insular auditor, Ben F. Wright, has endeavored to get the city's debt to the water district paid, and thereby thrown a pretty case into the United States supreme court; so that as yet the sum due from the city remains a bill receivable, of doubtful worth.

When the water district took over administration of the water system from the city, in 1919, there was an annual deficit. Collections in 1918 were P625,000, expenditures P875,000, the deficit P250,000. (The interest on the P8,000,000 bonds annually is P320,000, at four per cent, and the sinking fund P155,000. An operating charge of P400,000 makes up the remainder of the 1918 expenses). If the city pays its \$200,000 for last year, the collections will be P1,180,000; deducting the city's bill, however, the collections were actually P1,280,000. Interest on the old bonds was P320,000, and on the new P125,000. The sinking fund was P156,000, and operations expense P399,000. This rounds out an expense of P1,000,000, to use approximations, and leaves a net profit to the water district of P280,000, or P180,000 if the city pays.

"We can install the new system, assuring Manila abundance of pure water for fifty years, without increasing the rates," is Gideon's parting assurance, as he leaves Manila the community where he rendered 23 years of work of the stamp generally commended by men able to weigh its worth.

### ZAMBOANGA DROUTH COSTLY

From the Mindanao Herald:

Yesterday morning, May 7, the people of this community were filled with unadulterated joy when the clouds suddenly opened and poured forth a deluge of rain upon a parched and withering land. This was the first rainfall recorded in Zamboanga in 120 days.

The extent of the damage to agriculture would be hard to determine. The coconut trees, which are the main source of the province's wealth, have suffered enormously. It requires about one year for a coconut to mature, from flower to ripe nut, and as a large percentage of the flowers and small nuts have fallen from the trees, the

effect of this drought will be felt for months to come. A 50% shortage in copra production during 1926 would be a very conservative estimate.

This has been the first severe drought suffered in Zamboanga since 1912. We are fortunate that they do not come oftener, and it is probable that this region suffers less through drought than any other part of the Philippines.

It is possible we were becoming entirely too self-sufficient and an all-wise Providence caused this visitation to teach us to be more humble and not so inclined to crow over our superior advantages.

Anyhow, the rains have come in time for our rice and corn crops; the coconuts, hemp and rubber will be revived by the refreshing showers, and next year we will probably be even more cocky than ever before.



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