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162

ANCIENT IRRIGATION WORKS IN CEYLON

PART I.

BY

R. L. BROHIER,
Superintendent of Surveys.

Written on the Orders of

THE HONOURABLE Mr. D. S. SENANAYAKE,
Minister of Agriculture and Lands,

AND

Under the Direction of

G. K. THORNHILL, Esq.,
Surveyor-General.

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PRINTED AT THE CEYLON GOVERNMENT PRESS, COLOMBO.
To be purchased at the GOVERNMENT RECORD OFFICE, COLOMBO ; *price Rs. 3.*

1934.

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Outline of Contents of Parts to follow :—

PART II.—The interlinked works—Kalawewa, the reservoirs of Anuradhapura, Giant's Tank, Akattimurippu—and other vestiges in the Northern and North-Western sections of the Island.

PART III.—Ancient Works in the Ruhunu Ratta, which comprised the Southern and Eastern portions of the Island.

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DEDICATED
TO
MY BROTHER OFFICERS
OF THE
SURVEY DEPARTMENT,
CEYLON.

*“ And this our life, exempt from public haunts,
Finds tongues in trees, books in the running brooks,
Sermons in stones, and good in everything.”*

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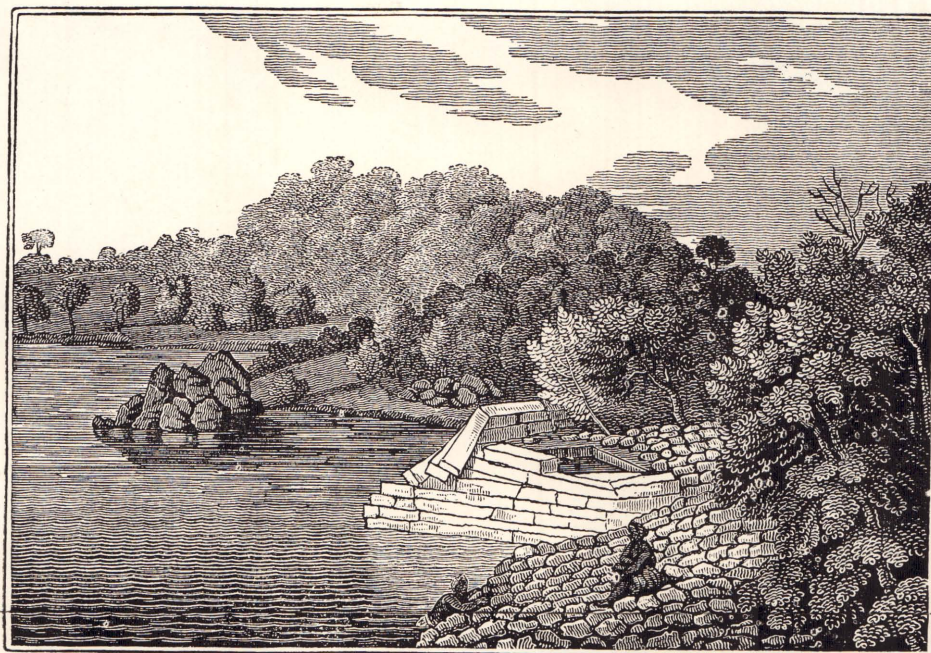
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KANTALAI TANK.
Reproduced from wood-cuts in Davy's "Travels in Ceylon"
1821.



The Bund and the "Biso-kotuwa".



The Sluice.

(v)

FOREWORD.

It is a remarkable fact which has often, perhaps, been noticed before, but which, as one accused recently of maligning the Public Service of the country, I take an especial delight in recording here again, that the greater part of the contribution to a knowledge of our past has been made by officers employed in the administrative and technical branches of our Public Service.

We owe indeed a deep debt of gratitude to these officers. Not content with merely drawing their salaries or even earning them, they availed themselves to the full of the opportunities afforded them by their duties of making themselves acquainted with the remains of ancient institutions and public works, and have left behind them the records of their research and study to serve as invaluable aids to a true understanding of a civilization that is gone.

But, quite apart from the published works of these officers, much, I believe, may be gleaned from records kept in the Government Departments themselves. Nearly fifty years ago, Bishop R. S. Copleston thanked the then Governor from the presidential chair of the Royal Asiatic Society for making available to the members the diaries of public officers, which he said had proved to be of interest and advantage in their learned deliberations.

I have been informed that in the records of the Survey Department, for instance, there is much material that will similarly prove of interest and advantage to those who would care to know of this country's past, and it is extremely fortunate that in Mr. Brohier, the compiler of this volume, we have a public officer who is alive to the best traditions of the Service to which he belongs and has undertaken the discharge of an undoubtedly onerous task at the expense of much personal convenience.

In the work that is now being presented to the public there is much matter that is new, and much that is not altogether new but has hitherto been available only in rare and expensive publications. Mr. Brohier has brought together in one volume in a readable and interesting form references from various sources to our ancient irrigation works. I note, in particular, with pleasure that he has found space in the volume for extracts from the masterly Minutes of Governor Sir Henry Ward.

If any Governor deserved the gratitude of the people of this country, Sir Henry Ward has a pre-eminent claim to it. Seeing the country for himself with his own eyes and not through rose-coloured spectacles, investigating personally with all the force and acumen of an experienced statesman the actual conditions of the country and the people he was called upon to govern, he was imbued with a deep sympathy for the people whose agricultural system had been permitted by his predecessors to crumble through neglect. Convinced that the British Government before him had "never devoted a fair proportion of the revenue towards the restoration of the old works," and that "the one thing that comes home to every Sinhalese is the improvement of those means of irrigation which the climate rendered indispensable," he embarked with energy upon a policy which had for its object "the substitution of abundance for sterility." All irrigational activity in the country to-day must trace its origin to the policy which Governor Ward declared.

This publication is intended to arouse and stimulate the interest of the people of this country in the wonderful achievements of their ancestors. In these modern days of mighty Empire-States, the achievements of little peoples are apt to receive but scant attention. The peoples themselves adopt a defeatist attitude, as if they were capable of no great achievement. Yet a knowledge of the stupendous monuments of our past greatness should surely prove a sound corrective.

When we have evidence before our eyes of a bund of over 17 million cubic yards which "at ordinary rates of of labour in this country must have cost £1,300,000, a sum which would be sufficient to form an English railway 120 miles long," and we remember that that bund is but one of a number of embankments that held together immense reservoirs in the country; when we have the testimony of a modern Engineering Expert that "as one whose duties permitted him to gain an intimate acquaintance with the ancient works he could never conceal his admiration of the engineering knowledge of the designers of the great irrigation schemes of Ceylon and the skill with which they constructed the works"; when we know, as a matter of fact, that "flaws" were discovered in these works by our modern experts which eventually were proved to be not "flaws", but the result of an imperfect understanding of the designs; when we contemplate that the construction of these works implies a vast expenditure of labour, which was not exacted under the lash of the task-master as in the building of the Pyramids of Egypt but was rendered under an organized system of determined co-operative effort for the common good; when we recall that our decline was due to causes which "wasted the organizations on which the fabric of society rested and interfered with the system of obtaining the combined labour of the whole local community"; when, and if, we remember these things, and learn from the lessons of the past, we surely need not despair of our future.

We are the product of the strength and the weakness of our forbears. I do believe that it is not yet too late to attempt to eliminate the weakness and to conserve the strength.

Ministry of Agriculture and Lands,
Colombo, November 25, 1933,

D. S. SENANAYAKE.

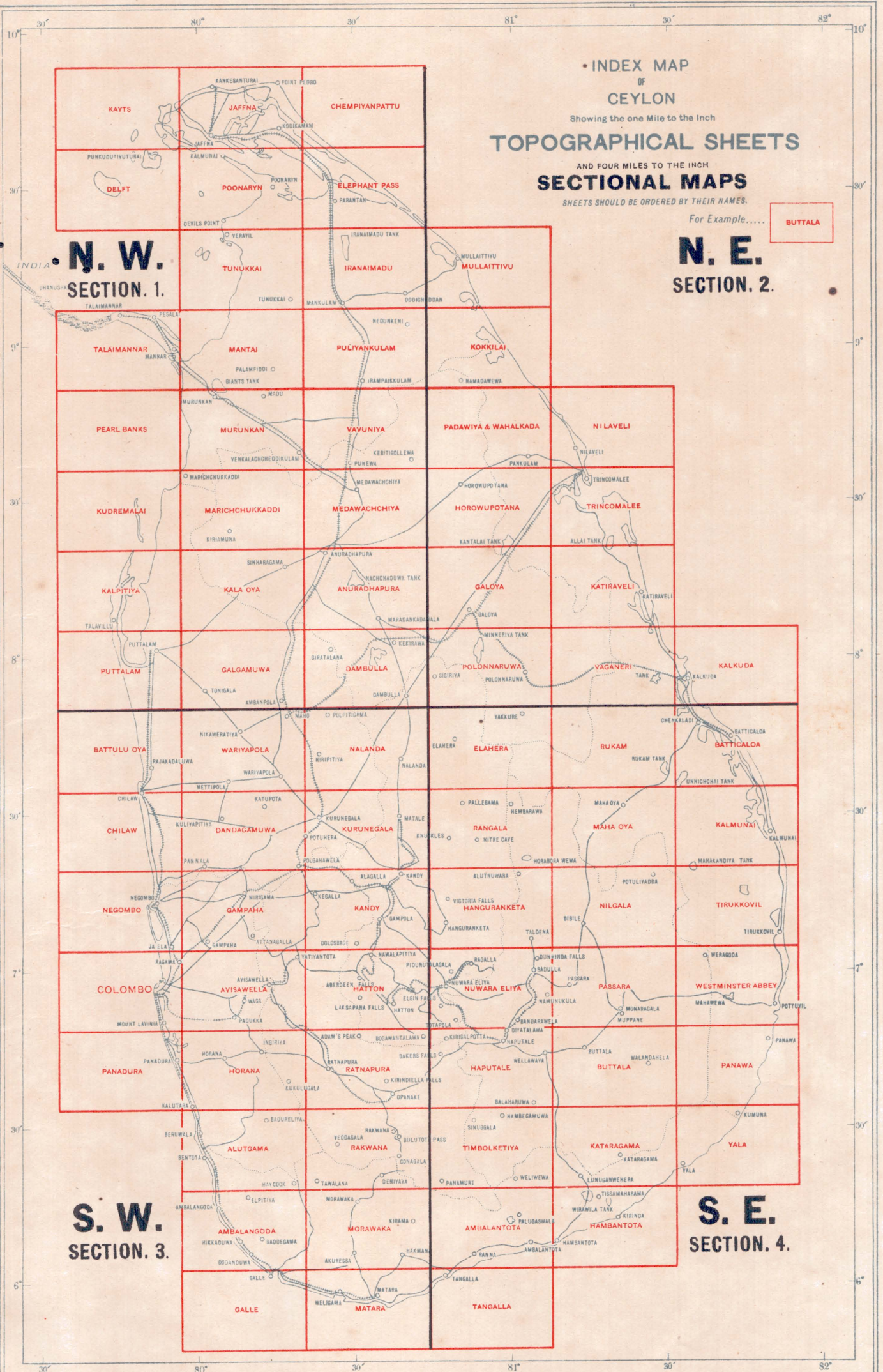
PREFACE.

The subject of Mr. Brohier's excellent paper on "Ancient Irrigation Works in Ceylon" is one which has been of intense interest to the Survey Department. Surveyors have always regarded it as a part of their duty to investigate and report on these wonderful old works whenever they came across them in the jungles, whether directly connected with their survey work or not. Many a leisure hour has been spent by surveyors in tracing up, investigating and reporting on old breached elas and bunds, dams and anicuts and the remains of ancient sluices, spills and tanks, hidden away in dense jungle, or in gazing with deep insular pride over the waters of ancient tanks, which have been in continuous operation for centuries and defied all the ravages of time. The Survey Department records are, in consequence, full of references to these ancient monuments, of which every Ceylonese, and everyone connected with Ceylon, may well be proud. When the Topographical Survey of the low-country was in progress and these old marvels of irrigation were being brought to light and mapped for the first time, since they were swallowed up in jungle, surveyors vied with each other in their efforts to discover more and more about these ancient irrigation works; and in "Recess", at the end of the field season, when the plans and reports on their discoveries were elaborated into final form, there was many an interesting discussion, between Staff Officers, O. C. Ps. and individual Surveyors, on this most interesting and important subject.

The author of this paper, who has already achieved a considerable reputation for historical research and literary work, deserves great credit for the manner in which he has compiled all the information available, from the records of the Survey Department, the records of other Government Departments and from various reports and publications, on the subject of "Ancient Irrigation Works in Ceylon". It must be noted however that Mr. Brohier deals only with the historical and general aspect of the question and not with the Engineering problems. These must be investigated by making further Engineering Surveys to supplement the Topographical Surveys. The "one mile" Topo. sheets, which are continually being revised and added to, form a useful basis, however, on which the Engineers can start their work, and it will always be a source of great satisfaction to the Survey Department to feel that it has been of any assistance in the great work of restoring any or all of the Ancient Irrigation Works of Ceylon and thereby restoring the Low-country to its former high state of development and importance.

Surveyor-General's Office,
Colombo, November 13, 1933.

G. K. THORNHILL,
Surveyor-General.



• INDEX MAP
OF
CEYLON

Showing the one Mile to the Inch

TOPOGRAPHICAL SHEETS

AND FOUR MILES TO THE INCH

SECTIONAL MAPS

SHEETS SHOULD BE ORDERED BY THEIR NAMES.

For Example....

BUTTLA

N. E.
SECTION. 2.

N. W.
SECTION. 1.

S. W.
SECTION. 3.

S. E.
SECTION. 4.

ANCIENT IRRIGATION WORKS IN CEYLON.

CHAPTER I.

INTRODUCTORY SKETCH.

IN one of the ablest reports on irrigation published by order of the Ceylon Government in 1855, Bailey, who was Assistant Government Agent of the District of Badulla, says "It is possible, that in no other part of the world are there to be found within the same space, the remains of so many works for irrigation, which are, at the same time, of such great antiquity, and of such vast magnitude, as in Ceylon. Probably no other country can exhibit works so numerous, and at the same time so ancient and extensive, within the same limited area, as this Island."*

It cannot be gainsaid that the sentiments, traditions and interests of the people of Ceylon are very closely bound up with this question of ancient irrigation.

Sir Emerson Tennent contributes to the subject by saying "The stupendous ruins of the reservoirs are the proudest monuments which remain of the former greatness of the country Excepting the exaggerated dimensions of Lake Moeris in Central Egypt and the mysterious "basin of Al Aram," the bursting of whose embankment devastated the Arabian city of Mareb, no similar constructions formed by any race, whether ancient or modern, exceed in colossal magnitude the stupendous tanks in Ceylon. The reservoir of Kohrud at Ispahan, the artificial lake of Ajmeer, or the tank of Hyder in Mysore, can no more be compared in extent or grandeur with Kalawewa or Padivil-colam (Padawiya) than the conduits of Hazekiah, the kanats of the Persians, or the subterranean water-courses of Peru can vie with the Ellahara canal, which probably connected the lake of Minneri and the "Sea of Prakrama" with the Anban-ganga river."†

Several authorities aver that in Pre-Christian times Ceylon had attained the idea of controlling the waters of streams formed by Nature, to satisfy the ample needs of the unfertile regions through which they passed. Extensive works of irrigation, secured with an immense amount of labour, skill and science had transformed arid plains into areas of plentiful prosperity at a period when agriculture in Europe was in the rudest and most primitive state.

It was to Wijaya and the Kings who succeeded him that Ceylon was indebted for the earliest knowledge of agriculture, for the construction of reservoirs and the practice of irrigation.‡

There was a time when the barren and desolate north-western coast of Ceylon was the commercial Emporium of the surrounding countries. Bochart, who was the first to suggest an eastern locality for "Ophir" and "Tarshish", fixed on Kudramalai as the site of the latter.§ Perhaps, the intrepid Phoenicians issuing from the Red Sea in their ships were acquainted with the coast long before their experienced seamen piloted the fleets of Solomon in search of the luxuries of the East.

The precious pearls which the adjacent shallow seas produced, undoubtedly helped to allure trading nations to the north-west coast. These reasons go to prove that from the dawn of history, large populations have congregated upon the coastal arid tracts of the Island—especially in the vicinity of Mannar and Arippe—rather than in the more healthy central mountain regions.

The local advantages of trade and the problem of providing food for a superabundant population gave rise, no doubt, to the extraordinary works of irrigation, which gradually spread all over the low-lying areas of Ceylon.

Should choice or compelling circumstances take you to the low-country dry zones in the North of Ceylon you will find for miles around, striking evidence to denote the extent of paddy cultivation and the colossal nature of the system of artificial irrigation, which under circumstances we have considered, unquestionably occupied the spaces now largely hidden by extensive jungles.

This evidence of material affluence, which is further attested by spectacular ruins of cities, palaces and temples in their midst, creates a halo of interest for the antiquary. The remains of tanks, large and small, and in various stages of preservation and decay cannot fail to appeal to the economist who would weigh the practicability and prudence of trying to restore some measure of their former fertility, to these long neglected but highly potential districts.

Facilities for exploration are afforded to-day by the topographical maps|| which cover even the wildest and most remote areas, and depict with scientific precision the positions and heights of mountain and hill, of water-course tank and ancient vestige. It is consequently less difficult in present times to elucidate much of the story of the past which was previously shrouded in mystery.

Every scheme of restoration undertaken in modern times, undoubtedly helps to stimulate interest in these relics of the past and to revive natural pride in the agricultural achievements, which in by-gone days provided an honourable pursuit to prince and peasant alike.

It is quite possible that curious and interesting ruins which might forge links of the chain connecting traditions and history remain undiscovered in the wildest parts of the jungle. It may be surmised that the efflux of time will gradually efface, in equal measure, all vestiges of the remarkable people who once inhabited these parts of the Island, and that all traces of their wonderful work may be for ever lost, unless these ruins are systematically and scientifically explored in the near future.

Many more tanks there must have been, of which no trace remains. Channels that have silted, anicuts which floods have swept away, cities which lie buried. They remain a secret of the centuries which have elapsed since industry was checked and the tanks were neglected, when morasses formed, when the jungle crept over cultivated land, and as would naturally follow, the climate became permanently deteriorated, the populations diminished and denizens of forest and glade simultaneously multiplied.

It is indeed intriguing to speculate on the causes which have diverted the march of civilization and left these regions, which were the homes of millions, now silent and deserted.

Medical opinion asserts that Ancient Ceylon, like Ancient Greece, was wiped out by the advent of malaria and the Anopheles mosquito. It is not improbable that when the fatal blight fell upon the Island, it destroyed the bulk of the inhabitants, drove what was left of the population from the neighbourhood of their mighty works to the mountains, where the Portuguese and Dutch found them, and consigned tanks and temples, villages and fields to almost irretrievable neglect.

* Sir Henry Ward's Collected Minutes, Reports, &c., p. 92.

† This was written before investigations proved it to be so.

‡ Turnour's, Epitome of the History of Ceylon.

§ Manual of the Puttalam District, p. 28. Modder.

|| See Key Diagram of the topographical map of Ceylon.

In the barren jungles which once upon a time were undoubtedly rice producing areas, this fell disease has held sway ever since and crushed many an attempt to invest them with even a small measure of their former prosperity.

To-day, however, with the assistance of modern science malaria is being gradually overcome. By this means the work of restoration, and efforts to re-open these areas on a large scale have been made possible.

Some authorities hold that it was the recurring strife, beginning in the twelfth century, which wasted the organizations and interfered with a system of obtaining the combined labour of the whole local community, and that the desolation which now reigns over the plains was precipitated by reckless waste due to the warring factions.

Others advance a theory that the passage round the Cape changed the course of the great commercial stream, whereby Ceylon lost that intercourse which she formerly enjoyed with foreign countries and that consequently public works were neglected.

Yet others, again, are of opinion that the destruction was caused by famine. To illustrate this theory, Baker says, "In those days the kings of Ceylon were perpetually at war with each other . . . they again made war with the Arabs and Malabars, who had invaded the northern districts of Ceylon; and as in modern warfare the great art consists in cutting off the enemy's supplies, so in those days, the first and most decisive blow to be inflicted was the cutting off the *water*. Thus, by simply turning the course of a river which supplied a principal tank, not only would that tank lose its supply, but the whole of the connected chain of lakes dependent upon the principal Tank would in like manner be deprived of water."

"This being the case, the first summer or dry season would lay waste the country. A population of some millions wholly dependent upon the supply of rice for their existence would be thrown into sudden starvation by the withdrawal of the water. Thus have the nations died out, like a fire for lack of fuel."

The same author goes on to say, "The population gone, the wind and rain would howl through the deserted dwellings, the white-ants would devour the supporting beams, the elephants would rub their colossal forms against the already tottering houses, and decay would proceed with a rapidity unknown in a cooler clime."

"In like manner, and with still greater rapidity, is a change effected in the face of nature . . . In one year a jungle will conceal all signs of recent cultivation. Is it, therefore a mystery that Ceylon is covered with such vast tracts of thorny jungle, now that her inhabitants have gone?"*

The climatic conditions which prompted and regulated the ancient system of irrigation are clearly indicated by a study of the location of what remains of these works. Such study discloses how unchanging are the meteorological conditions throughout long ages.

A thousand years ago, as much as it applies to-day, the North of Ceylon was subject to periodical droughts. From physical and geographical causes, the frequency of rains and abundance of rivers afforded a copious supply of water to the central and western areas. "The rest of the country was mainly dependent upon artificial irrigation, and on the quantity of rain collected in tanks, or of water diverted from streams and directed into reservoirs."

In a contribution to this subject, Elliot of the Ceylon Civil Service quoting from Sir Emerson Tennent's celebrated work, says, "The mountain ranges which tower along the south-western coast, and extend far towards the eastern, serve in both monsoons to intercept the trade winds and condense the vapours with which they are charged, thus ensuring to those regions a plentiful supply of rain. Hence the harvests in those portions of the Island are regulated by the two monsoons, the *Yalla* in May and the *Maha* in November; and seed time is adjusted so as to take advantage of the copious showers which fall at those periods.

But in the northern portions of Ceylon, owing to the absence of mountains, this natural resource cannot be relied on. The winds in both monsoons traverse the Island without parting with a sufficiency of moisture; droughts are of frequent occurrence and of long continuance; and vegetation in the low and scarcely undulated plains is mainly dependent on dews and whatever damp is distributed by the steady sea breeze. In some places the sandy soil rests upon beds of madrepora and coral rock, through which the scanty rain percolates too quickly to refresh the soil; and the husbandman is entirely dependent upon wells and village tanks for the means of irrigation.

In a region exposed to such vicissitudes the risk would have been imminent and incessant, had the population been obliged to rely on supplies of dry grain alone, the growth of which must necessarily have been precarious, owing to the possible failure or deficiency of the rains. Hence frequent famines would have been inevitable in those seasons of prolonged dryness and scorching heat, when "the sky becomes as brass and the earth as iron."

What an unspeakable blessing that against such calamities a security should have been found by the introduction of a grain calculated to germinate under water; and that a perennial supply of the latter, not only adequate for all ordinary purposes, but sufficient to guard against extraordinary emergencies of the seasons, should have been provided by the ingenuity of the people, aided by the bounteous care of their sovereigns. It is no matter of surprise that the kings who devoted their treasures and their personal energies to the formation of tanks and canals have entitled their memory to traditional veneration, as benefactors of their race and country. In striking contrast, it is the pithy remark of the author of the *Rajavali*, mourning over the extinction of the Great Dynasty and the decline of the country, that "*because the fertility of the land was decreased the kings who followed were no longer of such consequence as those who went before.*"†

Two different systems were adopted in Ceylon for conserving the abundance of water dispersed over the plains during the seasonal rains of the two monsoons.

According to one the natural and effective plan of making use of the upper reaches of a valley and embanking its outlets was resorted to.

The other system was based on much more scientific and ambitious methods, and aimed at securing a greater volume of water than any local catchment area could have supplied. This was effected by constructing massive causeways and anicuts across the larger rivers and turning the water into excavated channels which conveyed it sometimes many miles, over apparently flat country and impounded the water eventually in large reservoirs or a chain of reservoirs.

So careful were the inhabitants in husbanding the liquid resources on which their very existence depended, that even the surplus waters from one tank which would spill when water was plentiful, were not allowed to escape. The tanks were built in orderly method at slightly varying elevations so that there often was a series of reservoirs to take the overflow from the one above it. The exit of water was regulated by means of sluices to the rice-fields.

In this manner, the face of the country came to be thickly dotted with these reservoirs and the aspect of the intervening spaces heightened by cultivation.

* "Eight years Wanderings in Ceylon."

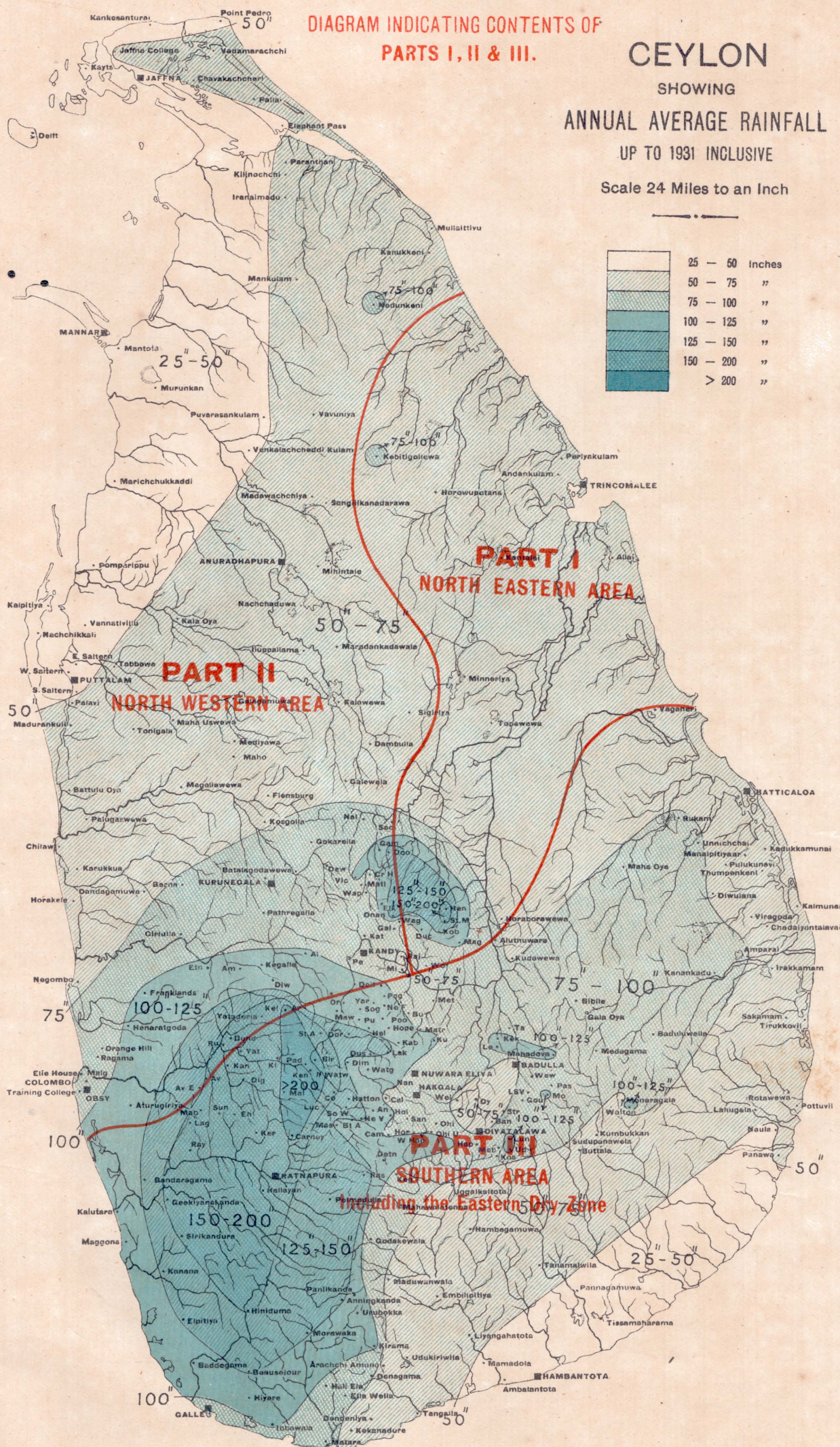
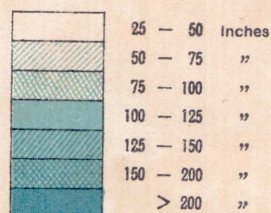
† Ceylon Manual, 1909, p. 254, and Tennent, Vol. I., p. 432; also see Journal R. A. S. (C. B.) Vol. 9 No. 31 (1885), "Rice Cultivation under Irrigation in Ceylon."

DIAGRAM INDICATING CONTENTS OF PARTS I, II & III.

CEYLON

SHOWING
ANNUAL AVERAGE RAINFALL
UP TO 1931 INCLUSIVE

Scale 24 Miles to an Inch



The remains of ancient monuments, palaces, and temples in these now deserted provinces of Ceylon are indeed wonderful. However, it is doubtful if anything is more impressive or is more likely to attract one to the study and consideration of early Sinhalese history than these great works of irrigation.

Writers on Ceylon commencing with the veracious Knox* have commented on these tanks as being "works of much art and of immense labour." But behind the peculiar beauty which attaches itself to many of these expanses of water there lies the evidence of engineering skill displayed by these early tank builders on which attention is not often sufficiently focussed.

Parker, who holds first place as an authority on the subject, has left the following on record. "As one whose duties permitted him to gain an intimate acquaintance with the ancient works, I have never concealed my admiration of the engineering knowledge of the designers of the great irrigation schemes of Ceylon, and the skill with which they constructed the works; and my friend and predecessor the late Col. C. Woodward, R. E., expressed the same opinion to me more than thirty years ago when recommending me to study them thoroughly."

Sir Emerson Tennent writes: "In forming the bunds of their reservoirs and of the stone dams which they drew across the rivers that were to supply them with water, they were accustomed, with incredible toil, infinitely increased by the imperfections of tools and implements, to work a raised moulding in front of the blocks of stone so that each course was retained in position, not alone by its own weight, but by the difficulty of forging it forward by pressure from behind."

Pridham draws on this as sufficient indication that "Ceylon was a densely peopled country and under a government sufficiently enlightened to appreciate the execution of an undertaking, which to men ignorant of mechanical powers must have been a Herculean operation; for such is the capricious nature of the mountain streams in the Island, where heavy showers frequently fall for many successive days without intermission, that no common barrier would suffice to resist the great and sudden pressure that must be sustained on such occasions. Aware of this peculiarity in the character of their rivers, the Sinhalese built the retaining wall that supports the waters . . . with such solidity and massiveness, as to defy the utmost fury of the mountain torrents."

Going back to Tennent one reads: "The conduits by which the accumulated waters were distributed required to be constructed under the bed of the lake so that the egress should be certain and equal as long as any water remained in the tank. To effect this, they were cut in many instances through solid granite; and their ruins present singular illustrations of determined perseverance, undeterred by the most discouraging difficulties and unrelieved by the slightest appliance of ingenuity to diminish the toil of excavation."

More than passing interest centres round the system for regulating the flow of water from these tanks, which has been briefly described by Tennent in the foregoing paragraph. Sir Henry Ward, a Governor of Ceylon, who evinced a keenness in irrigation that lured him to make personal inspections of the ancient works all the Island over, adds to the subject in these words:

"There is no visible outlet at the point from which the stream that supplies the Rice grounds, issues. Yet, it is perennial; and there can be no doubt that the run of the water is regulated by one of those ancient sluices, placed under the bed of the Lake which seem to have answered so admirably the purpose for which they were constructed, though modern Engineers cannot explain their action."

The works in the up-stream slope of the embankment which fulfilled this most important function are termed a *Biso-kotuwa*. Parker compares them to the "valve-towers" and "valve-pits" of modern times by which the outward flow of the water in large reservoirs is regulated or totally stopped. Such being the case, the Sinhalese engineers by building these Biso-kotuwas established a claim to be considered as "the first inventors of the "valve-pit" more than 2,100 years ago."

Parker goes on to say, ". . . it must have been no easy task to control the outflow of the water at reservoirs which had a depth of thirty or forty feet, as was the case at several of the larger works. Yet the similarity of the design of the biso-kotuwas at all periods proves that the engineers of the third century B.C., if not those of an earlier period, had mastered the problem so successfully that all others were satisfied to copy their design . . . Its exact details can only be conjectured . . . Whatever form the design took it was a triumph of the ingenuity of the ancient Sinhalese engineers and the more surprising when we find the earliest sluices furnished with it . . . It was this invention alone which permitted the Sinhalese to proceed boldly with the construction of reservoirs that still rank among the finest and greatest works of the kind in the world."†

Another aspect of the system adopted to control the water in a tank presents us with an equally astonishing fact. It is undoubtedly remarkable to find it recorded that the art of raising water by machinery was practised in Ceylon at least as early as B.C. 19. A king, Bhatikabhayo, is said to have raised the water of Abayo tank in this manner.§

Yet another branch of engineering which had unquestionably attained a very high pitch of perfection at the hands of the ancient Sinhalese was that which held within its scope a knowledge of surveying and levelling.

Most of their irrigation schemes are confined to tracts of land which when estimated by the eye appear to all purposes quite flat. Yet, we know from such evidence which remains that channels were traced mile upon mile on gradients that would call into use the most precise instruments of the modern age to establish; that baffling ingenuity which cannot be surpassed by any conceivable means available at the present day traced out the bunds and the contours of the larger tanks.

Taking as much into consideration, it cannot be disputed that under such conditions, to place such magnificent works within the sphere of the possible, a system of measuring heights and distances must have attained a very high level of efficiency.

It has been advanced on the evidence of tradition and fragments of age-old inscriptions, that an organization which functioned much on the lines of our modern service for survey existed from earliest times of the Christian era if not even before.||

This in itself carries some weight which cannot be overlooked in tracing the origin of Ceylon's early knowledge of land measurement. It would be reasonable to assume that the knowledge included some means of ranging out lines and appraising even small differences in elevation.

It is both evident and significant that the Sinhalese made rapid strides, to judge from a note struck by a writer who says "so far had the renown of their excellence in this branch (irrigation) reached, that in the eighth century, the king of Kashmir (Djaya-pida) sent to Ceylon for engineers to form a lake."

* "An Historical Relation of Ceylon" (1680-81.)

† Biso-kotuwa, literally means "Queen's Enclosure," but probably would be more correctly termed Bisi-kotuwa, the enclosure where (the water level) lowers. Ancient Ceylon,—Parker.

‡ Bertolacci, (p. 14) refers to these controls as "entirely resembling those used by the Romans in some of the lakes in Italy; which openings for letting out the water are known by the appellation of *condottari*."

§ Bailey.

|| "Hindu Administration in South India—Survey and Settlement."—Dr. Iyengar.

CHAPTER II.

VESTIGES OF VERY EARLY TIMES.

Although some attempts were made by the Survey Department to determine the positions of the ancient irrigation works in the Island from so early a date as 1855, it was not till many years later that any satisfactory advance in this direction was attained.

The surveys carried out in 1897 and the following years afford an excellent illustration, if such is wanting to establish the value of topographical survey operations in relation to irrigation schemes.

Until this topographical survey had been undertaken, very little was known of the exact sites of even the larger reservoirs, and practically nothing of the catchment areas. There was no conception until the maps were issued that the eastern and northern portions of the Island contained so many remains of old irrigation works, ranging from the small village tank to schemes which assumed gigantic proportion.

All that remains, or such evidence which can be traced to indicate the larger schemes confined to the north-central parts of Ceylon and spreading eastwards and westwards of the ancient capitals Anuradhapura and Polonnaruwa, might for purpose of easy reference be divided into five sections.

The reservoirs in the neighbourhood of Minneriya together with the net-work of canals extending from the base of the Laggala foot-hills west of the Mahaweli-ganga, to as far down as Trincomalee, appear to have been the most important, and doubtless rank first from the point of view of interest.

The large tanks Wahalkada and Padawiya, which if restored will completely alter the character of the whole of the northern Wanni which lies between Vavuniya and Kuchchaveli on the eastern coast, constitutes a second complete scheme of ancient days.

The interlinked works drawing on the Matale foot-hills as a catchment area, which include the Balaluwewa and Kalawewa, the channel which connects these to the reservoirs of Anuradhapura commonly referred to as the City Tanks, and the supplementary scheme which trammelled the waters of the Malwatu-oya and formed the Nachchaduwa Tank, afford consideration as a third scheme.

The fourth scheme is represented by Giant's Tank and Akattimurippu with the anicuts across the Aruvi-arū, and by the channels and smaller tanks, all of which go to prove how well-watered the north-western part of the Island in the vicinity of Mannar and Mantai was in days of the past.

The fifth and last section takes us further south, to the tanks relying on the Mi-oya and the Deduru-oya for their supply of water, which were located in the ancient division of the Island known as the Seven Korales.

Before venturing to consider these larger schemes in relation to the sections outlined, and in detail, it is perhaps desirable to include in a compilation, which portends to deal with ancient irrigation, the connected story of the growth of these irrigation works in Ceylon.

In the earlier days there were naturally less pretentious undertakings. Such early works, some of which have not been identified, others very vaguely by modern research, hold out a peculiar glamour and interest. They serve to illustrate the gradual assimilation of that ingenuity which we have already sufficiently associated with a remarkable people who have left their mark on the face of the country but have themselves passed away.

The Mahawansa, a national state-record which had been preserved in the archives of the Sinhalese kingdom, and has not inaptly been described as the most credible and philosophical of oriental histories; makes the first reference to the construction of a tank in its recital of the period dating to the fourth century B.C.

The writer of this ancient commentary has afforded posterity the information that Prince Anurada made a tank on the southern side of the capital, Anuradhapura.

"It has not been identified," says Parker, "and we may assume that it was merely a small work intended for the use of the village at which the prince resided."

The same authority (Parker) writes, "The next work for storing water, of which any information is given in the histories, is of an entirely different class from the village tank of Anuradha. Possibly it was the first reservoir ever made with an embankment of any importance that must have required special acquaintance with the principles of reservoir construction. The honour of occupying this prominent position rests with Pandawewa"

This ancient tank is popularly identified by some ruins on the Wariyapola-Chilaw road, about a mile and a half to the south-east of the modern village Hettipola; which Modder considers to be the city known in ancient times as Panduwas Nuwara.† This city, said to have been founded by Upatissa, Prime Minister of Wijaya, (505 B.C.) who later gave it up to Panduwas after whom it was called, is said to be the oldest in Ceylon excluding Tammanā Nuwara.

The magnificent tank, now in utter disrepair, lies to the north of this ancient city, with the present day P. W. D. road traversing its bed. It is supposed to have been built by king Panduwas during his reign.

This tank appears to have been originally formed by throwing an embankment across the valley of the Kolamunu-oya. There is a large gneiss rock in the line of the embankment which is to this day known as Deviyannekanda, meaning "God's Hill" or "King's Hill." Local tradition believes this spot to be haunted by the spirit of King Mahasen, to whom is also ascribed the construction of this tank. Undoubtedly it has repaired and enlarged over the ages which have passed since it was originally built.

The bund, 24 feet in height and a mile to a mile and a half in length, is said to have flooded a superficial area of 1,000 to 1,200 acres. In 1805 owing to a flood the bund burst over-night. The Kolamunu-oya has flowed untrammelled through the breach ever since.

It has been left in this state, and in possession of many settlers who squatted on the land in the bed of the tank.

"Although the size of this reservoir was surpassed by other pre-Christian ones and left far behind by many post-Christian works," remarks Parker, "we cannot fail to be astonished at the boldness and originality of the early engineer who ventured to construct such an earthen bank across a valley down which floods of considerable volume pass in the rainy season The old designer of the works must have been a highly intelligent man to overcome it so successfully He made every effort to reduce the quantity of the earthwork to a minimum; to effect this, the line of the bank was turned about in order to avoid low ground, in a manner never found in later works of a larger size."

Other works traced to days before the advent of the Christian era are the two tanks near the ancient city, Anuradhapura, which we to-day call the Basawak-kulam and the Tissawewa. The former has been identified as the Abhayawewa and the latter as the Jayavapi of the Mahawansa. They are associated with the reigns of Pandukabhaya and Devanam-piya-tissa, respectively. Although built perhaps a century after the Pandawewa near Hettipola, in the opinion of experts the older tank is far superior in design.

* From Parker's "Ancient Ceylon", p. 353. The Sanskrit and Pali word *vapi*, the Elu or Early Sinhalese words *wawī* and *wiyya*, the Sinhalese *wewa*, and the Tamil *kulam*, have the same meaning and signify "tank" or reservoir.

† See Journal R. A. S. (C. B.) Vol. 14, No. 47, "Ancient Cities and Temples."—Modder.

Such large works as these could not have merely served the communal needs of the people. It would be natural to presume on such evidence, that an adequate population who understood rice-growing existed in the northern parts of the Island at even this early period.

The benefits derivable having thus been made apparent, the kings, who of course were the moving spirits in these matters, were spurred on to undertake the construction of larger works.

Prince Saida Tissa, considerably before the year 162 B.C. is described as superintending the agricultural works at Diggawewe, localised somewhere in the Eastern districts. In B.C. 47, "the great canal Wannakanna" the first irrigation channel mentioned in the Mahawansa, was constructed by King Kalantisso, probably in the Mihintale area.

But of all these great works, "those in the neighbourhood of Minery, the centre, apparently, of a labyrinth of canals appear to have been the most important for there is repeated mention of them from the second century after Christ to the middle of the twelfth, the Kings Mahasen, Aggrabodi (I), Dappoola (II), Udaya (I), Wijaye Bahoo (I), and the great Prakrama Bahoo (I), being all specially recorded as having built, enlarged or repaired them."

These brief references which carry us through to the latter half of the twelfth century afford a sufficient background on which to project the brightest page of Sinhalese history dealing with ancient irrigation. It refers to the days of the celebrated Parakrama Bahu the Great, "whose reign Turnour characterizes as the most martial, enterprising and glorious"

Perhaps the reader will feel convinced that a short digression to help him to take full measure of this illustrious sovereign—"the most prominent figure in Ceylon History, and the *par excellence* of the Sinhalese nation,"* is justified.

About this period the condition of the country had not been happy. Over the northern kingdom of which Polonnaruwa was the capital, Gaja Bahu was reigning. The southern part of the Island was divided into three so-called kingdoms under our hero's father and two brothers. Sankhatthali, where Parakrama Bahu was born, is identified with the modern Alupota.

His first care on taking up the reins of government of the restricted kingdom which he was called upon to administer a short time after his father's death, was to develop its limited resources.

"It is impossible," says a writer, "not to admire the high conceptions of the duties of a ruler," which the Mahawansa sets forth in the following lines:—

"Having thus reflected, the King thus addressed his officers.

In my kingdom are many paddy fields cultivated by means of rain water, but few indeed are those which are cultivated by means of perennial streams and great tanks.

By rocks, and by many thick forests, by great marshes is the land covered.

In such a country, let not even a small quantity of water obtained by rain, go to the sea, without benefitting man.

Paddy fields should be formed in every place, excluding those only that produce gems, gold, and other precious things.

It does not become persons in our situation to live enjoying our own ease, and unmindful of the interests of the people. And ye all, be ye not discouraged, when a necessary, but a difficult work is on hand. Regard it not indeed as a work of difficulty, but following my advice accomplish it, without opposing my instructions."†

Such was his unbounded confidence in the capacity of human skill that "when the ministers, one and all, represented in various ways the extreme difficulty of the work" the king remarked:—

"What is there that cannot be done in this world by men of perseverance? Is not the tradition still current that Rama built a bridge over the great Ocean itself by means of monkeys?‡

"If I am destined by fortune, to reduce this Island under one regal canopy, and to promote the welfare of the State and Religion, then, indeed, will the commencement of the work see the accomplishment of it also."

That these were not vain words is testified to by the subsequent story of his reign.

Renowned in the arts of war, as he was in the arts of peace, he eventually secured the northern territory from Gaja Bahu. He carried the Sinhalese flag into India and Burma, undertook with energy the construction of new works and the restoration of those that during the years of internal disorder had been allowed to fall into disrepair all over the Island, and "he made the revenue that was obtained from the new fields alone greater than the revenue which had been derived from the old fields in the kingdom."

The greatest work initiated by this famous monarch acquired the name *Parakkam Samudda*, meaning "The Sea of Parakrama" which is thus described in the Mahawansa:—

"Moreover, having made Panda-wapi,|| which was formerly very small indeed, (into one) containing a body of water, great and exceedingly lofty, having out-lets for the water, and an embankment of greatly increased height, length, breadth, and strength, he gave it the name of the "Sea of Parakrama."

"In an Island situated in the middle of it, on the summit of a rock the king built a *Dhatu-gabbho* (dagoba).

In the middle also of the tank, he built a Royal Palace, three stories high, and of superlative beauty, a palace indeed, fit to draw into it the multitude of joys in the world." ¶

CHAPTER III.

THE LAKE OR SEA OF PARAKRAMA.

Much attention has from time to time been centred in modern efforts to locate and identify the sheet of water which perhaps the ancient historians to commemorate the accomplishment of a gigantic undertaking, rather than as a gesture of delicate flattery to the king, passed down to generations unborn, as the Sea of Parakrama.

The wealth of references to this subject testify to the fascination it exerts—all the more perhaps, since no valid evidence has as yet been advanced to help in placing it on our maps.

* See Journal R. A. S. (C. B.) Vol. XIII, No. 44, "Epic of Parakrama"—Copelston.

† See Journal R. A. S. (C. B.) Vol. III, No. IX. Translation by L. de Zoysa, Mudaliyar.

‡ This tradition is ascribed to the reef between Mannar and the Indian coast, called Adam's Bridge. It is supposed to have been built for Rama by the monkeys, when he crossed over to Ceylon to participate in the sanguinary wars so graphically detailed in that Epic, the Ramayana.

§ Translation by L. de Zoysa, Mudaliyar. Journal R. A. S., Vol. III, No. IX.

|| The name Panda-wapi, occurs but twice in the previous parts of the Mahawansa. King Maha-Nago is said to have, bestowed the Panda Tank Vihara on a certain Samanero, so early as A.D. 8. It is also mentioned as one of the tanks repaired by king Wijaya Bahu I, who reigned at Polonnaruwa A.D. 1071-1126.

¶ See Appendix, p. 28, Ceylon Almanac, 1857.

Turnour, who with his intimate knowledge of the history of Ceylon would undoubtedly have put forward some constructive ideas if he had the help afforded by modern surveys, says, "the sea of Parakrama with its embankments of many outlets is yet unknown, or at least unnoticed."

Parker, basing his contention on the context of the passage in the Mahawansa which makes reference to it, is of opinion that Parakrama's sea was not in the part of Ceylon over which Gaja Bahu ruled. He says, "it may be the great abandoned tank now called Pandik-kulam in the southern parts of the Uva Province."*

Mudaliyar Louis de Zoysa,† is "inclined to think that we may recognize the Panda-wapi of the Mahawansa," which naturally is the key to the location of the greater work, "in the modern Padavi or Padavil-kulam of the Wannu district."

"The reasons," he says, "which have led me to form this conjecture are, first, the similarity or rather the identity of the names . . . , secondly, the stupendous size and the magnitude of the work."

Leaving the reader to weigh this opinion with the detail description of Padawiya Tank which follows in the course of this compilation, we shall pass on to Major Forbes.

He writes in this connection, "we crossed the remains of a canal which is said to have connected the tanks Minneria, Kaudella, and Gantalawe, and to have reached up from the former of these to the Amban-ganga at Ellahera, from whence it was supplied with water. Until this canal shall have been traced through the Kondrawa Hills, the extent and difficulty of such an undertaking must excite doubts whether it were successfully accomplished . . . if it was found to have been completed I shall then have little doubt that the succession of tanks thus connected . . . were the waters to which the vanity of a king gave his own name, dignifying them with the appellation of the sea of Parakrama."

Fourteen years after the publication of Forbes' researches in his book "Eleven Years in Ceylon," three gentlemen—Messrs. Churchill, Adams, and Bailey, voluntarily undertook in 1855 the very laborious duty of inspecting and tracing the canal which Forbes refers to, and which, until they had proved it to be so, was merely on tradition supposed to have been directed from the Amban-ganga into the Kantalai Tank near Trincomalee.

In a report they submitted to Government, which later appeared as a Sessional Paper and has been reprinted on the lines of an extract and appended to this publication; these early explorers of the Elahera Canal further tangle the interesting controversy.

"It seems beyond doubt," they record, "that the Sea of Parakrama was in the neighbourhood of Ellahera, and the remains of the bund across the river, and the vast size of the embankment between that place and Kondrowawe, leave on our minds the conviction that it was formed by the enlargement of the work first executed by Mahasen.

"We are led to this conclusion by a careful examination of the gigantic embankments, in parts 80 to 90 feet in height, and a careful study of the adjacent country, as our opportunities permitted. When the whole body of the river was diverted from its course, the waters, receding must have spread themselves over many miles of flat or imperceptibly rising ground, to the foot of the Kondrowawe range of hills, and nine large streams being turned by the embankment, a series of immense lagoons, extending from Ellehera to Kondrowewe, must have been the consequence.

"The Sea must have ceased at Kondrowawe, for from the point where the communication branches off to Minneria and Giritella, the reduced proportions of the embankment, and the altered nature of the country shew, that canals, only, extended to Minneria, Gantalawe, and Giritella."

In a province largely covered by forest it is natural that there was plenty of scope for new discoveries of old works which gave rise to further theories.

About the year 1890, Mr. Ivers examined the possibilities of some old works known as the Minipe-ela Scheme and caused the bund of what is now called the Dumbutalawewa to be cleared.‡

As far as can be gathered, by this irrigation scheme the water was conducted along a canal from the Mahaweli-ganga. At its union with the Amban-ganga that river was stopped by an anicut and what was undoubtedly a large volume of water thus secured from the main river, its tributary, and all the streams flowing down from the mountain heights that enclose Dumbera which were intercepted on the western bank of the Mahaweli-ganga, was turned in a perennial stream through a chain of at least five or six older tanks into the Topawewa at Polonnaruwa.

The question, to which the great engineering skill associated with Parakrama Bahu's reign lends considerable practical interest, was revived with this new evidence. Was this the Sea of Parakrama?

Mr. Hugh Nevill, was not content to let the matter rest at that. A few years later, he carried out further investigations. The valuable conclusions which he arrived at were minuted in a report from which the following extracts are culled:—

"It was supposed that the great lake stopped at Dumbutalawa, and that a canal thence led its water into Topawewa. On inspecting the bund of the great lake I found that, under Mr. Ievers, several inscribed stone-posts had been discovered along the bund. The inscription records that for such and such a distance the great bund is the bund of such a tank restored by King Parakrama. The last I saw at Dumbatalawa records that this part of the bund is the bund of the Pandi-wewa.

"Now, the enlargement of Pandiwewa formed the Great Sea above referred to. Knowing the Mahawansa almost by heart, I at once searched for the ruin of a temple on a rock in the tank and found such close to the bund. Feeling now nearly sure that this was the Great Sea, that I was on the bund of the older Pandi tank, and my eye telling me that the bund towards Topawewa (mistaken by all my predecessors for the end of the lake) was at a much lower level, and the bund of a small tank only, I made personal search. My guides assured me there was no other bund near. Pushing through dense jungle I found that there was a small breach just beyond the existing portion of the original bund of the Pandi tank through the great bund of the lake, and after crossing the gully formed by the breach I recovered the true bund of the great lake. I had this cleared for some two miles until it reached the village Ganangolla, near which the bund crosses a low valley, and has an immense height and thickness pitched with stone at places almost to its top. There we found the ruins of a pavilion built of brick-work on a spur of high land caught up in the bund, and once standing up in the waters of the sea or tank. From this point the ground apparently rises, and some villagers traced the bund dwindling into a mere ridge across the main road between Polonnaruwa and Mangantota, where it joins the bund of the Kalingi-ela scheme.§

But all these conclusions, with the one exception—Parker's, were arrived at before the Island had been topographically mapped. It is therefore to be expected that much more weight attaches to the reports and hypothesis advanced by the officers who directed the surveys in these districts. They unquestionably had more

* See 4 × 1 Topographical Sheet—Timbulketiya.

† See Journal R. A. S. (C. B.) Vol., III., No. IX., "The Irrigation Works of Parakrama Bahu," and Appendix, Ceylon Almanac, 1857.

‡ See 4 × 1 Topographical Sheets—"Polonnaruwa" and Elahera.

§ From the Administration Report of N.-C. P., 1893, reprinted in the Literary Register, Vol. 2, 1894.

opportunities for investigating the ruins which demonstrated the ancient irrigation systems, and moreover, had the assistance of scientific data that put them on a much more competent footing to decide whether the face of the country in any particular locality afforded possibilities for artificially impounding such a vast sheet of water, which, even allowing for the different standards by which the historians of the past and we of the present take measure, could have suggested the idea of a "Sea," or more literally, *Samudda*, an "Ocean."

In 1897, Mr. D. Blair, with a party of seven assistants, proceeded to Minneriya and commenced a survey of the country lying between the tank and the Mahaweli-ganga, which had hitherto appeared blank on our maps.

In his administration report for that year, the Surveyor-General, Mr. Grinlinton, stresses that "the greatest attention was paid to the delineation of the ancient system of irrigation channels, by means of which the whole district, now dense jungle or waste park-land, is said to have been kept in a high state of cultivation."

However, it was not till the following year (1898) that the entire net-work of canals, and the tanks in the area were first surveyed.

These surveys disclosed that there seemed to have been no less than three large anicuts or "bemmas" thrown across the Amban-ganga which is a tributary of the Mahaweli-ganga and is formed by the confluence of four or five considerable streams taking their sources in the Matale hills.

First among these anicuts was the very famous old work near Elahera, diverting the waters into the great Elahera canal which led on to Kantalai tank after supplying Minneriya, Kaudulla and numerous other smaller tanks.

Messrs. Admas, Churchill, and Bailey endeavoured, as the reader is aware, to prove that this canal flooded the sea of Parakrama Bahu, and referred to the possibility of the presence of a chain of immense lagoons lying along and above the channel between Elahera and Konduruwewa, but these cannot have been nearly so extensive as reported.

Blair gives us the following reasons for disputing the theory. The Nuwaragalakanda range of hills runs much nearer to the channel than was supposed—the summit being only from two to five miles distant, so that, however high the bund of the channel, the "lagoons" could not have been more than one or two miles broad. The earthworks were described as varying from 40 to 90 feet in height, but they really rarely if ever rise 40 feet above the bed of the channel, and only that height where the channel crosses considerable streams or depressions—in the first case, to resist the impact of the inflowing waters and to flood the stream so as to let it deposit its silt before entering the channel; and in the second, to avoid long detours which would have so reduced the fall as to make it barely possible to take the water across the water-shed of the Radawige-oya into the basin of Minneriya."

Coming down the Amban-ganga, there is a second anicut where the river crosses a dip in the Sudukanda range of hills. It was built of square hewn blocks of stone, of considerable size, but now displaced in ruins. The bed of the river at this spot presents a formation of quartz, the strata standing up in ridges and furrows.

Tradition, which has not as yet been disputed by scientific data, but on the other hand has been proved to be correct by investigations, holds that Minipe-ela carrying the waters from the Mahaweli-ganga, ran closer and closer to the Sudukanda range of hills until it eventually entered the Amban-ganga above this anicut.

It is certain that all, or nearly all, the dry weather flow of the Amban-ganga was diverted along the Elahera canal. What more natural that the Minipe-ela was required to increase the flow along what has come to be called the Angamedilla channel.

The water was in this manner diverted into what must have been a gigantic tank on the shores of which was situated the capital of Parakrama's kingdom and his own palace.

Blair, basing inquiry on the data which he delineated on maps, asks the question in his report on these surveys: "Might not this more aptly have been called the Sea of Parakrama . . . ?"

He was apparently not aware that the result of the surveys unquestionably proved Nevill's theory.

The third and last anicut across the Amban-ganga was about six miles further down. A description of this anicut might more aptly be left to be linked with a channel called the Kalinga-ela scheme, which will be later referred to.

There now remains to trace the route of the channel augmented by the waters of the Minipe-ela, from the point it crosses the Amban-ganga at the second anicut, and to describe a work below it—that is to say, the great bund which held the water of what might well have been called the "Sea of Parakrama."*

This information is extracted from Mr. Blair's report of the surveys done in 1898, and is illustrated by the Polonnaruwa Topographical map.

Beginning at the northern end of the anicut, the bund is for some distance strongly built and faced with stone revetments. Half a mile below, it is badly breached and the waters flow through this and return to the river.

A mile and a half below the anicut lies the village of Angamedilla, now abandoned, but one field is still cultivated. The villagers have constructed small works by which some water is still run into the ancient channel. At the 3rd mile on the bund there is another small field called Kukurumahawela, and near it the channel is crossed by the pin-para leading from Elahera to Topawewa. Half a mile beyond, there is the last field now irrigated by the canal, at the village Kalahagala.

Some distance beyond, the channel enters a natural stream which rises from a small breached tank at the foot of the Sudukanda hills, called Mahaiyawewewa. The water apparently flowed along the stream for half a mile, until it was joined by another stream, the Kanaine-oya. Here the artificial channel begins again after damming up that stream. It is breached here now and the Kanaine-oya flows untrammelled to the Dumbutula-wewa. Beyond the Kanaine-oya breach, the channel bends round the base of a slightly elevated slab of bare rock.

The bund here is scarcely visible, and is much washed away. The entire length so far traced follows closely the contour of the ground and consequently the earth embankment is not of great height rarely exceeding 12 feet above the channel bed.

A little further, the channel again falls into the bed of a small stream and follows the natural bed for fifteen chains to where it joins the Diwulpitiya-ela, which must have been dammed up here but now flows unchecked to the Amban-ganga. Beyond this breach the bund of the channel begins again, its height being about 80 feet. Two miles further, it is again breached by the Etawetuna-oya. Three miles from this point and twelve from Angamedilla anicut, the channel divides into two.

The one to the right was surveyed for over a mile and a quarter to where it enters Topawewa, and as it is not breached, and the main channel for a mile before the branch-off is also unbreached, it diverts some water still, in the rainy season, into Topawewa. The channel branching to the left, with bund about 8 feet high was surveyed for over one and a half miles from the "divide", and then all traces of it was lost. The bund was found again at the crossing of the road from Topawewa to Minneriya and surveyed back from there for over half a mile, when again it was lost, thus leaving an untraced gap of over half a mile.

* The "Sea of Parakrama", according to Nevill's identification submerges an approximate area of 9,100 acres.

The channel crosses the Minneriya-Topawewa road nearly 15 miles by water (Angamedilla Anicut) and a mile and a quarter beyond this it falls into Anaulandewa Tank. From the western end of the tank the bund continues and after nearly a mile it is breached by Diwulankandawela-ela, 60 feet wide. If restored the water would be retained in a tank called Nikawewa. This tank, supplied by the channel, must have irrigated a great area of land in the valley of the Diwulandawela-ela, and the park-country below it shows every appearance of having once been one huge field.

Eighteen chains beyond the breach of Nikawewa there is an ancient biso-kotuwa and sluice, and fifteen chains beyond it the double bunds of the channel begin again, 17½ miles from Angamedilla anicut.

It is evident that Nikawewa was always kept up to spill level otherwise the efficiency of the channel beyond it would be impaired.

From Nikawewa the channel strikes north-east, sometimes with single and sometimes with double bunds, for three miles, in which there are only three minor breaches till it crosses the Topawewa-Galoya pin para. It was traced four miles beyond this through forest and park-country, till on the watershed between the Minneri-oya and the Diwulandawela-ela and near the source of the Talpot-arū, and less than two miles from the Minneri-oya. It gradually disappeared 24 miles from the Angamedilla anicut.

It is reasonable to assume that it really did end here, for beyond this is the valley of the Minneri-oya, which would have been irrigated by that river from Minneriya tank—the latter being kept full by the great Elahera channel.

From this very full description of the Angamedilla channel, which doubtless is as truly applicable to-day inasmuch as it conveys an idea of its state 45 years ago; we will now take up Blair's description of the great bund which impounded a sheet of water we are justified in calling Parakrama's sea.

"Beginning at its north end, which is also the north end of Topawewa, near it is the high level sluice now out of order. The bund then turns south and parallel to it and almost on the site of the existing road is a trace of what was probably an ancient road between the bund and the city wall. East and north of this lie the chief ruins of the ancient city of Polonnaruwa which were surveyed in 1897"

"About three-quarters of a mile from the beginning of the tank bund occurs the first important breach, and it is here that the tank now overflows. The house of the Revenue Officer and the irrigation bungalow are situated on a projecting portion of the bund, and the space enclosed by the bund here and the western wall of the Kotuwa or Fort is said to have been the site of King Parakrama's palace."

"It was from this enclosure that the lion couchant now in the Colombo Museum was taken, and here also is the semi-circular wall of the king's bath, which was filled from the tank by a sluice below the bund."

"Three-quarters of a mile south-west of this, across the tank, there is what seems to be the ruins of a dagaba (Palace), which must have stood up like an island out of the water in the days of Parakrama."

"At the south end of the palace enclosure is the ancient low level sluice, and it is from this that the water of the tank is still taken for irrigating the lands below, the bund being about thirty-five feet high."

"A mile south of this is the ancient spill, still in a good state of preservation, and over it is a double row of pillars which must have supported a bridge. Here the bund is only about eight or ten feet high, and twenty-four chains beyond this the bund vanishes in high ground. Five chains east of this on high ground is the statue of Parakrama Bahu on the face of a natural rock facing east*. On the same high ground, and some distance south, is another ruin called the Palge vihāre, whence many tons of spoil have been removed recently by some amateur archaeologist or seeker after treasure trove. After passing nearly a quarter of a mile of high ground a cross bund ten feet high was met, and this, the south bund of Topawewa, was surveyed westwards till it came within a quarter mile of joining the branch channel from the Angamedilla channel to fill the tank."

"On surveying it westwards from the Topawewa-Angamedilla track, it was found again to merge in high ground after seven chains, where there are thirteen pairs of stone pillars over what must have been another spill of the tank. After this a gap occurs, but there is little doubt that the ground being high, there never was a bund or only a very low one. As a matter of fact, when running a contour at the level of the top of the bund, traces of a bund, three or four feet high were found at intervals for three-quarters of a mile until at the crossing of the cart track from Topawewa to Dastota, near the 3rd milepost, the bund again becomes distinct. From this point it rapidly begins to increase in height as it enters the valley of the Eramadu-oya. Twelve chains south of it there is a breach of about 25 ft., and six chains further a sort of half breach caused by cattle crossing the bund. Five and a half chains south of this an inscribed stone pillar was found on the bund. I have been informed that the inscription records that for so many fathoms from it the tank is called but I am not certain that this is the very pillar referred to. Another small breach of about 20 ft. in width occurs 4½ chains off this pillar, but after this there is 70 chains of bund in perfect repair till at the re-crossing of the tavalam road, where the bund is 30 ft. high, there is a half breach 20 ft. wide caused more by the traffic than by anything else. From this point again the bund is perfect for 27 chains till at the Eramadu-oya it is badly breached and then scoured by the floods for a distance of about eight chains. It must formerly have been over 40 ft. high at this point—the lowest on the whole line of bund. Fourteen chains beyond this there is a breach of 40 ft. the bund being about 25 ft. high, and 42 chains further on another breach of about 25 ft. and five chains from here this bund joins that of Dumbutulawewa. From this point a bund strikes off into what must have been the bed of the ancient 'Sea' for 22 chains, where it is breached by the Eramadu-oya. The villagers of Kanangolla have half restored this (though scarcely enough to cause the water to reach the toe of the great bund) and have placed a primitive sluice by which they draw off water to irrigate their field adjoining the village running it along the oya through the great breach above alluded to. This northern bund continues in a north-western direction for 15 chains. It is clear that this bund can have been of no use when the 'Sea of Parakrama' was full, and it is doubtful whether it existed then. I surmise that at a period subsequent to the reign of Parakrama Bahu and the decay of Polonnaruwa city the great breach across the Eramadu-oya occurred. The number of inhabitants had decreased, and those remaining were not able or not obliged to restore and keep up so great a work. They therefore built this bund instead, thus making Dumbutulawewa a complete tank in itself, filled by the Kanaine-oya or the Angamedilla channel. The south bund of Topawewa might be accounted for in the same manner, and it is reasonable to suppose it was constructed about the same period as the north bund of Dumbutula. Five chains from the junction of the latter another inscribed pillar was found, and 20 chains beyond it the bund, about 35 ft. high, joins the Dumbutulewewa trigonometrical station. In that distance three minor breaches 10 or 15 ft. in width occur. Dumbutulawewa trigonometrical station is on a bare rock of gneiss traversed by many thick veins of quartz, and it rises only 70 ft. above the tank, but yet commands a perfect view of the country for 40 or 50 miles around. This point is five miles by bund from its northern end. South of Dumbutulawewa trigonometrical station it begins again, and the road from Topawewa to Angamedilla runs for nearly a mile (the water

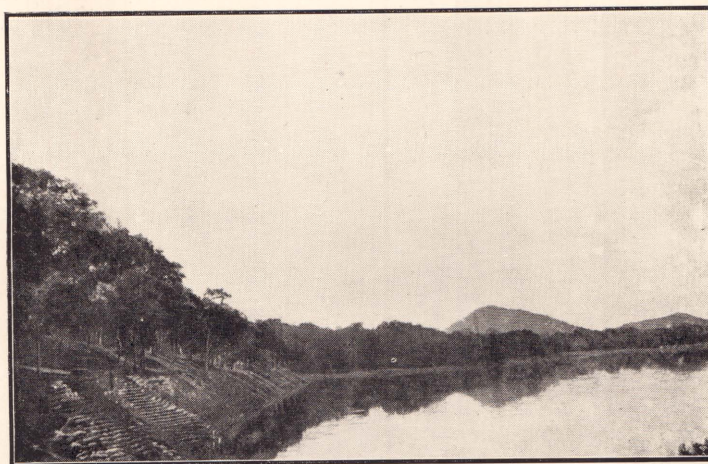
* The identity of this statue has been definitely decided to be that of a "rishi" and not that of the King. See Administration Report, Director, Colombo Museum, 1932.

A POLONNARUWA STATUE.



This twelfth century memorial is popularly believed to be a statue of Parakrama Bahu, the great tank-builder.

GIRITALE TANK.



The artificial stone pitching or "ripple-bands" on the bund affords a striking example of the labour, time and ingenuity expended on even the smaller tanks.

here reaching the bund) on its top, which here is 20 ft. wide and overgrown with huge trees which must be of great age. The bund here is in perfect order with stone revetments, and stands nearly 40 ft. above the bed of the tank."

"Seventy-three chains south of the trigonometrical station the first small breach of 20 ft. occurs, and ten chains beyond this another inscribed pillar was found, and just beyond it an ancient *biso-kotuwa*. From this sluice to the next which is in ruins—a distance of one and three-quarter mile, the bund is not in such good order, for there are fifteen breaches varying in width from 20 to 60 ft. The bund in that distance decreases in height from 30 ft. to six or eight feet, though near the last sluice it increases again to nearly 30 ft. Eighteen chains beyond it the bund approaches within five chains of the bank of the Amban-ganga, but is far above its level, the banks being very high. It was traced for 76 chains beyond this, running almost parallel to the river, and in that distance five small breaches of from 15 to 40 ft. in width were noted."

"The total length of bund is almost exactly nine miles, and in that distance there is only one very serious breach. If this were fully restored, it would form a tank covering not less than 5,000 but probably nearer 6,000 acres."

The remarkable capabilities of this great bund can hardly fail to grip the attention of those who would see the broad acres below it reclaimed from unprofitable jungle wastes.

Were the bund restored, it would probably be found that the drainage area would be insufficient to keep it full. It is certain that the supply of water will not serve the needs of the entire irrigable area below.

But closely linked with the many possibilities of reclamation are the problems of re-construction. Blair throws out the possibility of doubling the drainage area by diverting the waters of the Radawige-oya which joins the Amban-ganga at the mouth of the channel, even if the complete restoration of the anicut was not considered advisable.

More ambitious undertakings, however, hover round the restoration of the Angamedilla channel and recreating "Parakrama's Sea" by harnessing once again into service the Minipe-ela Scheme.

Note.—Mudaliyar Louis de Zoysa's translation of the Mahawansa reads: " He likewise built the great tank known by the name of the Lake of Parakrama also the tanks *Mahinda Ekaha-wapi*, literally 'The tank of One day,' the *Sagara* (sea) of Parakrama and the waterfall *Kottabaddha*."

The translator goes on to explain that this is either a clerical error, or there were more than one "Sea of Parakrama." A curious passage in the Raja Ratnakara, speaks of the construction by this king of three great tanks known by the names Maha Samudraya, Bana Samudraya, and Mati or Mani Sagara. (Journal R. A. S. (C. B.), Vol. III., No. IX.)

CHAPTER IV.

THE MINIPE-ELA AND THE KALINGA-ELA SCHEMES.

(i.) *The Minipe-ela Scheme.*

Even up to comparatively recent times, the valley extending along the base of the Laggala hills, and bounded on the east by the Mahaweli-ganga, formed one of the most valuable possessions of the Kandyan Crown.

It comprises that part of Bintenne which from ancient times was known as Minipe—"The mine district" or "gem district." Its populous prosperity and renown was disclosed at the time Spillberg, the Dutch Admiral, passed through on his way to see the King in 1602, and on this occasion, great quantities of gems procured from the Minipe district were sold to his men by the people.* But apart from these tales which veil its possibilities as a gemming district, the immense grassy plains, called *Dammanas*—"lovely park-country with high trees dotted about,"—afford abundant evidence of prosperity as an agricultural area.

These "dammanas" were at one time fields in which paddy was sown. Occasionally, from the days of early invasions, they were the battle-grounds of the ancient kings of Ceylon. The area was finally laid waste by the Portuguese during the raids of de Saay Noronha and Oliverez*; while its present un-productive desolation was undoubtedly precipitated by the neglect of its chief and primary asset—the Minipe-ela.

It is said that in the reign of King Daasenkelliya (A.I. 459) there lived in the spot named Handaganawa on the slopes of the Dumbera mountains, a tribe of Vedddhas—at that time called Yakkos. The King invited them to help in building a large channel and an anicut across the Mahaweli-ganga.

To this day the ruins of the channel, sometimes called the Minipe-ela, is also named Yaka-bendi-ela (the channel constructed by the Yakko), while the spot where the remains of the anicut stand is named Yakkundawa "thrown across by the Yakkos."†

This gigantic work which excites the wonder of the modern engineer consists of a scheme which turns the Mahaweli-ganga, at a bend in the river, where a large body of water enters a narrow channel formed by an island contiguous to the bank, partially closed by two rocks which intercept the water on its return to the main stream.

These rocks, when united by masonry became a dam, raising the waters in the natural channel to a great height.

The Minipe-ela, emerging from the base of this reservoir, received this precious supply of water and carries it northwards at a much higher level than the river.

Sir Henry Ward, basing his observation on legend and partial attempts at exploration describes it as an "Artificial Canal, extending as far north as Polinaruwa, where it came, if not into actual contact with the Ella-harra Canal, at all events, into the immediate vicinity of the scheme of internal navigation, known as the "Sea of Prakrama" and formed a corresponding branch, extending 50 miles to the South, and, probably, used for Boat traffic as well as for irrigation."‡

Yet, it might as truly be said to-day as it was said by Tennent nearly 75 years ago: "The strongest feeling awakened at this remarkable spot is that of deep regret on seeing this prodigious agent of enrichment and civilization (the Mahaweli-ganga) rolling its idle waste of waters to the sea. It sweeps through luxuriant solitudes, past wide expanses of rich but now unproductive land, and under the very shade of forests whose timber and cabinet woods alone would form the wealth of an industrious people."

One of the earliest attempts to trace the line of this artificial channel was made by Messrs. Adams and Brodie in 1858. They were the first to advance the view that the Angamedilla channel was a continuation of the Minipe-ela.

* Extract.—Neville. Ceylon Literary Register Vol. II., 1894.

† History of "Weddas of Ceylon"—Mudaliyar A. de Silva.

‡ Sir Henry Ward's Collected Minutes and Papers.

The following extracts from Brodie's diary (1858), are not uninteresting and will help the reader to visualize the zeal and indefatigable energy displayed by the pioneer in early attempts to throw light on the lost traces of ancient civilization in the Island :—

September 15 (Camped near Angamedilla).

"Out very early on the plains but saw nothing, sent out parties to search for the ela supposed to join the Amban-ganga to the Mahaweli-ganga. The people seem to know nothing of it, nor of the country through which it is supposed to run.

"In the evening went to see Prakrama's great spill water. (The Angamedilla anicut.) He selected a bed where the water ran over uptilted ranges of rock. He then seems to have cut out his new channel and lined it neatly on the outside of the curve and having done this allowed the river to enter the canal. He then set to work and built a long but very low spill water along the previously mentioned ridges. The idea was I (think) more practical than that adopted at Elahera, at the south end of the spill searched for the end of the Minipe-ela but with no certain success. There are however two elas these running longitudinally.

"The lowest of these I fancy simply the stream intended for Dambegollewela while the upper may be Minipe.

"Went out again to these elas ordering my servants to go on to Rotawella. Followed on Welikanda for about 2 miles and it then stopped suddenly, not disappearing gradually but coming to an abrupt termination just where the natural water course crosses its stream. Examined the jungle in all directions but could not find its continuation then went back thinking we might somewhere have got out of the original ela but still in vain, so determined to strike through the jungle towards Kotawella pushed through the bushes followed elephant and so on and at last found ourselves on the Amban-ganga about a mile above Angamedilla walked to meet villagers then on to this, three miles. As to the Elas all I suppose is that the embankments we saw were the dams of elas fed somehow at their summit levels and declining on one side to the Amban-ganga above the dam on the other to Pale and Dantagolletenna respectively and that they were carried merely round the spill leaving the water to follow its natural course.

"We still think that the upper of these is the continuation of the Minipe-ela and that the lower must have been joined at a subsequent period, if they are elas at all in the true sense of the word and not mere K is a fine moor village with a large field but cholera made sad havoc a few years ago, at last I am convinced that in this part of the country at least the people are dying off the face of the land.

"Detained a long time about a few coolies required to carry supplies to the next station. The vidhana did not do his duty as he had in the previous evening promised to have them all in readiness for which he was informed that he would be reported to Mr. Morris, we found the distance to Nasgama about 10 or 12 miles just what the villagers called it. The country is quite uninhabited. Breakfasted in the dry channel of a stream near a hollow in a rock which contained some peasoupy substance which the people called water. Encamped just where the Nasgama-oya joins the fine Mahaweli-ganga here a noble stream probably 130 or 150 yards across. There are no houses, just on the northern side of the Tributary, observed 4 or 5 small ruined dagobas regarding which the people have not even a tradition, though some say there was a city at the place. I find that the spot is called indifferently Wassgama and Walapana. It may be that the latter is an erroneous derivation from the former and that the latter is really a Pali or Sanscrit word for which search may be made in the Mahavansa."

September 20.

"Left our bivouac, breakfasted in another dry river channel and then came on to Halabolawela whole distance probably not more than 12 miles, when within 4 miles or so of our halting place sent on our attendants and plunging into the jungle for about half a mile from which we had a magnificent view of the Kandyan and Badulla Mountains. One of our people killed two deer with a discharge of buck shot, broke them and got them carried on, our larder being in too reduced a condition to permit of extravagant charity to jackals and other vagrants. Had a long talk with the people about the repair of the Minipe-ela between Hin-ganga and this. They say it is altogether beyond their powers, we will see."

September 21.

"After an early breakfast walked together to the bed of the field and then parted. Mr. Adams surveying northwards towards the Wapagama-oya. I southwards towards Hin-ganga. Mr. Adams reached the former river and observed that the ela crosses it and continues towards Angamedilla, our next trip towards this part of the country will, I doubt not, enable us to complete this last link. I did a good many miles from Hin-ganga. The dam is in some places 30 or 40 ft high in other places has almost disappeared. Made some inquiries about Wijeyapura which must have been near Wijeyakanda some 5 miles west of where the Minipe-ela crossed the Wassagama and also about Kalingu Nuwara which must be about 4 miles north of Wassagama."

September 22.

"Left Halabolawela and came into Wilgomuwa passing but a single hamlet Okgommuwa, the field of which belongs to the Gabada Nilame. Had exquisite views of the hills from some heights. After a late breakfast started to continue the survey southwards towards Hin-ganga could not find the place where I left off till after some loss of time. Then walked most manfully till past six, found our way home through the forest partly along the banks of the river made chules and reached home about half past eight."

September 23.

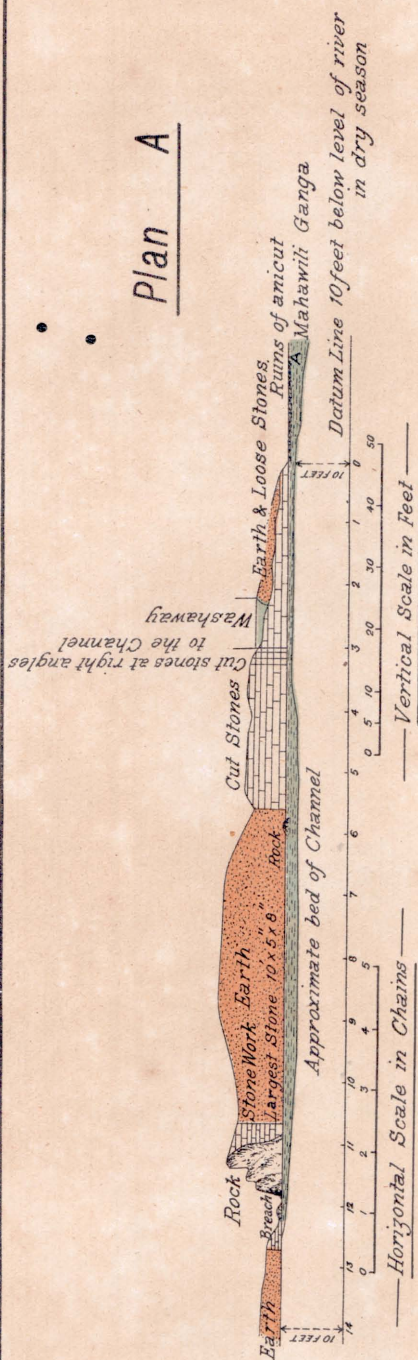
"Parted from Mr. Adams who is to go on tracing the Minipe-ela southwards I going to Pallegama. Immediately on arriving started for the amuna to see whether it would be practicable to avoid a dam altogether by commencing the ela at a place some distance further on, do not think it would answer, there being much rock in the line, at any rate a very small spill will answer. I spoke to the people about the possible repair of Dasgiriya, all delighted with the idea. They say that judging from the look of the ground the old field must have been about a mile in breadth"

In the report of the Irrigation Commissions appearing in Sessional Papers of 1867, allusion is made to the Minipe-ela. It was however not till 1898 that investigations proved the possibility of the traditional story which alleges that it crossed the Amban-ganga and ended at Polonnaruwa.

Unfortunately, no systematic search was made for the traces of this channel in the 1898 surveys and as a result only stray sections of it were delineated on our maps. But setting off the results against the difficulties which had to be contended with in searching for the traces of a bund hidden by a wilderness of thorn and bramble, in an area where there was little hope of enlisting the help of villagers who had come upon traces in the course of their wanderings, much had been done. It was proved that the ancient channel must have crossed the Nawagaha-ela above the Malagomuawawewa which must then have been filled by the water from the Minipe-ela. It is almost certain that it was thus filled, for faint traces of an amuna (anicut) were found in the Nawagaha-ela above the tank.



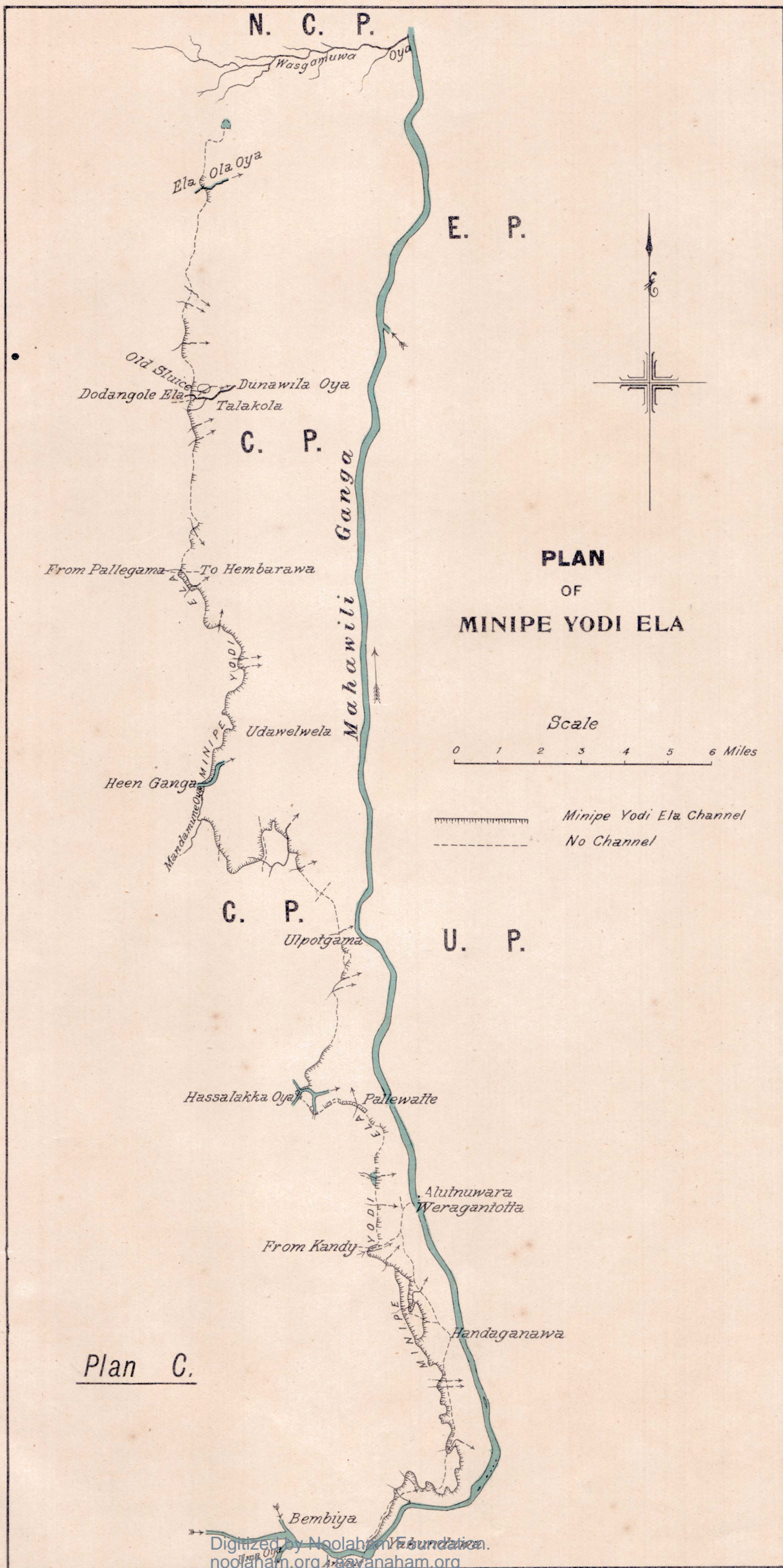
Plan A



Plan B



PLAN
OF
MINIPE YODI ELA HEADWORKS



Blair describes the Malagomuwa-wewa as "a sheet of shallow water covering about 40 acres, retained by a bund in perfect order on the south-east, joining two hills of bare rock." He goes on to say that "North of it the Nagaha-ali-ela (Nawagaha-ela) flows through a narrow gorge between two hills of bare rock, and it is here that the tank was breached. A bund 60 ft. long and 30 ft. high with a sluice and spill in it would cover 200 or 300 acres and irrigate the land between it and the Mahaweli-ganga. To this day names of *fields* are given to stretches of open land below it, testifying to its former usefulness, and the ruins of an ancient stone amuna were found in the stream issuing from the tank."

But getting back from this digression, a deal of information regarding the Minipe-ela is afforded in a very full report submitted by Mr. Charles Erskine of the Survey Department.

He says "The anicut, or what remains of it after many hundreds of years wash, is still to be seen in the shape of some loose stones below the surface of the river, and the intake of water even now is considerable."

"I visited the headworks," he goes on to say, "on the 28th and 29th August, 1903, when the river was rather low. I made a careful survey of the headworks, and I now submit two large scale plans, the A plan is a vertical section showing the stonework, height of earthwork, breach, &c. I also submit plan C on a scale of one mile to the inch from the topographical surveys carried out by my Assistants. This shows what portions of the channel are now to be found, and gives a general idea of the lay of the whole channel. The cut stonework at the base of the anicut and near the mouth of the channel is in fairly good repair. A peculiarity here is the stones being placed at right angles to the channel instead of parallel to it. The water overflows here when the river is flooded, and it has formed a channel through the middle of the Island. Next to the stonework comes the earthwork, and then again some stonework in good repair adjoining a natural rock and close to the breach. The largest stone I measured was 10 ft. 5 in. long and 8 in. high, all the others ranging from 6 ft. to 3 ft. in length. The breach, as I have already mentioned, begins at the natural rock, and is about 60 to 80 ft. wide. This must have been the site of an ancient flood spill, for there are nine holes 6 in. to 10 in. square and 6 in. deep in the rock bed where the supporting pillars of the spill must have been built. There is a good flow of water even now along the channel up to this breach, where it flows through and rejoins the Mahaweli-ganga. From this point the channel follows closely the course of the river, and for over 2 miles it is never more than a few chains away from it, as the foothills there extend almost to the bank of the river. If the breach above-mentioned was repaired, the water would flow along the channel for 10 miles, the other breaches being only very small ones where the small streams have forced their way through the channel. I walked along the channel for some miles, taking measurements of the bund in several places. Soon after leaving the main breach at the headworks, there is a retaining wall on the lower side of the channel extending for about half a mile. This wall is built of cut stones, the same as at the headworks, and in some places where the channel is close to the river it is 6 ft. high, and is evidently constructed to prevent the channel being washed away by the river, or it may be to raise the channel to the required level. All this stonework must have taken an enormous amount of time and labour to build, for it is put together with great skill. In one place I measured the embankment, which was 37 ft. high and 6 ft. wide at the top. It looked like the bund of a huge tank. The bed of the channel here was 15 ft. wide, but in many places it was 20 ft. wide. About 2 miles along the channel the bund was only from 3 to 6 ft. high. The channel appears to be traced most carefully, very deep cuttings being avoided wherever possible, and the winding course of the channel can be seen on the plan. The guide who accompanied me along the channel told me that about forty years ago Ganegoda Ratemahatmaya of Harispattu restored the channel in a sufficient manner to take the water as far as the Handaganawa fields, a distance of about 10 miles, and that these fields had been cultivated three times only when Ganegoda Ratemahatmaya died and the channel fell again into ruin. The guide also pointed out to me the patch, work of Ganegoda Ratemahatmaya here and there along the retaining wall already described by me."*

"The channel is easily traced up to the crossing of the Kandy-Alutnuwara road, and Mr. J. F. Dickson, who many years ago was Government Agent of the Central Province, says in his report that Mr. Adams, who walked along the bed of the channel as far as Handaganawa, about 9 miles, found only two breaches of any considerable size. The Minipe Yodi-ela must have irrigated nearly all the lands lying between it and the Mahaweli-ganga, as the land is quite flat the channel itself having being taken along the foot of the high range of hills. The channel divides into two branches (see plan C) close to Handaganawa, and after 2½ miles they join. It is difficult to understand why this loop in the channel was built, unless it was done to give a shorter course with a greater fall. There are only eight small streams crossing the channel from the headworks to the Kandy-Alutnuwara road, a distance of 12 miles, and none of them have any water in the dry season. These are shown on plan C."

"Beyond the above road the channel cannot be traced in many places, and these I have shown on plan C in a broken line. The firm blue line shows those portions of the bund which at present exist. A careful and diligent search was made by each of my Assistants for the channel where it ran through their blocks."

"Every advantage has been taken by the ancient engineers of any small ridge or high ground for a bund. As far as Talakola, a village some 30 miles by channel from the headworks, there is nothing of importance to be seen along the channel, excepting that it crosses some large rivers, the Hassalaka-oia, Hin-ganga, and Hettipola-oia, but there are no signs of anicuts in these rivers."

"At Talakola there is an ancient sluice in the channel, which is used now to bring the water of another stream—the Dodangole-ela—to the Talakola fields. Beyond this village the channel could only be traced in small pieces to a small tank, some distance north of the Elaola-oia, a tributary of the Wasgamuna-oia, and 47 miles from the headworks."

"I walked up the bed of the Wasgamuna-oia (which is the Province boundary) to its source, a distance of 9 miles, and searched carefully for the crossing of the Minipe-ela, but found no signs of any dam. From the Wasgamuna-oia the channel is supposed to have run closer and closer to the Sudukanda range and eventually to have entered the Amban-ganga, just above the Angamedilla anicut. . . . As to the resoration of the Minipe channel, I leave it to those who know more about irrigation works than I do, to pay a visit to this great and ancient channel, but I am certain that it would not be an expensive work to restore the channel as far as the crossing of the Kandy-Alutnuwara road, for down to that point it is in fairly good repair, and the land that is now a howling wilderness could be put to better use. Of course it will be difficult to induce people to settle in such a feverstricken country as this, yet the villagers of Handaganawa and Yahalagama, Weragantota, &c., are craving for the channel to be restored. There is a good path, which I have shown on plan C, from Weragantota or Alutnuwara right up to the headworks, and a horse could be taken along it, excepting where there are fallen trees across the path.†

* H. B. Rambukwella, Ratemahatmaya of Uda Dumbura, is said to have organized. The villagers likely to be benefited, and effected repairs in recent years to portions of the Minipe-ela, near the head-works.

† Administration Report, Survey Department 1903.

(ii.) *The Kalinga-ela Scheme.*

There is a small island in the Mahaweli-ganga, about four miles north of Dastota, round which the waters of the river swirl with extreme impetuosity. To judge from the ruins of buildings, it was a proud spot in the days of old. It was known as Kalinga-nuwara—so called after a kingdom in India of that name. The early Sinhalese Kings of the Great dynasty, claim descent from the royal family of Kalinga.

The section of the Mahaweli-ganga between this island and the sea off Trincomalee was of sufficient depth at all times to be navigable for small vessels. The historian Valentyn states that even up to recent times the kings of Kandy had establishments near this spot for building galleys and “tsampans.”

Above the island of Kalinga, the Mahaweli-ganga loses its sandy character and flows over rocks of granite.

Making the most of this rocky obstruction which presents a series of rapids and falls sometimes of 12 feet and upwards, the ancient Sinhalese built an anicut across the river. The great massive, square hewn, blocks of stone—some weighing two or three tons perhaps, are there to this day. When they served as an effective dam, the rushing waters which had evaded the trap at Yakkundawa, were turned into two channels, one on the right and the other on the left bank of the river.

The story of the origin of this superb irrigation scheme is lost in the mists of centuries, but it is not unlikely that the channel on the left was one of the great canals formed by King Datusena or Daasenkelliya (A.D. 459.)

More authentic identifications, however, assign its re-construction and perhaps the extension of the scheme, to the reign of Parakrama Bahu. It is recorded in the Mahawansa, that this monarch built “the channel Aciravati that proceeded towards the west (left bank) of the Mahavaluka-ganga and was designed to turn away the danger of famine for a long time; the channel Gomati which proceeded *thence* towards the east side.”

The possibility that the Mahawansa makes allusion in this reference to some other spot on the Mahaweli-ganga, is very remote. Nowhere are there any traces of channels which branch off to the right and left from one point in the river, other than at Kalinga.

Blair says that if the reports of the village inhabitants as to the destination of the channel in the Egoda pattu, that is to say, on the right bank of the river, is confirmed, it will be found to be over 50 miles long. As a matter of fact, it was traced and surveyed for a distance of 21 miles to the northern end of Gunner's Quoin.

It follows closely the contour of the ground and its earthworks in consequence are not large, rarely exceeding 8 feet in height. In many parts the water was conveyed between two bunds about 70 feet apart. The breaches in it are very numerous, while at many places the earthworks are barely visible. How circuitous is its course may be judged from the fact that its 21st mile is only 11 miles distant from the anicut.”

“Four and a half miles from the anicut the channel almost touches Yakkure tank, about 130 acres in extent, which must once have been filled by it, but which now depends upon local drainage. From its ninth to its fourteenth mile the channel forms the southern boundary of Bendi Villu, a great natural lake covering 1,500 acres filled by the flood waters of the Mahaweli-ganga, to which it is connected by several *Kotaliyas* or back-waters. At its eighteenth mile, near Horiwila village, the channel enters a small abandoned tank which must have always been kept at spill level, and about a quarter of a mile beyond, it emerges from the tank and winds through park-country round the base of the Gunner's Quoin hill or Dimbulagala, till at the twenty-first mile it crosses the path from Mannanpitiya to Maha Ulpota where the 1898 survey ends.”*

There is no reason to doubt the validity of the village tales which suggest that this channel continues further, to near the Virigul-aru, a direct distance of 22 miles more.

The channel which takes off on the left bank of the river is called by Nevill the Kalinga Canal.

Venturing to piece together such fragments of evidence that remain, it is not unreasonable to assume that this channel too ran almost as far as the Trincomalee border. Traces of it were surveyed from the Kalinga anicut for a distance of three quarters of a mile to the crossing of the Pitakinda-ela. There, the bund was lost. It was picked up again two and a half miles from the anicut and surveyed a distance of $7\frac{1}{2}$ miles where it enters a back-water of the Amban-ganga called the Nabudagas Kotaliya, which perhaps as a make-shift, was in subsequent years linked up to supply Dastotawewa with water. But the size of the earthworks and the width of the bed of this channel afforded evidence that it was meant to carry a much greater volume of water than was needed for irrigating the tract of land which lay below the channel and the main river. Such evidence weighs heavily in bridging the gaps and in support of the theory that the channel originally fell into the Amban-ganga near the crossing of the road from Dastota to Topawewa.

Perhaps the Kalinga Canal was from this point carried across the Amban-ganga by a dam, or some other engineering achievement of which no trace is left today, it would appear to have been eventually diverted along the Gal Kotaliya joining up with the very definite channel trace that has from this point been picked up and delineated many miles northward on modern maps.

If the Angamedilla anicut and the Kalinga Channel did at one time function together, there must have been on the north of the Amban-ganga, a great lake, with sluices along its bund irrigating a strip of land which lay between that bund and the bund of the Kalinga Channel. Between the Kalinga Channel and the Mahaweli-ganga one might picture another stretch of fields which reached as far as Mahagantota and for miles northward on the left bank of the great river.

Nevertheless, such visions of plenty, and of vast tracts of luxuriant fields, hinge on a pertinent question: Did these parallel channels function together or had the Kalinga Canal an inherent defect which limited its usefulness and in consequence centralized ancient engineering talent on the more ambitious scheme further up the Amban-ganga?

Nevill has considered this and says “only a scientific survey can answer.”

“If this was the case” he adds, “the restoration of both schemes would for that section effect the same result as the restoration of one. The Kalinga anicut would be a very costly work, the Amban-ganga anicut (at Angamadilla) presents no prohibitory features, if once cultivation was resumed to utilize it.”

In concluding his notes on this subject Nevill ventures on a digression which is not without a great measure of value at the present day.

He says “As to the country irrigated, the borders of the river bear high forest, which should be rigorously conserved owing to the water carriage facilities for timber transport. The rest of the land is not only, where low enough, fit for rice, but would, I think, give good returns with irrigation if cultivated with cotton on the Egyptian system. Much, however, of the lower lands are of ideal soil, deep and rich, for cacao, and I believe that cacao cultivated here, with irrigation by means of little channels to keep the surface soil cool and moist, will be a permanent success. I therefore recommend a small trial on this system, and then the restoration of this work or works, primarily for cultivation of cacao and cotton, not rice, on the irrigable land, leaving the surplus water of the lake or sea available as of old for rice cultivation in other parts of the district, excluding the fertile strip between the lake and river, which I believe to be so well suited for cacao.”

* Surveyor-General's Administration Report, 1898.

CHAPTER V.

THE YODIYE-BENDI-ELA, THE ELAHERA CANAL, AND THE CHAIN OF MAJOR TANKS.

(i.) *The Yodiye-bendi-ela.*

No evidence is better calculated to impress people with a due appreciation of the indomitable perseverance of the old-time engineer on works of irrigation than what remains of a connected scheme which tapped the Amban-ganga and its affluent—the Kalu-ganga.

The Elahera Canal which forms a part of it unquestionably ranks first among the channels which at one time carried a ribbon-like trail of sluggish water, over imperceptible gradients—from the foot-hills to the plains in the north-central regions of the Island.

This remarkable relic of ancient irrigation is generally assumed to have diverted the waters of the Amban-ganga and to have conducted them ultimately to Tambalagam Bay, linking among others the major tanks Minneriya, Kaudulla, and Kantalai. But this popular idea is disputed by tradition which tells that the canal did not really begin at Elahera, but at a point directly 15 miles further south where a dam had been thrown across the head-waters of the Kalu-ganga and water conducted to Elahera by a channel 30 to 35 miles in length.

In 1856, Alex. Young Adams, who was told this story by “a priest in Kandapolla,” determined on making further inquiries regarding the alleged tradition. Having done so, he says, “I have ascertained that the information received from the priest was correct.” By this scheme, the water of the Kalu-ganga was led to the Amban-ganga, into which it fell at a point above the great Elahera Anicut. The tributary and the main river were thereby turned into the lower section which we to-day call the Elahera Canal.

It is but natural that it should have been considered a super-human accomplishment to trammel both these rivers and to carry the water over the rugged stretch of country which lay between them. There is consequently small reason to wonder why the ancients referred to the head-works of the Elahera Scheme as the Yodiye-bendi-ela, which literally means “the canal cut by giants.”

Adams tells in a memorandum which sets out the results of his investigations* that the first point at which he came on the traces of the Yodiye-bendi-ela was at an abandoned village 12 to 14 miles from Elahera.

From this point he followed it for about 2 miles but was obliged from the thickness of the jungle to abandon the course and pursue an elephant track which crossed and re-crossed the bed of the channel for many miles.

Ultimately, he traced the channel to its headworks, at the Kalu-ganga where he came upon the remains of ancient stone-work which the people called the Hattotte Amuna.

“On this river,” he tells, “as on the Amban-ganga at Ellehara, advantage has been taken of a natural rock running across the whole breadth of the river, and on this as a foundation, a masonry dam was constructed by which the water was turned into the Canal.”

It must be left to the expert archaeologist to say by whom and when this particular anicut and channel were constructed. Adams drawing on the evidence that the embankment of the channel was less perfect than the embankment below Elahera, and from the circumstance that the stone-work of the dam is of a wilder character than that of the one across the Amban-ganga, ventures to suggest that the Hattotte Amuna and the Yodiye-bendi-ela might have been constructed at an earlier period than the Elahera Canal. Yet, against this, he urges that “both these differences might be referable to the circumstance of the body of water to be turned by the Dam, and conducted by this Canal, being much smaller than that at Ellehara.”

If this explanation is to be relied on, it would not be unreasonable to associate the works with the statement in the Mahawansa that Parakrama Bahu turned the waters of the Karaganga into the “Sea of Parakrama” although this would upset Nevill’s theory for the location of the “Sea.” The similarity of the names Kalu-ganga and Karaganga are perhaps remarkable.

But, such reasoning, based on controversial differences and theories, cannot naturally be definitely sifted by the glimmering ray which lights up the dawn of history.

Until experts tell us otherwise, there is much which sufficiently identifies the “Karaganga” with the Amban-ganga. Much that proves the Elahera Canal to have been the original work of Mahasen, the Yodiye-bendi-ela to have possibly been a later undertaking for affording more waters when other larger tanks were linked up, and for supposing that the Angamedilla Channel was the “Godaviree” Canal which diverted the waters of the “Karaganga” into the “Sea of Parakrama.”†

While Adams was examining the Hattotte Amuna, an old Gamarala‡ is said to have told him “We have always had a tradition in our village, that the king kept boats at Elahera, tied to a tamarind-tree there, and that they were sent up with people to clean the Canal.”

About 5½ miles down the Elahera Canal there is a tamarind-tree§ of patriarchal age and gigantic dimensions on which the peasantry point to marks said to have been left by the ropes that were used in ancient times to moor boats at this point.

A strange circumstance which sheds interest to the story told by the Gamarala is stressed by Adams, who tells that on questioning the old man he found he did not know of the existence of the historic tree at Elahera, but spoke merely from traditional knowledge.

The evidence, based on strong traditional assertion taken in conjunction with the testimony of the earliest investigator, therefore leaves no room for doubt that the Yodiye-bendi-ela and the Elahera Canal formed one continuous water-way, and that it served the twofold object of irrigation and water carriage by permitting boat traffic.

In 1858, the anicut on the Kalu-ganga, and the Yodiye-bendi-ela, were inspected by Brodie who makes reference to these works in his diary.¶ The following are extracts from his notes:—

September 10.—Struck tent and sent out people to Pallegama. Kalu-ganga (village) some 8 miles below on the same river—Kalu-ganga. Taking the Korala and some Kattie men with us walked rapidly down the left bank about 2 miles to the old amuna built by Prakrama Bahu. It was formed at a spot where numerous sheets of rock intersect the stream, dividing it into small channels and gullies. The bank on each side is also rocky and elevated, in fact the site was well chosen. On the right bank and close to the river is a spill water formed of huge prismatic blocks of granite, one of which was found to be 12' 6" by 2' 9" by 1' 2" and therefore weighing about 3 tons. Of the stone-work only a small portion remains, but the blocks formerly

* See Ceylon Almanac, 1857, Appendix, p. 14..

† See Turnour’s Epitome.

‡ Village patriarch.

§ Tamarindus Indica.

¶ See Brodie’s diary 1858, Extracts in G/CS. 527 C. P. General Irrigation Vol. I.

composing it are now scattered all about and are quite available. The spill-water too would work with slight repairs but seems altogether unnecessary. All that is necessary is to fill up the gullies . . . about £100 would do the work. If a couple or 3 elephants are not given with them—it cannot be done at all.

. . . while our panting attendants rested themselves down, enjoyed the pleasure of fly-fishing with some success. Starting again we took measurements all down the ela. In most places it is distinct enough with its great mounds on either side, at some places however it was scarce traceable having been carried away by cross-streams.

The jungle is for the most part of that peculiar nature which one finds along the bank of streams subject to heavy floods, very leafy but with little fine timber. By this time night had come on, however chulus were sent out to us and we got home well tired out about half past seven. Heard the low growl of elephants near us this morning.

Heard various cases and appointed Vidhana Henaya. Spoke to the people about their Ela which seems to be a most desirable work. We saw a portion of it yesterday just where it branches off from the Kalu-ganga. They still have nearly a mile to do and are going at it as well as they can, considering that there are only about five and twenty available able-bodied men. It runs along the side of the hill and might be extended to Attaragalluva 7 miles below this, and in the intervening space there are hundreds of acres which could be irrigated from it. One of the chief recommendations of this Ela is that it may be extended by degrees, as population increases but the whole is useless till the first mile and a half has been completed which would bring it to this village. I told the people to talk over the matter adding that if they will undertake to finish the work to this within six months, I will ask Government to give them £10.

September 11.—Sent our attendants by the road to Attaragallewa and ourselves proceeded along the Ela. Rode back 2 or 3 miles to the place where we had left off surveying and then proceeded along the Ela first to the branch leading to Dahasgiriya* and then to that to Tibituwala; after this lost it and therefore cannot yet say positively whether the Ela ever was carried across to Elahera. Surveyed on to the Hunukotuwa, a huge embankment which seems useless if not intended to prevent the waters of the Ela from going down towards Tibotuwala. Then walked on briskly to Kande Pitawala where breakfasted under a tree, made a dash of half a mile into the jungle here to see the yakakadawala an enormous bund joining two hills and apparently for the same use as the last. Shortly after this began to descend, saw a large hollow tree ingeniously applied to the purposes of night shooting by having loop-holes cut in various directions, also a detached piece of rock perched on a very slight base and appropriately named.

After this examined the third of the great dams joining hill to hill; this one is on the west side of the Plateau and at the very crest of the cliff. Of what use it can have been seems very difficult to conceive as the waters of the canal. I think could not by any possibility have reached to within 50 ft. of its base.

Descending here, found a little hut nicely got up, examined the magnificent dam and spill water and also the stone pillar which bears an inscription which I shall have copied. Walked on to the little spill water and gave precise instruction about its repairs. Korala is working carefully. Near the village got chules and on again 3 miles to Attaragallewa having walked at least 20 miles and both as fresh as when we started. Pretty scenes when crossing the wide Amban-ganga by torch and moonlight.

The following entry, despite the digression, will perhaps interest some readers.

September 12, Sunday.—Tamby Lebbe of Ambena states. I am now trying to asweddumize 30 or 40 amunas of land at Kuruwipitiya. Taking water from the river I even manage this amuna myself, but the Ela will be about 2 miles long and there is some blasting required.

I have made all preparations and expect my men down today or tomorrow to blast the ground further, originally purchased from Keppetipola Wallauwa. The deed was only made out last year, but was in our possession before. It was in the left bank in Gangala Udasiya. The other (ela) could not be extended, as it winds to a river. I am going to give pieces of the land to those who request.

The Surveyor-General—Lt.-Col. F. C. H. Clarke, mentions in his Administration Report of 1885, that two of his officers, Messrs. Snowdon and Erskine, were employed in a survey of the basin of the Amban-ganga and its affluents for the purpose of obtaining more precise knowledge of the catchment area above the intake of the Elahera Canal, with a view to clearing up some of the complex questions connected with the ancient irrigation system known as the "Sea of Parakrama."

These surveys were continued the following year, and concluded in 1887.

* * *

(ii.) *The Elahera Canal.*

From these references to the Yodiye-bendi-ela and the Hattotte Amuna, we will next turn to the Elahera Anicut and the water-way below it. The well authenticated and documented account of this canal by Messrs. Adams, Churchill, and Bailey, to which allusion was made in a previous chapter† leaves little to add to the subject.

However, the following details of the canal and the chain of major tanks, based on other authorities and on the reports of the Officers of the Survey Department who worked in the area when the Topographical Survey was done in 1898, pronounce many remarkable features—much that is valuable as regards the past, and much that may be of practical use regarding the present—which when taken in conjunction with the early report are decidedly interesting.

The first section of the canal from Elahera to Minneriya lies through a luxuriant region of forest which stretches between the Konduruwewa and Sudukanda ranges, on the west and east respectively.

Anticipating the action of the streams which flow cross-wise down the face of the Konduruwewa range of hills, many safeguards were constructed at intervals along the whole canal.

These consisted of stone foundations and stone pitchings which appear to have resisted the impact of these hill-streams where they entered the canal very effectively. Notwithstanding the centuries which have passed since the canal has been left to the vagaries of turbulent flood-waters which rushed down these streams, the bund at these points has remained intact, forcing the stream to run down the canal and effect a breach where the bund was constructed less solidly, of earth.

Apart from precautions of this type, several "galwanas" or rock-spills were built into the bund at intervals, some of them 50 feet wide with solid wing-walls. These permitted an over-flow from the canal and were distributed at points where there was a possibility the water might rise too high for the safety of the bund.

* A large tract of land in the Matale District, below the Kalu-ganga, was surveyed in 1879, as it was supposed to be irrigable from the Dahasgiriya-ela and anicut, if they were restored.—Administration Report Survey Department.

† See appendix 1.

The sluices which controlled the flow into fields below the bund were invariably of square cut-stones. They opened under the bund and a foot or so above the bed of the canal. Most of these are in ruin and would appear to have been about 2 feet square.

The average height of the bund above the bed of the canal is 15 feet. Near the 12th mile from the anicut it rises from 30 to 35 feet, oftenest on the right bank but sometimes on both. Konduruwewa village is about 19½ miles by canal from Elahera. At the 20¾ mile, the grand trunk canal may be said to end. Its width is from 70 to 200 feet, but its normal width may reasonably be assessed as 100 feet.

The following tabulated description of the trunk-canal has been compiled from Survey Department reports. The mileage is reckoned from the Elahera Anicut.

¼ mile	..	Breach made by Amban-ganga. Gal-wana, 70 feet wide with wing-walls 15 feet high.
2nd mile	..	Village of Elahera.
4th mile	..	Breach made by Kongeta-oya.
5th mile	..	Breach made by Kirandagalle-ela.
5½ mile	..	Historic tamarind-tree called "Orubendi-siyambalagaha," 26 feet in circumference. Growing on top of the embankment.
6¼ mile	..	Gal-wana, 50 feet wide with wing-walls.
6½ mile	..	80 feet breach made by Heerati-oya.
7th mile	..	70 feet breach made by the Bakkamunanne-ela.
7½ mile	..	Gal-wana, much in ruin.
9th mile	..	Sluice of square cut stones. In ruin. Height of bund here 15 feet above bed of canal.
10½ mile	..	50 feet breach made by Kottapitiya-oya.
12th mile	..	Sluice—similar to one at 9th mile but in better repair. Bund here rises to a height of 30 feet above bed of channel. Double bund between 10th and 11th mile.
14½ mile	..	Sluice in good order. Bund rising to 35 feet above bed of canal.
14¾ mile	..	Gal-wana, with wing-walls. Well-built of stone and in good order. Bund drops to 15 feet in height.
16th mile	..	70 feet breach made by Athanakadawela-oya.
16¼ mile	..	Gal-wana—with wing-walls.
16¾ mile	..	Megolla-ela enters the canal.
17½ mile	..	Breach made by Megolla-oya.
18½ mile	..	70 feet breach made by Radawige-oya.
19½ mile	..	Konduruwewa—tank and village. The inhabitants have run a 4 feet dam across the canal and by this means stopped the water collected by the mile and a half of unbreached bund up to the Radawige-oya and formed the Konduruwewa Tank. Ancient sluice in use to irrigate the Konduruwewa fields.
20th mile	..	Gal-wana of smooth rock, 4 ft. above bed of canal and an ancient sluice almost silted up.
20¾ mile	..	Trunk canal ends. Ruins of a masonry dam, or spill, or distribution gate, in too imperfect a state to be identified.

At the end of the trunk canal three channels branch off.

The one on the right, about 30 feet wide and with low earthwork falls into the Nehinne-ela and eventually into Giritale-wewa, 27 miles by water from Elahera Anicut.

About 2½ miles up the Nehinne-ela from the point where it enters Giritale Tank there are remains of a very short but high embankment joining natural hills at either end.

This earthwork could not have been constructed to merely hold up water to irrigate the lands beneath it, for their extent is not great in proportion to the storage capacity of this bund.

It is not impossible that this was intended as a supplementary supply tank for Giritale presuming that it was not a minor work which eventually gave way to the major undertaking of a later date.

The high level channel which branches to the left from the end of the trunk canal is about 50 feet in width. The water is often carried between double bunds rarely more than 10 feet above the bed level.

It has been traced on a very slow fall up to a bund above which are traces of an abandoned tank called Ihakulawewa.

This tank must once have flooded an extent of 200 acres, but there is a bad breach in the bund where to all appearances the ancient sluice was located. The breach is said to have been caused by a spring beneath the bund.

Blair, remarking on this says "certainly there is a very deep pool of cool, clear water in the breach, and this never dries up."*

Returning again to the bifurcation the middle or main channel may be traced for ¾ mile, until it merges into the Talwatura-oya. After flowing four miles along this stream it enters the Minneriya Tank. The point of entry is 25 miles by water from Elahera.

It is but natural to presume that in order that the entire scheme from Elahera to Kantalai would be perpetually operative, Minneriya Tank had to be always kept up to spill level, to do which the Elahera Canal must have had to carry a great body of water.

There are two spills in the northern end of Minneriya Tank at slightly different levels and less than a quarter of a mile apart.

The spill to the east, which is the lower of the two, is the source of a water-way which leaves the tank for the first half mile between high embankments.

This channel is called the Agalawana-oya. After a course of nearly five miles it joins the Gal-oya. At about the fourth mile it enters what must at one time have been the bed of the Kaudulla Tank.

The channel which leaves the Minneriya Tank from the spill to the west is the second section of the Elahera Canal, the main feeder which runs its course to Kantalai.

The following tabulated description of the continuation of the Elahera channel from Minneriya has been compiled from a report by Mr. Blair of the Survey Department. The mileage is reckoned from the Western Spill of Minneriya Tank :—

1½ mile	..	A cross-bund which was intended to divert the water from the channel to the Agalawana-oya or <i>vice versa</i> . This is called Wavekotuwa.
3rd mile	..	Village and Tank, Rotawewa. Bund 18 feet high.
4th mile	..	A loop in the bund retains a small head of water called Matalawewa. Bund 10 feet high.

* The Ihakula Channel is breached at the 1¾ mile from the end of the trunk canal, by the Talwatura-oya, at the 2½ mile by the Irahanduketadamana-oya, and 25 chains further on by a small un-named stream.

- 5th mile .. Crossing, Gal-oya-Polonnaruwa path. Bund 10 feet high.
 6th mile .. 70 feet breach by Gal-oya river. Channel originally crossed the river obliquely evidently to reduce the impact of the water against the embankment. Ten chains up the Gal-oya from this crossing and on the left bank of the river there is a ruin which is said to have been a temporary royal residence used by the king when he travelled by boat along the canal. The bank of the river is faced with stone work here, and it is likely when the river was dammed by the channel bund that the king went by boat right up to the palace gate.
 8th mile .. Smaller breach by Koggala-ela.
 9th mile .. Gal-wana, one chain wide, in ruins. The channel here is 120 feet wide and runs between a double line of embankments.

Between 9th and

- 13th mile .. Five rather bad breaches 30 to 130 feet wide.
 13th mile .. 80 feet breach by Alut-oya. Here too the channel originally crossed the river obliquely.
 13½ mile .. Crossing Alut-oya-Minneriya path. Breach in channel bund.
 14½ mile .. Two breaches by small streams flowing into the abandoned tank, Puliyanakulam.
 15½ mile .. Breach made by small stream.
 16½ mile .. Breach made by small stream which disappears in the flat country lower down.
 16¾ mile .. Crossing Gal-oya-Trincomalee railway line.
 19¾ mile .. Crossing Trincomalee road—culvert at 81st mile on road. Bund 18 feet high.
 20th mile .. Channel merges into Kituluttu-ela which enters Kantalai Tank 3 miles further down.

Whether or not, the channel was continued further is conjectural. It was disclosed at the survey done in 1898, that the channel did not end at the Kituluttu-ela, but that it passed round the western shore of Kantalai Tank. An effort was made to find the trace of this extension. Blair reports that "a faint trace of a bund was followed for about 30 chains in a north-western direction and then all traces of it was lost."

But yet, they say, that once upon a time Lake Tambalagam was green with waving rice-fields watered by means of a canal that was brought to them from the great Kantalai Lake by one of those ancient kings of the Island whom nothing ever seemed to daunt in the way of public works. The sluices and control-points long ceased to serve their purpose. So it was, that too much water was suffered to flow down the channels and the teeming rice-fields became a lagoon.

Between Kantalai Tank and Tambalagam there lies to-day a stretch of wild and un-peopled land. Nevertheless, we have the evidence of modern survey maps that proves the existence of a continuous water-way affording irrigation facilities which linked up Mahasen's channel and Kantalai Tank to the sea.

The Elahera Canal, a total length of water-way of 54½ miles from the anicut to Kantalai Tank, affords possibilities for restoration which have appealed to popular imagination time and again from the days of the Dutch occupation. In 1884, on the recommendations of the then Assistant Government Agent at Matale a scheme of restoration was launched and the work commenced. Six years later, after 54,000 rupees had been spent, another Assistant Government Agent drew attention to great engineering difficulties in the way of development, the cost of which would probably be found prohibitive. He moreover, pointed out that the channel passed through an absolutely uninhabited country, and that the locality was reputed to be unhealthy. The work was in consequence stopped with the result that not a single additional acre was brought into cultivation.

Sir John Keane Bart, (R. A.) in his report on Irrigation in Ceylon* draws on these circumstances as an illustration of a work that has failed for want of a definite policy and careful previous examination.

* * *

(iii.) *Kantalai Tank and Vendarasan Kulam.*

The Tank of Kantalai presents to the eye a scene of singular beauty. In the opinion of connoisseurs, it is the most beautiful lake in Ceylon.

"Greatness of expanse is not a absolutely necessary for the formation of perfect lake scenery," says Pridham ; "it is the peculiar beauty of the waters of Kandella that in their case the ground ascends everywhere from their edge with a nearly equal degree of boldness."†

The same writer says : "Independently of the cheerful and refreshing appearance, which open plains and a large sheet of water present in a wooded country and warm climate, this place has also strong claims to admiration for its numerous groups of forest-trees, scattered through the plains which intervene between the lake and the thick jungle covering the rising ground and the hills on the west and north of Gantalawe."

The natural charm of Kantalai Tank has helped Cave‡ to create a forcible picture which many a traveller of decades past can doubtless recall. He says :—

"After several hours of travelling through the dense forest, it is with a shock of delight that the monotony is broken by the sudden appearance of a beautiful lake stretching away for miles to dreamy ranges of distant hills, whose beauties are reflected in its calm waters. Life and light combine to greet us as we emerge from the dense jungle. Flashes of every tint appear as the gay birds are startled by our approach. We stand enchanted by the scene. All is still save the voices of the creatures that dwell on these beautiful inland shores.

"Spotted deer are browsing ; peacocks airing their gaudy plumage, strut o'er the plain ; the majestic elephant is enjoying his evening bath in the shallows ; herds of buffaloes leave the shade of the woods to slake their thirst ; grim crocodiles are basking on the shore or watching their prey ; troops of chattering monkeys are sky-larking in the trees, while the stately cranes and pink flamingoes stalk the shallows. Such are the scenes that surround the tank or lake of Kanthalai."

Suppose we for a moment go back to the ages before history to the 512th year of the *Kali* era which corresponds to the year 2590 B.C. "An oracle had declared that over the dominions of one of the kings of the Dekkan impended a peril, which was only to be averted by the sacrifice of his infant daughter ; who was in consequence, committed to the sea in an ark of sandal wood. The child was wafted to the coast of Ceylon and landed south of Trincomalee, at a place still known by the name of Pannoa, or "smiling infant," where, being adopted by the king of that district, she succeeded to his dominions."

Meantime, a Hindu prince having been urged by a vision repaired to Ceylon and began erecting a temple on the rocky promontory off Trincomalee, called to-day Swamy Rock.

The princess hearing of his arrival sent an army to expel him—but concluded the war by accepting him as her husband. In order to endow the temple which her consort had built, called the "Temple of a Thousand Columns," she attached to it the vast rice fields of Tambalagam and built the Kantalai Tank for the purpose of irrigating the surrounding plain.

* Sessional Paper XLV. of 1905.

† The present area of Kantalai tank is 3,750 acres.

‡ See "Golden Tips," p. 383.

That Kantalai was invested with very early religious associations is undisputed; for even recently a statue of the god Vishnu was discovered buried with other architectural fragments which point to the presence of a shrine. But the legend of the building of the tank by the princess is perhaps erroneous. The Mahawansa chronicles that it was built by Maha Sen, and it was apparently undertaken "towards the end of his reign which terminated A.D. 301.*

An apostate from orthodox Buddhism in his youth, he became a firm believer and a bigot in his later years, and bestowed all the lands irrigated by this lake on religious establishments, from this circumstance it derived its name of Dantalawe or Gantalawe (plain gifted to temples) corrupted by Europeans into Kandelly."†

The Hindu tradition which claims the existence of this tank before the days of Mahasen is however supported by another alluring legend.

It tells that king Gaja Bahu (A.D. 113) marched from Anuradhapura with the idea of demolishing the "Konesar Temple" at Trincomalee and to convert it into a Buddhist vihare. When nearing Kantalai Tank he is said to have been miraculously cured of his blindness by a Brahman and to have become a Hindu. The tank is said to have been named on this account Kandalai—meaning, "eye grows."‡

What perhaps is the earliest report on the Kantalai Tank was furnished by the Engineer, Tornbauer, in 1793 to the Dutch Governor, Jacob Willem van de Graff.

The peculiar value which is traceable to it at the present day, is that a century and a half ago, the immense possibilities for irrigation afforded by this tank and the advantages to be gained by restoration of the ancient scheme, were realized by a Government whose activities were merely confined to the maritime regions of the Island; and who were not in a position to investigate the headwork of the Scheme.

Tornbauer, in addressing the Governor, says: "Excellent Sir—In pursuance of your order . . . the sworn Surveyor of this place M. Johan Frederick Struys, has surveyed and designed on the accompanying chart, the Lake of Candelay and the fields which it may be made to irrigate; and I now take the liberty to submit to Your Excellency this report on the situation, size, and circumstances of that lake, and of the cultivable ground connected with it."

The Chart might, or might not, be hidden away with old-time records of the period, but from the report which accompanied it, translated by Mr. George Lee,§ the following observations are extracted:—

"The lake is almost entirely of natural formation . . . Two defences of piled-up unhewn stones which protect the gradual ascent of the two hills against the effects of the waters, and two aqueducts of hewn stone, through which the lake discharges itself, are the only artificial aids which the eye can discover. Close to the village of Candelay (Kantalai) the water from the two courses unites itself in a narrow stream and winds through high bushy land between deeply made shores towards the village of Tambalagam lying five hours' distant; and hence it is conducted by hundreds of little channels to the extensive rice-grounds. In very heavy rains, and as long as the water . . . high, the lake also empties itself through a canal called Kudamkadam pavan (Kusumbakada Vaan-ela) which is however of no service to the agriculturist."

Reporting on the water-courses, meaning the sluices, he says:

" . . . it is perceived from the outside that they are composed of heavy hewn stones with no cement beyond their own weight, a square opening 5 feet broad and nearly 4 feet high is divided into two by a separation of stones 20 inches thick and hence in each water-couse there arises two gutters . . . These courses are fully 200 feet long and lie concealed under a hill (bund) 50 feet high."

Venturing to assign probable reasons why the ducts of the sluices, on the edge of the lake are smaller than on the outside, where they discharge, he says:—

"When the courses are stopped up, they have to be cleared inside by persons who enter into them. If the opening next to the lake were as large as the outer side, those persons would not dare to venture on account of the rapidity and pressure of the water . . . The diver who keeps the courses clean, says that in each course one of the gutters is stopped up by heavy stones, so that no water passes through it . . . but from the darkness of the interior . . . and the thickness of the water and its rapid rush, it would be impossible for him to state with certainty the size of the opening . . . We may suppose as certain that the opening next the lake is seven times smaller than on the other side."

This peculiarity, which is common to most other ancient sluices, has been referred to by many another authority. It undoubtedly is illustrative of the ingenuity of the ancient engineer to counteract the velocity and the attendant pressure of the water on the sides of the sluice.

"Observations show", says Tornbauer, "that the Lake never runs dry and at the driest times it only sinks 3 feet per month or only 1½ inch daily."

This statement is based on the circumstance that at the time of the inquiry, 1982 Paras|| were under irrigation. Turning over the possibility of bringing a plantation of 3,000 paras of growing paddy under Kantalai and Vendarasan Kulam, the same writer says:—

"On seeing the Lake of Kantalay alone, one would think it capable of irrigating a larger extent. The strong construction of the water-courses, the stone defence of the hill they lie under, the tradition that this hill and the dam are the works of human hands, the extensive view across the lake, the religious feeling of the people towards the lake—everything unites to foster this impression . . . An ancient record kept in a temple mentions 30,000 paras as the quantity watered by the two lakes; but it is apparent that this has reference rather to the mid-year harvest than to the quantity of seed sown."

From this fascinating report which is deservedly valuable even to-day both to the individual speculator and the Government of the country in respect of exhaustive information as to the value and importance of Kantalai Tank, we will turn to some notes taken by Mr. Thomas Christie, Inspector of Hospitals, while accompanying His Excellency the Hon. Fredric North on a journey from Trincomalee to Matara in April and May, 1802.

"At three o'clock A.M., we set out from Tamblegam, and arrived at the lake of Candelye at half past seven A.M. . . . As we approached the lake, we descended a flight of steps nearly fifteen feet in height, formed by large stones piled in regular order."

* Nevill says in his publication "The Taprobanian," the origin of this tank has been frequently misrepresented, the actual date of construction had better be again put on record. It was made by Sulu Akbo or Agrabodhi II in the first half of the 7th century A.D. and was called Gantala Wewa, Kanthalai being a modern Tamil corruption of that name.

† Forbes.—Vol. II., p. 39; also see Turnour's Epitome of the History of Ceylon: Mahasen A.D. 275. "He also formed 16 other great tanks, and cut the Talawatta-ella Canal by which means he formed 20,000 fields, which he dedicated to the Denanakka Wihare, whence the rice-growing grounds got the name of Dantalawa (Gantalawe or Kandelly.)

‡ Extract from Report of Konanayager Temple Commission, 1919.

§ See Literary Register Vol. I., 1886-87.

|| Para, a measure equal to 5 kurunies. Kuruniya, a measure of grain about ½ of a bushel; the extent of land that can be sown with the above measure.

The Dutch parah was a cylinder of 11·57 inches in depth and breadth. One parah's sowing extent is 1 rood.

"The lake or tank of Candelye is of very great extent, perhaps twenty miles in circumference, situated in a valley, which is nearly surrounded by mountains of considerable height, and where these do not join, the water is confined by a very strong and thick wall, composed of large stones regularly hewn and piled; which shews that not only an immense deal of well directed labour must have been employed in this stupendous work, but that the builders must have been well acquainted with the general laws of mechanics. This tank must at one time have been much more considerable than at present, as in many places even the base of the wall is dry, and more elevated than the surface of the lake. The wall may at the highest places be about thirty feet in height, and, I think, about one hundred and fifty in thickness at the base. On the southern side of the lake towards Tamblegam, where there is a considerable length of wall, is the only outlet which we observed. It penetrates at the base of the wall, and although on the inside it occasions no very evident whirlpool, yet the entrance of the channel may be discovered by throwing a piece of wood into the water at this place, which has a slow circular motion.

"On the outside of the wall the water is observed rushing by two openings, out of a channel made of hewn stone, and carried on a few yards farther than the base of the wall. The force of the water has also broken a passage in the side of this channel by which nearly as much water escapes as by the regular portals. The whole uniting, forms a considerable river, which runs in a rapid current towards Tamblegam.

"This work bears the marks of great antiquity. The wall in many places is covered with a considerable thickness of soil, out of which are growing trees of a noble and venerable appearance. From a view of the whole it is evident that this work must have been constructed at a time when the people of Ceylon were more numerous"

The following is an extract from the account by John Davy, taken from his book on Ceylon, published in 1821 :—

"The lake or tank of Kandelle is a great work, and the best example of the kind of work, that I have seen. The embankment by which the water is confined is a mile and one-third long. It extends nearly in a straight line, from a rocky hillock at one extremity, to a high ledge of rock at the other. Its face towards the lake is composed of stones that rise one above the other like steps It is perhaps worth remarking, that they have no sharp angles or asperities of surface; they have the appearance of quarried stones, rendered thus smooth by the action of the elements in long process of time. Besides the great embankment, there is a small one detached from it about a quarter of a mile, and nearly at right angles to it, similarly constructed.

"The lake has two outlets: the principal one about a hundred yards from the rocky ledge, through which a river is constantly flowing; and another near the opposite extremity of the embankment, which is commonly dry, and carries off water only when the lake is unusually high.

"The great outlet or sluice is constructed with much art and of vast strength the water passing through the embankment, appears on the other side gushing out in a noble stream through two apertures The water rushing out in a considerable volume with great force, dashing among rocks beneath, in a deep gloomy shade produced by overhanging trees, makes altogether a very striking scene. The work itself has a simple grandeur about it which is seldom associated with art, it looks more like a natural phenomenon than the design of man.

"The Kandelle river flows into the bay of Tamblegam. At Tamblegam a good deal of rich paddy-ground is still irrigated by this stream; but with this exception and the solitary field at Kandelle, instead of conveying fertility through its whole course, it runs entirely waste."

Captain Charles Sim of the Royal Engineers submitted a report on Kantalai Tank in 1855.† Alluding to the flourishing state of Tanjore and the vast sum of half a million paid by Ceylon, at that time, annually for grain, principally to that country, he pointed out the advantage which that State had gained with an expenditure of £4,000 annually for 50 years on works of irrigation.

The District had so prospered that the population had doubled, the revenue had risen from £300,000 to £500,000, and the saleable value of land was assessed at 4 million pounds.

"Had half the money spent on such works in Tangore, been spent in Ceylon instead, in keeping in repair those already existing here," he says, "this Island would probably have exported, over and above its own wants, as much grain as it now depends on other countries to supply."

The same authority in a further report submitted the following year, says:

"However fully recognized may be the importance of the Tanks, it is not without reason to expect, that the Government could at once plunge into any costly scheme for their restoration. Yet, to overlook them altogether—to cast aside all consideration of those that even now might be turned to profitable account—would be equally injudicious. An experiment on a small and inexpensive scale, might, surely, first be tried, before the subject is entirely rejected—if successful, it could be repeated; if a failure, but little would be risked.

"Of all the Tanks, Kandelly offers the most advantages for such an experiment The streams from the sluices, uniting at a short distance, flow for 12 miles into Tamblegam Bay which is close to the harbour of Trincomalee—the high road to that Port from Kandy, runs by Kandelly, rendering the Tank easily accessible But the reason above all why Kandelly offers greater advantage than any other tank, is that, whereas population is wanting in the vicinity of almost all, large paddy fields worked by a considerable number of cultivators, are to be found on the banks of the Tamblegam River. The only experiment, therefore, needed, is the improvement and extension of what now exists as a nucleus.

"Looking beyond the time when these Crown fields may be brought into cultivation there is no reason why the whole of the land bordering on the Tamblegam River, should not ultimately be laid out, to an extent of half a mile on each side and for the whole distance from the Tank to Tamblegam."‡

It is recorded in the Administration Report of the Survey Department in 1876, that a complete survey with levels of 26,000 acres of land irrigable under Kantalai Tank, had been completed.

Both the Dutch engineer, Tornbauer, and Cpt. Sim, draw attention to the possibilities for turning the spill-water from the waste weir at Kantalai, and for husbanding the water of Vendarasan Kulam, should more land be brought under cultivation at some future date.

The former says: "Not at a great distance north of Candelay, lies another lake about 500 roods§ in length and 150 in breadth; it discharges itself into the stream which flows from Candelay also through a water-course of hewn stone in times of very heavy rain the lake of Winderaselew (Vendarasan||) disgorges itself into that of Candelay (Kantalai)."

* See "A Description of Ceylon,"—Cordiner (Vol II., p. 130).

† See Ceylon Almanac, 1857, Appendix, p. 23, 26.

‡ Cpt. Sim outlines an useful and perhaps profitable scheme for bringing the land under cultivation. See Governor Ward's Collected Minutes and Papers, pp. 86 and 87.

§ One rood or Roeden is equalent to 12·36 English feet.

|| Nevill is of opinion that this tank is older than Kantalai—See "The Taprobanian".

The bund of Vendarasan Kulam is in good repair. If the sluice is rebuilt it will regulate and hold a head of water of about 15 feet. A very remarkable fact, however, is that this tank has no spill. Behind this circumstance there seems to lie yet another clever scheme devised by the ancient engineers for utilizing the waste water of this tank and of Kantalai as an additional supply for Tambalagam, independent of the flow from Kantalai Tank down the Per-arū.

Investigations carried out during the topographical surveys of 1900 disclosed very little reason to doubt that this tank which even now covers 420 acres and has a drainage area of only 1,900 acres, was used as a reservoir to hold the water pouring out of the north spill of Kantalai Tank in the rainy season.

If the spill level of Kantalai were to be raised to its former height, the old-time scheme at present inoperative would become effective.

The water would under these circumstances rise till it was 4 to 8 feet deep at the "woman's bund" at the north-eastern end of the tank. At the western end of this bund it would leave the tank and following a channel for 30 chains, it would flow into Vendarasan Kulam.

There being no spill in Vendarasan Kulam, the surplus water, after the tank has filled to within 8 feet of the top of the bund, would overflow at the north-east corner and find its way down the Paravippanchan-arū.

A glance at the topographical map (Horowupotana Sheet) suggests how the water from this possible connection between Kantalai and Vendarasan Kulam was held in check about $3\frac{1}{2}$ mile further down. The reservoir, now breached, is known as Paravippanchan Kulam.

The bund only 20 chains long blocks a gorge in a ridge of hills—claiming in itself a drainage possibility of 3,400 acres.

The water regulated from this reservoir continued to flow down the Paravippanchan-arū.

The map illustrates how it was eventually turned by the anicut on the Per-arū into an artificial canal, and how it was next run along a natural water-course to irrigate fields of Kinyai which to-day are covered with scrub, chena and forest.

But besides the discovery of the flood spill of Kantalai* of its normal spill and of one of its bunds, which strange to say were missed out in investigations prior to the topographical survey; a very ingenious ancient scheme by which the head waters of the Nelu-oya, in a different basin altogether, were diverted into this great tank, was also disclosed by the survey in 1900.

About four miles north of Kantalai, there is an abandoned breached tank known as Mahawewa. At one time, it held the waters of the Nelu-oya. From the spill of this tank, a channel, delineated on modern large scale maps, led the water for $1\frac{1}{2}$ miles, after which it fell naturally into Kantalai Tank.

Kantalai Tank submerges at the present day at spill level an area of 3,700 acres. It depends upon its own catchment area of 73 square miles for its sole supply, and now irrigates about 2,120 acres—158 acres two miles below the high-level sluice which is the starting point of the "Barber Channel" and 1,740 acres at Tambalagam watered from the main sluice by the Per-arū.

Sufficient evidence has been put forward to show that it was undoubtedly an immense lake in the past—filled by the Elahera Channel, from the water-shed of the Nelu-oya, and its present insignificant catchment area.

By the second of these schemes alone the water of nearly 9,000 acres would be turned into the tank increasing its supply between 20 to 25 per cent.

These briefly outlined ancient irrigation schemes set an estimate of the value and importance of the unproductive land in the valley of the Per-arū reaching away to Kinyai.

Should efforts be made to bring this land back to its former wholesome state of productiveness it will be worthy of consideration whether apart from the Elahera Channel, the results would not justify the restoration of the less ambitious undertakings to their pristine efficiency.†

* * *

(iv.) *Minneriya and Giritale.*

Minneriya.

Sixteen centuries have elapsed since the Minneriya Tank is alleged to have been constructed. Through these ages tradition has woven intangible and fragile threads round its hills, its hanging woods and its glassy waters which are likened to visions of Killarney warmed and illuminated by an Eastern sun‡.

Perhaps we hardly know enough to say whether the peculiar associations and beliefs of past generations can endow any spot with a feeling of hope, of awe, or of wonder. If this be within the realms of possibility, a fanciful explanation is offered for the confident outlook, the spirit of worship and the mysterious fascination which broods over Minneriya.

Time was when endowments were so lavish that a king awarded a priest, who had presented him with a draught of water, land within the circumference of half a yoyana (eight miles) for the maintenance of a temple.

It was in this manner, they say, that the artificial lake of Minneriya came to be enclosed, and, together with the 80,000 amonams of ground which it watered, was conferred on the Jeytawana Wihara at Anuradhapura.

"The national benefactor", so tells Tennent, "was no other than the apostate king, Maha Sen . . . who temporarily abjured the religion of Buddha, persecuted its priests, and overthrew its temples and statues."

Many stories tell of the manner in which he endeavoured to atone for his sacrilege, and ventured to conciliate his outraged subjects.

Cut off by the steep forest-shaded gullies of the Konduruwewa range of hills separating the Matale District from Tamankaduwa, there lies the ruin of a city, virtually unknown except to a very few.

That the structures date to a distant age is undisputed. The characteristic feature of what remains of Nuwara-gala-kanda, as it is called, is the bold simplicity in the moulded lines of basement and stairs, and the total absence of surface carvings on the several functional members.§

This is perhaps an insignificant circumstance in itself, but it nevertheless, is sufficient to illustrate the policy of the builder, who, while maintaining Rajakariya|| as a national institution, stigmatized it as "oppression" when applied to non-productive objects.

* The ancient flood spill of Kantalai has been located at the 85th M. S. on the road to Trincomalee. The present spill at the 86th M. S. is 12 or 15 feet lower and is really through a breach in one of the short bunds of Kantalai which has been brought to light by the survey of 1900.

† See Blair's report on the Topographical Surveys, 1900. Administration Report, Survey Department.

‡ Tennent.

§ See Archaeological Reports, 1910-11.

|| "Rajakariya", a system of compulsory labour by which the King had a right to employ for public purposes all the inhabitants.

"Rajakariya, under various names and under various modifications, exists in all countries and among all peoples. It is a power inherent in all governments to claim the personal service of the people in urgent state necessity." "Notes on Ceylon"—James Steuart, 1862.

This city, so runs the legend, was built and occupied by Maha Sen. It was from this spot that he superintended the great works of irrigation—including the lake of Minneriya or *Minihiri*—and fertilized the wide areas which were appropriated to the maintenance of the people, the temples and the priesthood.

"It is a striking illustration of the grateful remembrance in which the people still hold the memory of the king by whom these enormous reservoirs were formed; that they not only forgot his apostasy, but, by a grateful apotheosis, have exalted him to the rank of a god."*

Various reasons are advanced by tradition to explain why this monarch was deified.

Forbes suggests that " . . . after the period of Maha Sen's death unfavourable seasons for cultivation, followed by famine and disease, oppressed the sinking and wasted population; who then . . . invoked the deceased king as an incarnate of Kartikeya or Katragam-deyio, one of whose names is also Mahasen. They believed that the supernatural power of this monarch had been sufficiently evinced by the mighty works he had executed when ruling over them; and even before his death, the extent of the public works which he had accomplished had created the impression that he was assisted by invisible agents."

Undoubtedly, swayed by such convincing circumstances, "the fevered imaginations of a suffering people conjured up a dream which they adopted as a revelation, and then began to make offerings to Maha Sen, claiming his protection if he were a god, and deprecating his wrath if he had become an evil spirit of power."

Pestilence at that time abated; Maha Sen remained an object of fear and worship.

It happens in this way, that to this day Minneriya is under the strict overlordship of Maha Sen Deïyo, or the Hat Radjuruwo, as he is also called.

In an unpretentious *devale* (temple) not far from the 15½ mile post on the motor road connecting Minneriya with Polonnaruwa, a *kapurala* (lay-priest) conducts ceremonies to appease, and on behalf of the peasant populace invokes the help of this deity who was incarnate as King Maha Sen.

Enshrined within the building consecrated to his memory, are various weapons and insignia that the votary believes at one time belonged to the king.

Apart from this tradition, we pick up another localized in the vicinity of the low-level sluice on the bund of Minneriya Tank.

At this spot, which is called Veda-inna-maligawa, there is a collection of broken images. Many a village traditionalist supposes that these images represent Maha Sen, his consort, and his ministers.

Such is the veneration and awe in which these relics are held, that not infrequently, law-suits and family disputes are settled, even up to present times, by one or the other party undertaking to swear to the truth of their statement in the presence of these images.

Sometimes, parties and individuals refuse to face this ordeal at the last moment, and go back on statements they at one time vehemently persisted in.

These are the intangible legacies, conventions and beliefs of the past—vast, rich and varied—which generations have accepted and acted on without discussion.

The artificial lake and the other stupendous works of irrigation carried out by King Maha Sen are the monuments he has left behind, by which posterity might know in part what manner of man he was, and from which they might learn and profit.

Sinhalese histories say that Minneriya Tank was built by the conjoint labour of "men and demons", the demons or Yakkos, being the aboriginal tribes who peopled the district.† They were—so tradition tells—summoned from far and near by the beat of drums.

To what extent such compulsory labour was capable of exaction, or under what safeguards it was enforced, cannot be gauged from historical books. But a significant fact which attracts particular attention is that this policy, and this alone, accelerated the progress of the social improvement in Ceylon.

His Excellency, Sir Henry Ward, says, "no wisdom, and no power, in the Ruler, can have forced such efforts, even upon the most passive of Oriental nations, without a general persuasion that the work was one of paramount necessity, and that all would participate in its benefits."

The sacrifices to which a whole people submitted, sufficiently proves the sense entertained of the value of water as the first element of cultivation in a tropical climate, by the former possessors of the soil in Ceylon.

The peasant was undoubtedly as conscious as the King that unless he secured this blessing, his labours must be of little avail.

Nature has done much to form Minneriya Tank. Notwithstanding the great expanse of water behind it, the principal embankment is not of any greater size than the bund of many a smaller reservoir. Those who should know, say, that want of rain for two years would not cause Minneriya to become exhausted.‡

"It is apparently a work by which man has successfully combated the caprice of seasons and the revolutions of nature."

Sir Henry Ward visited Minneriya while on tour in 1856. In his "Minute on the Eastern Province", he says:

"From Giritella to Minneriya (4 miles) the path lies for three miles through thick jungle, and for the last mile through paddy fields watered by a stream which flows constantly from the Tank, and would irrigate the whole 1,000 amunams of land, said, once to have been under cultivation, but now reduced to 30.

"In the evening, we visited the Lake—a much more appropriate name than Tank, for so large an expanse of water. It is near 21 miles in circumference, and of peculiar shape, forming bays, where it receives its principal feeders. The Bund is, as usual, of enormous solidity . . . No symptoms of decay appear any where. The supply of water is most abundant; and nothing is wanted but population. Minneriya . . . combines natural advantages with the vicinity of a Town, and a Port, from which if the Home market failed, produce might be exported."

One of the earlier visitors to Minneriya Tank was Mr. Ralph Backhouse. His description of this artificial lake goes back to the year 1820, at which period he was Collector of the District of Mannar.

Bennet, draws on Backhouse's description and says: "The Lake of Minere is about (36 miles S. W. of Kandelle) and in the district of Tambankadewe, also in the Eastern Province. The country between them is diversified with woods and plains, which latter are in parts inundated during the rainy season. The tank of Minere is twenty miles in circumference, surrounded with marshy lands, capable of very extensive cultivation of rice, and having abundant forests of the most valuable timber trees in their vicinity."||

* See Tennent, Vol. 2.

† Blair, writing in 1898 says: "There is a strange legend current among the Veddahs living in Bintenne North, that Minneriya was first built centuries before the time of King Maha Sen—that it was breached totally, and that in his reign and before, the bed of the Tank was a famous hunting ground of the Veddahs who had spread themselves over a great part of the Island. According to these Veddahs, Maha Sen only restored the tank and compensated their ancestors for having submerged their hunting ground.

‡ The present area of Minneriya tank is 4,430 acres.

§ Synonymous with Government Agent.

|| See "Ceylon and its Capabilities" p. 29.

THE CENTURIES-OLD KALINGA SCHEME.



The channel on the right bank of the Mahaweli-ganga which has been traced up to Gunner's Quoin.

A BACK-WATER OF MINNERIYA TANK.



A glimpse up one of many creeks which for beauty have hardly a parallel in any land.

Forbes, who also saw Minneriya, about the year 1840, in a state of picturesque abandonment, has afforded too deliciously graphic a description to be omitted. He says :—

“The placid surface of the lake . . . when lighted by the evening sun, reflects the varied foliage and forms of the clumps and trees on its promontories, capes and islands ; narrow creeks pierce far into the overhanging forests ; and beyond the waters, rich grassy plains stretch among the wooded hills, over which arise in the distance the grand outlines of the mountains of Matale.”

“On the plains are scattered herds of elephants, buffaloes, and spotted deer, and all the winged race in every variety of form and hue glance along the margin of the waters, or flit along its narrow inlets, while the whole scene, brilliant in colour, refulgent with light, and replete with animal life, leaves behind a never fading reminiscence on the mind.”

Tennent, who traversed the country about eight years after Forbes, submits that “universal acclaim pronounces Minneriya and the surrounding scenery, to be the most charming sylvan spot in Ceylon.”

The same writer continues to say :—

“We rode for a mile along the great embankment, which, although overgrown with lofty trees, remains nearly perfect, and the ancient conduit still gives issue to the pent up flood that, flows in a broad stream to the Mahawelli-ganga.”

At this period the waters of the tank were put to little purpose and the neighbouring plains contained a scanty and sickly population owing to their low and marshy situation.

Tennent and Baker and other contemporary writers give prominence to the fact that the area abounded in wild animals, to such an extent, that it became one of the favourite resorts of elephant hunters.

Such a picture offers a digression. Might it not be very truly imagined that many a surveyor destined to work in the district, in those spacious days of the past, must have undoubtedly been lured to give practical expression to the words of Jonathan Swift, who wrote two hundred years ago factiously ascribed to the “Dark Continent” :—

So geographers, in Afric maps,
With savage pictures fill their gaps,
And o'er uninhabitable downs
Place elephants for want of towns.”

The latent possibilities which have been made amply manifest by the authorities hitherto quoted, necessarily impelled efforts to redeem the district from the reputation it was acquiring as a hunting ground. The great sportsman, Sir Samuel Baker, lived to write of Minneriya as “now no longer attractive to my eyes”.*

When, about two decades later, Governor Sir William Gregory created the North-Central Province, some effort had been made. But impressions drawn from his *regime* depict the resurrection of the old districts of Anuradhapura and Polonnaruwa, and the Government pledged to a very heavy programme of irrigation works.

The trouble, however, in all undertakings to reclaim the district, was the incidence of malaria which was probably more deadly in its attacks than it is to-day.

The work of restoration was nevertheless steadily pursued by successive Governors with some success. However, the story of the rescue of the Province from the decay due to a thousand years' desertion, of the restoration of its marvellous ancient irrigation works, and—if its noble cities cannot be rebuilt—of flourishing towns which will spring up, gives fair promise of being told.

It opens with what is to-day being done on the vast wastes below Minneriya.

Although this tank has been previously selected as the venue of colonization schemes that have not achieved any solid results, many a promising circumstance tends to hold out a very hopeful outlook for the spirit of enterprise and dogged perseverance of the pioneers who are at present helping to build up a colony in the neighbourhood of Minneriya.

A problem all along has been the difficulty of finding a population to replace that which has disappeared.

“For five consecutive days,” so writes Sir Henry Ward, “I rode through the most lovely country in the world ; but in that country, one thing was wanting—Man !”

“Why repair Kowdella (Kaudulla) or Padiwel Colum (Padawiya),” observes the same writer, “. when Kendella (Kantalai) and Minneriya are pouring out streams of water, that we cannot use, for want of hands to till the soil ? We must, therefore, colonize, or do nothing I cannot but think that the experiment might safely, and prudently, be tried.”

The fall in the price of the Island's chief commodities of export and the attendant problem of unemployment, have determined, by circumstances, two factors which point to the present as an opportune moment for stabilizing a population that would convert the dry zone into as prosperous a country as the wet zone.

In Ceylon, where traditions linger, quaint rites and omens must necessarily exercise a strange hold over the minds of a peasant population.

The misfortune which attended the Minneriya Paddy Scheme and the accident that resulted in Dr. Willis losing the use of an eye while inspecting the lands under this Tank at the instance of Governor Blake were both put down by the people of the district to the influence of the local tutelary deity who resented the intrusion of trespassers on his preserves !

It is generally accepted that on these and similar coincidences traditions thrive—but to-day, the gods smile.

Before the huge forest was cut down and the shrubs and jungle undergrowth was uprooted, the good will of the overlord of Minneriya and of a neighbouring deity was sought in accordance with Ceylon rural practices, and ceremonies to this end were conducted to the satisfaction of the agricultural folk.

When, a few days later, a bubbling spring was discovered close to the main settlement, it was of course credited to the good will of the gods who had been placated.

One may not inquire how long this spring has been there, hidden by the mantle of jungle. It is sufficient, however, that the peasant believes that it was created in response to the faithful observance of ancient rites, and that it indicates a favourable omen.

Note.—The Government Agent, N. C. P., referring to Minneriya Tank in his Administration Report, in 1900, says : “The scheme of restoration of this tank is to put in three new sluices, one high level and two low level, and to cut a channel some 9 miles long running eastwards just below the summit of the high land which forms the watershed of the Kawudela-oya, and irrigating everything to the south of it. Here again, labour troubles have stood in the way, but nevertheless some progress has been made. The concrete foundation for the tower of the north low-level sluice has been laid This has been the most troublesome part of the work owing to the necessity of completely emptying the tank, a by no means easy matter in the case of such a large reservoir”

* See, “The Rifle and Hound in Ceylon.”

So, when over the two thousand acres below Minneriya Tank the plough will set to work, when with the co-operation of the Anti-malarial Campaign there will be health, with increasing population—prosperity will smile on the 80,000 fields which the royal architect, sixteen centuries ago, formed along with the lake which was to irrigate them.

Giritale.

The tank of Giritale, but for its being so close to the beautiful artificial Lake of Minneriya, would claim considerable attention and admiration.

It was mentioned in another connection that originally the head of water in Giritale Tank was maintained through the Nehinne-ela, by a branch channel which was linked to the Elahara Canal. At the present time, it merely relies on the rainfall which is turned in by a very limited catchment area. Even this restricted supply is put to little or no account.

When this tank was surveyed in 1897, it was described as being in a good state of preservation and about 500 acres in extent.

From what can be traced of the history of this tank, it would appear that Giritale was built by King Agrabodi II. (623 A.D.), and that it was restored by Parakrama Bahu. There is also reason to believe that the latter constructed “a channel from Giritale to fill lake Kuddara Veddhamma and thence to the village Arimadde Wijeya.”

Forbes thus describes Giritale :—

“ . . . it is formed by a strong embankment of stone, which crosses a hollow at the top of a steep descent, terminating in level ground and damp forests. On re-entering the jungle, hewn stones, carved spouts, and steps of masonry spoke of former times, when this was one of the populous suburbs of a wealthy city . . . ”

In 1900 an attempt was made to clear the blocked sluices of this tank with dynamite, but without success. Want of labour is said to have prevented this work from being taken seriously in hand.*

* * *

(v). *Kaudulla and Topawewa.*

Kaudulla.

The large abandoned tank called Kaudulla has many interesting features, historical, scenic and illustrative of the skill of the ancient engineer.

Investigations go to tentatively prove that at one time this tank must have retained a head of water equal to Minneriya, and that in all probability it submerged even a greater area of land.

“From Minneriya”, writes Sir Henry Ward, “we went to Kowdolly Tank . . . the waters having burst the bund at a period so distant, that what was once the bed of the tank, is now a forest, abounding in trees of largest dimensions. The road through the jungle is good; but when it enters the bed of the tank, and passes along the Bund, once created with stones which are now scattered in irregular masses . . . the riding is difficult and even dangerous . . . It is impossible to imagine anything wilder than the scenery. Herons and Bitterns, sat like statues, on their accustomed perches, as our cavalcade passed, so unaccustomed were they to see, or fear man. The Tank still retains water in many parts; and the magnificence of the vegetation denotes a soil, said to be the best in Ceylon for the growth of Rice, and Cotton, which last production, though indigenous, and of excellent quality, has hardly yet attracted the attention of Capitalists.”†

The following are extracts from a report by Mr. D. Blair, based on investigations carried out in the course of surveys done in 1898 :—

“ . . . the stone pitching on the bund is partly artificial and partly natural, and it is not easy to say which is which exactly, for all is densely covered with magnificent trees of great age. The natural bund is a part of the great Sudukanda range, a quartz rock formation which strikes off from the Knuckles mountains near the Nitre Caves and running almost due north crosses the Amban-ganga exactly on the site of the Angamedilla channel anicut.

“Ten miles further north, a bund filling a gap in the same range retains the waters of Giritale tank. Three miles further north another narrow gap permits the Minneriya-oya to pass through, and also the irrigation channel which here is only a few chains from the Oya which it tapped three miles further up. King Maha Sen might have gained greater fame by building the Minneriya bund here, forming a lake which would have connected Minneriya and Giritale. About five miles north of this, this range becomes the bund of Kandulla Tank . . . (Kaudulla).

“Hill and earthwork were pointed out as the bund of Kandulla for a distance of 4 miles north of this, but the high ground beyond this must have held the waters of the tank for probably two miles more. There are only two great breaches in the bund. One is where the Gal-oya now flows through; here the bund is about 50 feet above the bed of the river and is 120 feet wide at the base, the breach being about 60 feet wide.

“The artificial part of the bund here is not nearly 50 feet high, for the living quartz rock forms the lower half of it. The rock exhibits here a strange arched strata, an unusual thing in quartz, and this must have weakened the bund and been the cause of the breach. Deep pools of water which remain throughout the dry season lie in the breach, and huge crocodiles still frequent them and bask on the large rectangular slabs of quartz as mentioned by Messrs. Adams, Bailey, and Churchill when they visited this tank 45 years ago (80 years ago, to-day). In their report, however, they over-estimate the height of the bund at 90 feet. The next breach is $1\frac{3}{4}$ mile further north, and through it flows the Kudagala-oya which crosses the Trincomalee road at Alut-oya resthouse. This breach is only slightly smaller than the Gal-oya breach, and between the breaches the bund is for the most part artificial and protected with stone pitching to within 15 feet or so of its top.

“Despite these breaches the bed of the tank is flooded with shallow water for nearly 1,000 acres. In July-August the sheet of water has dwindled to a mere pool from which the semi-Veddah inhabitants of Rotawewa village reap a fine harvest of fish; yet when the last drop evaporates the stench of dead fishes is well-nigh unbearable. Large herds of buffalo graze in the bed of the tank eating the coarse ramba grass which springs up as the water recedes.”

Historical references to Kaudulla tank seem to have evaded all attempts to search for them.‡ There is little doubt that this tank must have been mentioned in the old Sinhalese histories, but as there was no means of picking out the name in the vernacular language then extant, it has not been identified.

There is one other feature which might be introduced into these impressions of Kaudulla Tank. Below it, is one of the largest stretches of Park Country to be met with in the Island.

This plain, which was undoubtedly at one time paddy land, stretches between the Kaudulla and Minneriya-oyas and covers an area not much less than 10,000 acres. It is called Hingurawakdamana.

* Administration Report, Government Agent, N.-C. P., 1900.

† Sir Henry Ward's Minutes and Collected Papers, p. 70.

‡ Kaudulla was in working order down to 1680 A.D., according to the “Account of Mr. Pybus' Mission to the King of Kandy,” in 1762.

"When very open, it is possible to see a mile through the trees dotted over the plain, while at other times they are so close as to be of the nature of an open forest. The trees are seldom of great size, and among them are many lovely blossoming varieties such as satin, ehela, mee, damba, &c., and when many of these are in flower, before the grass-land is scorched, it is the most lovely country in the Island to travel through."

Topawewa.

Topawewa must undoubtedly have been a splendid tank in ancient times, probably covering an area considerably over 1,000 acres. It has already been shown that the waters of this tank must have merged into the "Sea" when Parakrama Bahu completed his spectacular scheme which flooded the country between Polonnaruwa and the Amban-ganga.

Turnour, in his "Epitome of the History of Ceylon", records that Oopatissa the second, who commenced his reign A.D. 368, formed the "Toopaawewa", probably near Polonnaruwa. He was perhaps stimulated to this exertion by a great famine which is said to have prevailed in his reign. It was not till A.D. 650, however, that we can trace any references to a royal palace having been built in the capital which stands below this tank.

A scheme for reconstructing this tank which was mooted 35 years ago conveys the idea that it was intended to include the restoration of the old Yoda-ela or channel from the Amban-ganga, which used to feed this tank. There was apparently also a proposal to raise the bund sufficiently to hold up another 7 feet of water.

• The scheme apparently never went beyond a report that the "Preliminary surveys have made some progress."

A glance at the topographical map affords a striking illustration of the present capacity of this reservoir and the area which has been brought under cultivation below it.

CHAPTER VI.

PADAWIYA AND WAHALKADA TANKS.

Padawiya.

In the north-east of Ceylon there lies a tract of country which might very aptly be classed among the less explored regions of the Island. It comprises an almost roadless area, girdled by the main thoroughfares which link up Mullaittivu, Vavuniya, Horowupotana, and Trincomalee.

A glance at a map* will suggest that this stretch of country is watered by two main rivers—the Yan-oya and the Ma-oya. The former rises near Habarana and flows into the sea 33 miles north of Trincomalee after covering a distance of 65 miles, the latter which takes its name from the junction of two affluents—the Mukun-uya and the Mora-oya—after a shorter course empties itself into the Kokkilai Lagoon.

For four months in each year, both these rivers carry a prodigious volume of water which runs to the sea without filling a single tank. A good deal of evidence proves that this water was not permitted in ancient times to run to waste.

At several points along the course of the Yan-oya, there are traces of ancient anicuts of solid masonry, some in ruin, others in almost perfect repair where the waters have evaded the trap and skirting the obstruction have made a new bed for the river.

Every effort was made, at the time this country was mapped, to trace the channels which must have started at these anicuts. These efforts met with indifferent success. Either the earthworks were small or the vestiges were of such ancient origin that time has effaced all but fragmentary traces of them.

Mr. Wickwar in his report on survey done during the year 1897 in the area, affords a detailed account of the anicuts and other interesting monuments he discovered on this river below Horowupotana. He says :—

"Two of the anicuts are in an almost perfect state of repair. The first one is still in perfect preservation. It is built of both wedged and rough stone, advantage being taken of two large boulders in mid stream. It is 132 feet long by 50 feet wide, and about 6 feet above the bed of the stream. The old ela is still distinct and part of it forms a portion of the present bed of the stream, as it has worked its way round the left hand side of the anicut leaving the latter entire.

"The second anicut is some distance further down the stream, and is one of the finest pieces of old work which I have seen. Like the one previously described, the stream has forced a passage for itself on the right-hand side of the anicut, leaving the latter without a stone displaced. It is built entirely of wedged stone fitted together most carefully, the different layers of slabs being placed alternately parallel to and at right angles to the course of the stream. Some of these slabs of stone which I measured were 11½ ft. by 1½ ft. The dimensions of the anicut are 92 ft. long by 38 ft. broad and 10 ft. above the bed of the stream. At each end of the anicut there is a high step 6 ft. high gradually falling away towards each bank. These were evidently built with the intention of keeping the flood water which passed over the anicut within bounds. About 14 chains above the anicut and on the right-hand bank is a channel which I think must have been the take-off of the ela. This channel now joins the main stream again 10 chains below the anicut; and as I was unable to find any trace of the ela away from this channel, it is probable that it has since silted up. The left-hand bank of the ela, at the take-off from the stream, is composed of a large quantity of small rocks and broken metal, which appear to have been placed there to prevent the corner from being washed away. Notwithstanding the fact of there being a channel round the anicut, the right-hand bank has been washed away, and is now the principal course of the stream. From this it would appear that the breach at the end of the anicut was the first relief that the stream got, and that the ela, which now forms part of the channel, gradually worked its way back to the main stream below the anicut.

"Besides the two anicuts above described there are a number of others, but they appear to have been built of smaller stone and have been unable to withstand the floods.

"The remains of two stone bridges are also interesting. In one case most of the stone pillars are still standing, and the slabs can be seen at varying distances down stream where the floods have carried them. It is apparent that in ancient times every drop of water in the Yan-oya was utilized, and I have no doubt that the chain of tanks which exist down each side of the river were then fed from this stream." †

This evidence alone testifies to the prosperity of this region in times long past, but going further north, to the basin of the Ma-oya, the ancient tanks of Padawiya and Wahalkada—long breached and abandoned—definitely recall a magnificent scheme, which if tradition speaks true, provided for miles of flourishing fields reaching to the very coast-line. ‡

* See Topographical Map—Padawiya and Wahalkada.

† Administration Report, Survey Department 1897.

‡ There is a legend which tells that the Kokkilai Lagoon was at one time a paddy field watered by the Padawiya Scheme. A quarrel between two factions interested in the land caused one party to cut a breach through the narrow bar which separated the fields from the sea.

Records of visits to Padawiya are few and far between. Still fewer are the references to Wahalkada tank. In fact, until the latter formed the principal discovery of the topographical surveys done in 1898, it was practically unknown except to the Archæological Commissioner, Mr. Bell, who was the first to draw attention to its importance as a vestige of ancient times.

The scant attention paid to ancient irrigation schemes in this area is all the more surprising as these two tanks rank among the largest in Ceylon. Authorities are not wanting who place them as the most wonderful examples of engineering skill, whether we look to size, or difficulties of execution, or to the time at which these difficulties were overcome.

His Excellency Sir Henry Ward's enthusiasm for exploring all and every ancient major irrigation scheme in Ceylon was, as it would appear, not damped by trying journeys off the beaten track.

Penetrating even this wild part of the North-Central Province, traversing unhospitable tracts of interminable *Katupat* or thorny jungle, he has left to us his impressions of Padawiya.

He describes it as:—"The most gigantic work of all (the tanks), for the bund which is in perfect repair, except at one spot, where, in the course of ages, the waters have forced a passage between it, and the natural hill, which it united, is eleven miles long—30 feet broad at the summit,—180 feet the base and seventy feet high"

His Excellency goes on to say, "Padiwel Colum, a great part of which I rode or walked over, was formed by the waters of the rivers Morra-oya, and Moonganoo-oya, confined to the plain by the enormous bund which I have just described. Its construction must have occupied a million of people, for 10 or 15 years."

"The tank when full, is said to have irrigated the whole space between the Bund, and the Sea, in the direction of Lake Kokolai. A vast breach is now open, the depth of which is said to be unfathomable, and what was once the basin of the tank, is covered with magnificent timber, except in those parts, which are still under water during the rainy season."

Another visitor to this tank in early British times was Tennent, who approached it from the eastern coast. He graphically tells us why this country is known so little, and why a journey to this wonderful heritage of ancient days is not undertaken merely as a pastime.

"The immediate vicinity of the great tank is so infested with malaria, as to render it dangerous to pass the night there." It was for this reason, he says, "we arranged to halt and sleep at a village about 10 miles to the south-west of it."

"As this plan involves a long day's journey," continues Tennent, "we started for the tank by torchlight some hours before the sun. It was tedious work the branches, thorns, and climbing plants closed overhead so low that we were obliged to get down and lead our horses. The footpath ran along the embankments of neglected tanks, and over rocks of gneiss before daybreak we entered on the bed of the tank and proceeded towards the main embankment when this enormous embankment was in effectual repair, and the reservoir filled by the rains, the water must have been thrown back along the basin of the valley for at least fifteen miles."

This estimate which rests undoubtedly on a general view from the large rock occupying a position about the centre of the bund, was possibly distorted by the prodigious area which lay stretched below; broken into by numerous ponds and diversified by groves of trees. It is not correct as subsequent surveys go to show. However, with Sir Emerson Tennent rests the credit of being the first to offer a detailed description of the bund and sluices, and the other ancient vestiges in the vicinity.*

"The bund is faced throughout its whole extent by layers of squared stone. The fatal breach is an ugly chasm, two hundred feet broad, and half as many deep, with the river running slowly below this breach presents a perfect section of the embankment from summit to base One of the sluices remains so far entire as to permit its original construction to be clearly understood. From its position, I am of opinion that the breach in the embankment was originally the second sluice, which had been carried away by the pressure of the water at some remote period.†

"The existing sluice is a very remarkable work, not merely from its dimensions, but from the ingenuity and excellence of its workmanship. It is built of layers of hewn stone, varying from 6 to 12 feet in length, and still exhibiting a sharp edge and every mark of the chisel. These rise into a ponderous wall immediately above the vents which regulated the escape of the water; and each layer of the work is kept in its place by the frequent insertion, endwise, of long plinths of stone, whose extremities project beyond the surface with a flange to key the several courses, and prevent them from being forced out of their places. The ends of these retaining stones are carved with elephants' heads and other devices like the extremities of gothic corbels; and numbers of similarly sculptured blocks are lying about in every direction, though the precise nature of the original ornaments is no longer apparent."

We naturally ask, who was the constructor of this mighty monument which has withstood the floods coming down the valley, for ages?

It is a question which baffled the ingenuity of many inquirers.

Pridham says, "After the strictest search, we have been unable to find any authentic record of its construction, or of the period in which it took place."

Tennent leaves the solution "buried in obscurity," but draws attention to a tall sculptured stone, with two engraved compartments, which stands on the top of the bund and close by the breach, as the possible record of its history.

We are indebted to Mr. H. C. P. Bell, the late Archæological Commissioner, for the following elaborate description and the translation of the inscribed pillar at Padawiya.

"The pillar slab rises 8 ft. 6 in. out of the bund, and is 1 ft. 8 in. in width. It is crowned by a chastely designed finial, a lotus flower, the outer petals drooping down on to the head of the rectangular shaft. Its front or north-east face, alone is carved. This is divided horizontally into three incised panels by raised bands, the broadest ornamented with three conventional flowers. The upper framing immediately below the lotus capital bears a neat diamond pattern. Within the two higher panels is cut the inscription (five lines of writing on each) in the form of the Sinhalese characters in vogue during the 12th and 13th centuries.

"Below the writing (separated by a flute) is the third, or lowest panel, in which are carved in sunk relief an urn-like vase with flowers, flanked by a pair of lamps—all standing on a moulded pedestal."‡

Literal translation of the first panel:—

"This was caused to be made for the benefit of the whole world by Sri Parakrama Bahu, Supreme Lord of Lanka, minded to perform what was required to be done."

* A full and elaborate report on Padawiya Tank was drawn up by Mr. Parker in 1886, Sessional Paper XXIII.

† Bell agrees that this was the *meda horowa* or low-level sluice of the tank. (Ceylon Literary Register, Vol. II., p. 75).

‡ Photograph reproduced with a note on the inscription in Archæological Survey Report, Oct.-Dec. 1891. (Note. Bell, Ceylon Literary Register, Vol. II., p. 76.)

Second Panel :—

"Having dammed up smaller streams (ni), rivers (ganga) (and constructed) tanks in Sri Lanka (and) caused fields to be cultivated (and) all the water (in the tanks) to be stored, King Parakrama Bahu made this."*

* * *

(ii.) *Wahalkada.*

It has previously been implied that Wahalkada was practically unknown before circuit work took Mr. Bell into the neighbourhood in 1891. Until then, what appeared to be the sole reference to Wahal-kada-wewa was a passing allusion by Parker. Bell says that even so careful an observer as that ubiquitous irrigation officer, dismissed it with the premature remark that it is "not a tank of great size."

Mr. Wickwar when in charge of the topographical surveys in the area, in 1898, was responsible for placing the tank on our maps and drawing attention to its immense size. In a report on the recently discovered reservoir of ancient times, he says :—"The tank is a worthy rival to Padawiya and in many respects resembles it. In building the bund advantage has been taken of the hills and ridges, the intervening valleys being filled in and forming the artificial bund."

The investigations carried out by Mr. Wickwar offered elucidation of the great irrigation schemes which existed in connection with these enormous reservoirs.

The following detailed description is embodied in his report :—†

"Starting from a high, well-defined hilly range known as Mahinna, which runs north-east and south-west at a point known as Yakinikanda, the bund runs in a north-westerly direction and averages about 60 ft. in height, being of course covered with jungle, and it is in a very perfect state of repair. After running for about 60 chains the bund runs into a low sandy ridge known as Godahinna. This ridge runs parallel to the Mahinna ridge and is difficult to distinguish from an artificial bund, so like is it. The ridge runs south-west for about $2\frac{1}{4}$ miles and then gradually runs north-east, again close to and parallel to the portion already described. After running in this direction for a mile or so it turns suddenly at right angles and runs in a westerly direction for about 50 chains, gradually falling away. From this point the artificial bund is carried on in the same direction for about a mile, and then runs north into high ground for about another 30 chains. At this point there is a good deal of rock about, and is the site of the principal spill. As far as I could see, the spill-water merely ran over the rocky bed of a fairly large channel, which has been scoured out by the surplus water. A few chains from where the bund leaves the Godahinna can be seen the repair of a former breach. The new work is as good as the old portion of the bund and requires no further addition. Portions of the bund further on are about 50 to 60 ft. high with a good slope and in perfect repair. The inner slope of the bund is pitched with stone to within about 8 ft. of the top.

"*Sluices.*—There is at present only one sluice to be seen. It is in the portion of the bund between the Mahinna and Godahinna ridges, and about 15 chains from the latter. This sluice is exactly like the one in Padawiya tank described by Mr. Parker. It is in perfect repair, with the exception of a few bricks which have been displaced in the bisokotuwa. The bisokotuwa is 12 ft. by 8 ft. and about 10 ft. deep. It is built in the ordinary way, there being four courses of rock slabs and the upper portion of brick. There are two culverts rectangular in section, each 2 ft. wide by 3 ft. high and separated longitudinally by a wall about 2 ft. thick."

"Another sluice is said to have existed at the present breach where the river finds its way through a break in the Mahinna. This is very probable, judging from the cut stone to be found down stream.

"*Spill-waters.*—I have already described the site of the principal spill, situated at the northern end of the bund. A so-called 'gal-pennuma' exists at a point in the Mahinna range about one third of a mile south of the breach. It is a narrow gap in the ridge which certainly looks artificial, though I do not think that it was intended for a spill, firstly because I think it is situated too high, though of course I was only guided by my eye and no actual levels were taken, and secondly it is very narrow, being only 10 ft. wide. The southern side of the gal-pennuma is almost perpendicular and from 30 to 40 ft. high, composed mostly of rock. The northern side is 15 ft. high and perpendicular, then gradually sloping upwards.

"A spill of these dimensions would, I consider, be useless, especially as it is situated at such a high level at which it would be necessary that the water in the tank should be run off at once to ensure the safety of the bund, presuming it to be a spill.

"It is possible that this gap in the range was intended as a 'pass' or roadway to the massive ruins which exist on the inside slope of the range and near the breach. Access to these ruins by any other path would, I found, necessitate a certain amount of climbing in order to get over the ridge, and it certainly looked to me as if the path crossed the ridge at this so-called gal-pennuma and then ran along the inside slope of the range to the ruins, which I understand was originally a bathing place. Another spill-water is said to have existed at or near Ihala Divulwewa village, about six miles south-west of the breach. Judging from the lay of the country at that point, I consider this very probable.

"The first spill described is too small to carry off the water of such a large tank, and as Ihala Divulwewa is situated at the top end of the tank we may presume that there was a high level spill there, probably at the south end of the low hills north-east of the village.

"*Contour.*—The contour of the tank as shown by me, is to some extent uncertain. I made most careful inquiry and have been over most of the country said to have been originally submerged by the tank, and though actual levels only can determine the correct contour, I think it will be found that I have not over estimated the extent of this fine tank.

"From the breach the Mahinna ridge forms the eastern contour for a distance of six miles in a south-westerly direction. The country from there to Ihala Divulwewa village is slightly high, and continues so far as the ridge shown south of Tawalammillewawewa. This tank is said to be just above the contour, but, presuming that there was a natural spill at Ihala Divulwewa, I am inclined to think that it was submerged, or at any rate a portion of it. Anaivillunthan village is said to have been just above the contour, which then runs on to Tamarawewa. East of Namadawewa is a large slab rock, from which I am told people were in the habit of catching fish in Wahalkada tank. The rock is known as Andiagala, and has been located. From there the contour runs northward close to where the Yoda-ela—to be described later—crosses the watershed between Wahalkada and Padawiya tanks and thence runs into the northern end of the bund.

"Assuming this contour to be correct, it gives a rough area of 15 square miles. Seven occupied villages are at present said to be in the bed of the tank, and in view of its probable restoration it would be advisable to discourage the opening up of more lands in the bed of the tank.

"*Watershed.*—A glance at the plan will at once show that the watershed is extremely small—in fact, comparatively nothing. This fact was recognized when the tank was made and to supply a certain amount of water a YODA-ELA was cut from the Mora-oya close to Namadawewa, which, running above Kahatagallewa and

* See Ceylon Literary Register, Vol. II., pp. 46, 47, 75-78.

† See Administration Report Survey Department, 1898.

supplying that tank with water, found its way across the watershed, north of Rambewa, into Wahalkada tank. The Tawalahammillewa-oya rises about three miles south of the tank of the same name. The water in this stream, which is made up of numerous springs of good water, only runs for the first few miles during the dry season, so that Wahalkada tank receives no water at all during the dry months, and the bed of the stream is perfectly dry. At the crossing of the watershed the cutting for the ela is perhaps 20 ft. at most, and I was informed by an old villager that the waters of Padawiya and Wahalkada are said to have 'met' at a point close to Rambewa. In flood time this was most probably the case, as the watershed between the two tanks—which one might almost call twin tanks—is so low. I think it probable that the spill level of the two tanks will be found to be about the same. The Yoda-ela mentioned above is in good repair and in the wet season a considerable amount of water finds its way down it. Remains of the anicut, near the 'take off' on the Mora-oya, are still to be seen.

"*Breaches.*—There is only one breach of any importance, and considering the size of the tank the breach is comparatively small and could without much difficulty be repaired. As already stated, the Tawalahammillewa-oya runs through a break in the Mahinna ridge. It is at this point, where a bund originally ran from ridge to ridge across the stream, that the present and only breach is to be seen. The ridge to the north and south of the stream is well defined, being composed mostly of rock and running almost down to the banks of the river.

"From the northern end of the ridge to the river bank is only about 70 ft. A drop of 15 ft. to the river bed, which is 50 ft. wide, and another 200 ft. brings one to the northern end of the southern ridge. A small dry stream 6 ft. deep and 10 ft. wide crosses this line parallel to the main stream.

"The ends of both the ridges are very steep. The northern one was evidently used as a quarry, as quantities of stone can now be seen, some of it wedged and finished, while quantities of rock bear the wedge marks and have either been split or dressed. In fact, it gives one the impression that a considerable amount of work was going on there at one time, which had been suddenly abandoned. The southern ridge is almost more interesting. It ends in a large rock which is perpendicular, and at a distance varying from 8 to 20 ft. from the ground runs a gallery which varies from 8 to 20 ft. in breadth. This gallery appears—in certain parts at any rate—to have been cut out of the rock. From this gallery again the hill rises abruptly for about 20 to 30 ft., and this appears to have been the level of the bund, judging from the remains of wedged stone and bricks to be found there. I cannot understand the reason for the gallery, unless it had something to do with the sluice which originally stood there. From the description given above it will be seen that the breach is a comparatively small one. Stone, ready wedged, is on the spot only requiring to be rolled down the hill into the river bed, and the restoration would be a simple matter.

"A few small breaches, or more correctly speaking, elephant tracks, across the bund close to the spill require only a few cubes of earth to repair them, and the bund would then be in perfect order.

"*Remarks.*—Like Padawiya, Wahalkada tank was built to be used more as a reservoir than for direct irrigation purposes.* The Wahalkada scheme is identical with the Padawiya scheme. Padawiya tank irrigated a comparatively small extent of paddy land directly below it. Wahalkada irrigated a still smaller extent. Wahalkada at present has only one sluice, which is situated in that portion of the bund which runs between the Mahinna and Godahinna ridges. These ridges are parallel to each other and only 60 chains apart, and run north-east for some distance, the high ground running almost down to the Yan-oya. It was only possible therefore to irrigate a limited extent of country directly below the tank between these ridges.

"The only sluice which was situated at the present breach allowed the water to escape into the Yan-oya, and the combined waters of the Yan-oya and the tank were carried across to the country on the east bank of the Yan-oya by means of the anicut which I discovered in 1897, known as the Wanattipaluwa."

The discovery of this hitherto unknown, yet enormous tank, and speculation as to the capabilities of both Wahalkada and Padawiya, which were still more or less limited to conjecture, led to a further survey of the area on a larger scale, with a net-work of levels. The work was undertaken by another officer of the Survey Department, Mr. Ridout, in 1899. His carefully compiled and valuable report will be found in the Appendix.

Mr. Grinlinton, who was Surveyor-General at the time, commenting on this report says :

"The work was referred to mean sea level and numberless benchmarks were established, so that when an opportunity occurs there will be no difficulty in completing the investigations."

Concerning the ancient story of Wahalkada tank nothing seems known. Even tradition does not offer the most slender evidence on which its history might be investigated. "The present names," says Bell, "—and there would seem to be no others—merely signify (Palace) gate-way (Wahal-kada) or *Gateway to Padawiya* (Padavidora), and are possibly corrupt translations of its ancient designation. The fine Tamil inscription of the slab near the breach when deciphered may throw some light on its past."†

There is a tradition that Maha Sen built Padawiya tank. In keeping with the legends associated with other tanks ascribed to the genius of Maha Sen, at Padawiya too the story is told of the guardian spirit which haunts the neighbourhood. The large rock towering over the embankment is therefore known as *Deviyanne Kanda*—"God's Hill" or "King's Hill".

If their near proximity and general resemblance is accepted as a clue, the formation of both Wahalkada and Padawiya should be approximately contemporaneous. While accepting the possibility that Maha Sen built them, more weight however attaches to the probability that the tank builder who flourished in the twelfth century restored these works.

An intriguing link is in this connection forged by Ridout, who, in his reports mentions the fact of his being told by a priest that Padawiya was called, *Maha Sagara* (allied to the sea), Wahalkada was called *Bena Sagara* and that Nambakada tank was called, *Mati Sagara*.‡

* This leads to a matter which, as far as I am aware, has not been considered by any authority.

It is not unreasonable to assume that these large tanks served a dual purpose.

Apart from storing water for irrigation, they undoubtedly held up water which under other circumstances would have flooded the country, laying waste, or inundating rich agricultural areas.

The floods which at the present day sweep down the steeper gradients of the Mahaweli-ganga, converting the low-lying areas into unprofitable swamps for a considerable period each year, were possibly, in certain measure, controlled in days gone by.

It is this theory which helps to reconstruct the ancient potential agricultural value of the areas between the channels leading from the Kalinga Anicut and the Mahaweli-ganga. A great deal of the water which would have flooded these areas had already been turned down the Minipe-ela and stored in Parakrama's Sea.

(See Elahera and Polonnaruwa Topographical Maps).

† Appendix. B., Archaeological Reports, Oct.-Dec. 1896.

‡ This curious identification is undoubtedly based on the passage in the *Raja Ratnakara*, which has been previously alluded to, see page 9, (Note).

VELANKADU VILLU.



Shallow reed-fringed natural reservoirs, called in Ceylon "*villus*". The gently sloping banks and the clay bed hold up the rain-water drainage for a considerable period.

THE MAHAWELI-GANGA.



A prodigious agent of enrichment and civilization—showing the railway bridge under construction at Mahagantota.

Nambakada tank, which has been under such circumstances vested by tradition with a measure of importance, is situated a few miles due east of Padawiya. It is not large in comparison with the other two, but it possesses an unique inscribed pillar—"rivalling the slab on the bund of Padawiya"—by which the story of irrigation works in this area is perpetuated.

Until Messrs. R. W. Levers and G. M. Fowler were enticed to the spot, in 1887, by the strange tales of village hunters who roamed the rough forests which girdle Nambakada tank, nothing was known of this valuable vestige.

But since then, from writings which have badly weathered and from other evidence, Bell says, that the inscription may reasonably be assigned—at present at least—to Kasyapa V., A.D. 954–964. *

The "Vanaddi-palama."

About ten or eleven miles down the more or less sinuous course of the Ma-oya, which passes out of the breach in Padawiya tank, there is an ancient stone dam or weir, which is entitled to take one of the foremost places among the great structures of the kind in Ceylon. This is known as the Vanaddi-palama.

It seems clear that only one authority has ever inspected this monument of labour. Parker, in Sessional Paper XXIII. of 1886, writes: "It would be difficult to produce a better proof of our apathy and ignorance regarding the interesting and important works which the Ancient Sinhalese have left behind, than the simple fact that after nearly one hundred years occupation of the District, the Vanaddi-palama has remained unknown to us up to the present time."

Drawing conclusions from the circumstance that the irrigable area in the vicinity of Padawiya tank is comparatively small for such a large reservoir, and that, moreover, no channels appear to have been laid out from the *meda horowa*, considerable weight is added to the probability that the great dam and the tank were originally designed as one scheme.

The tank apparently stored the water and passed a constant flow down the river for eleven miles, until it was checked by the dam and diverted into two channels. There is a vast extent of what would appear to be irrigable land lying between the dam and the coast, on both sides of the Ma-oya. Here, possibly, lay the ancient paddy fields soaked by the water stored in Padawiya.

It is conjectural whether the land nearer the sea was more fertile than that nearer the reservoir, or whether it was selected as being more accessible or healthier than the interior. Some satisfactory reasons, however, are doubtless forthcoming, or the laborious work required at the anicut would not have been undertaken.

It would be appropriate to close on a note struck by Parker, who, in considering schemes of restoration of the Padawiya works, says, "If we rashly think, after a mere glance at the site (in comparison, on the other hand, with the actual practical experience of the Sinhalese for nearly 1,000 years), that we can, *change all that*, and effect untold improvements on the general designs of the ancient works, we may find, when too late, that they were right and we are wrong. Experience constantly impressed on me that if there was one subject which these wonderful old engineers understood better than another, it certainly was the irrigation of paddy fields, and the designing, at least in outline, of the great structures which were needed for that purpose."

END OF PART I.

* Appendix E., Archaeological Reports—Oct., Dec., 1896.

APPENDIX I.

Extract from the Report on the Canal from Ellehara, near Matelle, to Minnery and thence to Gantalawe, near Trincomalee. (See Sir Henry Ward's Minutes and Collected Papers, pp. 77-83, and Appendix, Ceylon Almanac, 1857.

We began on the sixth ultimo, by examining the commencement of the work at Ellehara, and taking the dimensions of the stone bund.

The Elahera
Anicut.

The Ambanganga is formed by the confluence at or near the village of Ambene, of four or five considerable streams, taking their sources in the south and west parts of Matelle. Thence it is called the Ambanganga. A range of hills, commencing from a spur of the Laggalle mountains, extends in a northerly direction to the left or southern bank of the river, nearly opposite the present village of Ellehara. At a point where this range approaches within a distance of 200 yards from the river, a large embankment of earth, with stone revetments, commences, and extends for about 130 yards, terminating in a wing wall about 15 feet in height. Here begins a large spill water, the length of which was probably about 90 yards, and from its extremity ran, at an obtuse angle, the great stone bund; this extended across the stream, until it joined an immense earth embankment, with stone revetments, averaging 60 feet in height, which still exists, and leads to the mouth of Mahasen's Canal.

The remains of the spill-water measure 76 yards in length. This brings us to the edge of the river, and it is evident, that it was continued for some 12 or 14 yards further, to the rocky foundation in the bed of the river on which the great stone bund was built. The breadth at the top, at its southern end, is 29 yards, and at the northern end, where it has been carried away, 33. Its height above the level of the water at ordinary seasons, is about 40 feet. It is built throughout of huge blocks of hewn stone embedded in chunam, which still remains in the interstices. The stones in the interior of the work were carved with figures, and evidently had formed part of a building of an earlier date. This is also observable at Kalawawe and Balalawewe, works of irrigation in Nuwerakalawia, and also attributed to Prakrama Bahoo, which seems to prove that the larger works of irrigation in Ceylon are of a comparatively modern date.

Engineering
skill.

Great engineering skill is shown in preparing the rock to receive the foundations of the large stone bund across the river. Upon the outer side these consist of a trench, cut into the solid rock, to receive the first layer of masonry, at a distance of 25 feet inwards, is a continuous row of holes, 2 feet square, and about 3 feet apart, and sunk to a depth of about 3 feet; into these were fitted large stone pillars, the remains of some of which, broken short off, are still to be seen, one of them protrudes above the surface of the rock to the height of about 2 feet.

Parallel to this, and at a distance of 10 feet from it, is another row of smaller holes, into which, also, pillars were fitted to form the inner edge of the masonry. From the angle in the centre of the bund, another row of holes extends, in a semicircular direction, towards the spill-water.*

From the northern extremity of the stone bund, and nearly in the same direction, a large earthen embankment, faced with stone revetments, extends as far as the mouth of Mahasen's Canal—a distance of nearly half a mile.

The waters of the river, checked by these vast embankments, must have inundated the low lands lying on either side of the river, for a distance of about 10 miles, thus forming the largest of that series of lagoons which doubtless bore the name of the "Sea of Prakrama." As a proof that these low lands were so inundated, gigantic koobooks, trees only growing in or near the immediate neighbourhood of the water, are now to be found far above the height to which the river overflows its banks.

Intake of
Elahera
Canal.

At first sight it would appear, that here the river naturally divides into two channels, the one being very much larger than the other; but on closer inspection we have come to the conclusion, that what appears the smaller branch was, in reality, the mouth of Mahasen's Canal, leading into a deep pool in the bed of the river, which, with a bund very much smaller than that, of which we have described the remains, would have afforded a sufficient supply of water for the purposes for which it is said to have been formed.

Prakrama Bahoo, however, having conceived the idea of forming his "Sea", constructed the bund we have described, at a point where he could obtain a good rocky foundation, and could easily connect the high ground on either side of the river. We were led to the conclusion, that what now seems a smaller branch of the river, is artificial, and was the excavated mouth of the canal, by the facts of its banks being rocky and precipitous, and very much higher than the land on the south side of the river. This channel, therefore, could not have been formed by the natural course of the water.

At a quarter of a mile from the mouth of the canal, the rush of water appears to have breached the bank through which the stream now flows, and joins the river at some distance lower down. There are here some hewn stones scattered about, which are evidence of the remains of the embankment, from this point, therefore, the bed of the canal is quite dry; a very small stream only, in a slightly different direction, being led to the fields now existing at Ellehara.

Drainage from
Konduruwawe
range of
hills.

From the same spur of the Laggalle mountains, to which we made allusion before, a range of hills extend in a north-easterly direction, through Kondrowawe, to within half a mile of the Minnery Lake. The Amban-ganga, having received the waters of several other streams, intersects these mountains at the village of Ambene, and flows down to Ellehara, a distance of about 14 miles.

Series of
Lagoons
claimed to be
Parakrama's
Sea.

To conduct the water of the Ambanganga to Minnery, and to divert the streams falling from this range of hills, this wonderful embankment, which extended, without intermission, for 24 miles, was constructed. Its height, as before mentioned, varies from 40 to 90 feet, but taking its average at 50 feet, it must have contained more than 3,800,000 cubic yards of earth-work, which, with the masonry, would have cost, at the present rate of labour, not less than £200,000. This only includes the works from Ellehara to Kondrowawe. The range of hills to which we have alluded, are at some places, at a distance of several miles from the embankment, and the ground, intervening between it and their base, being flat, or rising with an almost imperceptible slope, was submerged. In other places, the small spurs of the hills approached so near the embankment, as to form a series of canals connecting the lagoons, which the receding

* A series of sketches which illustrated this report will be found reproduced in the Ceylon Almanac, 1857.

hills enclosed. Of these lagoons, the largest was that at the stone bund across the river, where the hills form a large amphitheatre, eight others, connected by as many canals, covered the intervening space above the embankment, between Ellehara and Kondrowawe.

From the point at which the waters of the river have breached the canal, the embankment continues, about 50 feet high, to the present village of Ellehara. At a distance of about a quarter of a mile from the commencement, advantage has been taken of a flat rock to form a spill-water of about 70 feet wide, with wing walls 15 feet high. This was evidently as a safeguard for the overflow of water in the great lagoon, which, over this spill-water, returned to the river.

Mr. Turnour, in the Ceylon Almanac for 1833, quoting from Mr. Brooke's notes, mentions, that "at the commencement of the canal or about 300 yards from the Ambanganga, a basin has been cut, about 300 to 400 yards in circumference, said to have been excavated when the canal was made, and no doubt was originally a harbour for boats passing up and down." He adds, "It has also had a communication with the canal". We could find no trace of this basin, and think that Mr. Brooke must have mistaken the spill water which we have described, as the communication to which he alludes.

The present village of Ellehara is situated at about two miles from the mouth of the canal; the fields lie below the embankment, and are still cultivated by means of the water of the Ambanganga. Most of the houses, however, are now upon ground formerly part of the site of the great lagoon. A sluice through the embankment still conveys the water to the fields. The name of the village proves that its existence commenced subsequent to the formation of the canal.

The few houses which yet remain occupied in this once extensive village, are wretched to a degree, and from the number of ruined and deserted huts, and traces of sites of former dwellings, there is no doubt, that the place was once very flourishing, even when Mr. Brooke passed through it, about 23 years ago, it contained 50 families, which number is now reduced to 10.

On the 7th, leaving our camp at Ellehara, we set out to commence the exploration of the canal towards Kondrowawe. A road traced towards Batticaloa is cut for three miles, at no great distance from the embankment. Two considerable streams, the Kongatoo Oya, and Kirandegalle Ella, which were once checked by the embankment, have breached it; the first about half a mile, and the second at about two miles from the village of Ellehara. At about a mile and a half from the last breach, stands a gigantic Tamarind tree, on the top of the embankment. This tree which measures 26 feet 2 inches in circumference, is called the Orubenda Siembalagaha. Tradition has it, that boats stopping there on their transit up and down the canal, were fastened, and the natives point out some scars near its root, which they say are the marks of chains and ropes. It is worthy of remark, that there is no other tree near it at all approaching it in size, and it is evidently a tree of very great age. We have found the traditions regarding the canal so consistent throughout, that we cannot help laying some stress on this legend, for we have the most satisfactory proof, from the size of the embankment, that the line from Kondrowawe to Ellehara was navigable. This tree stands at the end of the second large lagoon, and near it are the foundations of some building on the embankment, which was, at this point, about 90 feet high.

In consequence of the high lands approaching the embankment, a canal extends for a mile into the next lagoon, which begins at a spot where the Hirettia Oya enters it, and after flowing along the embankment for a short distance, breaches it, and flows down to the river. About half a mile further on, it is again breached by the Bakamoonoo Ella. From this point, half a mile of canal leads into another large lagoon, along the base of which the embankment extends for two miles, when the natural high land approaches, and forms, with it, a canal, which extends half a mile to the Kottapitiya Oya, which has breached the bank. The lateness of the evening here obliged us to return to Ellehara.

We now found considerable difficulty in obtaining any one who would undertake to guide us to Kondrowawe, for, though many had crossed the embankment at different places, no one had ever gone along it; and the distance and the difficulties of the route were greatly exaggerated by the people, from their utter ignorance of it, and their fear that no water might be found by the way. The country between Ellehara and Kondrowawe is now an almost impenetrable jungle, nearly destitute of water, at this, the dry season, with only the site of a deserted village here and there.

Having at length succeeded in obtaining a hunter from Kondrowawe, who undertook to guide us, although he admitted that that part of the country was very imperfectly known to him, we dispatched our large tent, horses, and all the baggage we could spare, by the known road, which is a very circuitous one, to Kondrowawe, and on the morning of the 9th, taking with us only a small tent, supplies for two days, and as much water as we could procure gourds to contain, we started to prosecute our trace as long as daylight lasted. We quickly walked over the ground which we had chained the day before, and recommenced our survey from the Kottapitiya Oya. While breakfasting, we imprudently sent on our guides and catty men, with a view to expedite our work, and lost some time from having missed our way, the high banks of the oya misleading us, as they closely resembled the embankment which was hidden from us by the thick jungle, but which, we afterwards found, left the river at a sharp angle. On regaining the embankment, we found that it gradually increased in size till it averaged, for many miles, 80 feet in height. For nearly three miles we found it without a breach, and it was evident, from the absence of jungle immediately above it, that in the wet season a considerable quantity of water collects along it. Here the lagoon must have been very extensive, as the base of the hills is four or five miles from the embankment.

A little further on we found it breached, in two places, by a considerable stream, the Keerewanaheena Ella, which rises in the Kondrowawe range. For about three-quarters of a mile, a canal connects this lagoon with the adjoining one. Evening was by this time closing in, and as we found that much of our supply of water had been drunk by the coolies to whom it had been entrusted, it became necessary to seek for camping ground at some reasonable distance from a spring. Our guide, who had hunted over this part of the canal, undertook to lead us to a plain about a mile from the Ella, at about two miles from which there was a spring.

References to contributions by Brooke and Turnour.

The Village of Elahera in 1855

Exploration between Elahera and Konduruwewa.

The Historic Tamarind tree.

Canal said to have been navigable.

Canal lies through almost impenetrable jungle.

Continuation of exploration from Kottapitiya-oya.

Explorers run out of drinking water.

We then sent our coolies to pitch the tent and bring water, while we continued our survey as long as light permitted. We ceased chaining at a large rock spill-water, and it being too dark to take its dimensions, then, we were guided to our halting place.

Description
of a sluice
and spill.

Early on the 10th we returned to the spill-water. We found it a sheet of smooth rock, about 12 feet in height, 110 feet long, and 110 feet in breadth. At one end of it is a channel cut through the solid rock, 7 feet deep, 6 feet wide, into which sluice gates, evidently fitted, for the irrigation of the fields below. Wing walls rose at either end, about 20 feet above the level of the spill-water. Below the spill, and outside the large embankment, is another embankment, of considerable size, which apparently was for the purpose of protecting the fields, immediately below, in great floods, as well as for conveying the water to other parts of the country for the purpose of irrigation. We regret that we had not time to explore this branch, below which, we were informed, lies a vast plain, called Patambegaha Ella Damoonoo, where, doubtless, were formerly the fields irrigated by this sluice.

More
evidence of
this canal
having been
used for
navigation.

Opposite to the spill-water, and continuing parallel to the embankment for a considerable distance, we observed, at about 100 feet from it, a small earth bank about 6 feet high, which may either have been intended to regulate the flow of water over the spill, or to confine it in a canal, in the dry season, for the purpose of navigation. At about two miles from the spill-water, the lagoon terminates in a canal, cut through rock, for a distance of about 200 yards, and about 30 feet in width, at the end of which the embankment is again breached by a stream, now called the Attanakade Ella. Two other breaches occur about a mile further on, caused by the Megolle Ella. One of them, probably, is at the spot where the sluice for the irrigation of the fields of the now deserted village of Oulpotegame existed.

Konduruwawe
Village.

The high ground here approaches the embankment, and a canal, for about three-quarters of a mile, extends to the site of the deserted village of Talacolepitia, the fields of which were formerly irrigated by the water of Pécolom, a large Tank situated about 4 miles west of the embankment. This village was deserted 25 years ago, and a few fields are still cultivated by the people of Kondrowawe, below the great embankment, by the water which escapes from the ruined tank in the rainy season, in a stream called the Radawigi-oya, which has breached the embankment just beyond Talacolepitia.

We now approached the plains adjoining Kondrowawe, and owing to our guide's ignorance of the country, and the thickness of the jungle, again wandered from the embankment, which however, after some hour's search, we regained, about a mile and a half from the village of Kondrowawe, where we met our people whom we had sent by the road, and breakfasted. Here there is still a considerably larger tank about the embankment and at a higher level than the canal. This apparently was fed both by streams falling from the hills, and from the water of Pécolom tank. It is separated from the canal by a large embankment. Having ascertained that the spot at which the canal branched off to Minery and Giritella was two miles further on, we proceeded thither, and there encamped for the night.

Traces of
rich paddy
fields.

Between the village and this point, we passed two sluices, long disused, but originally for the purpose of irrigating the numerous fields once existing below the embankment. The first of these penetrated the embankment at a spot where advantage had been taken of a natural rock to form a spill-water, which is singular from the fact of its having two levels. The entire breadth, including both spills, from wing-wall to wing-wall, is 200 feet. The lower spill-water is about 8 feet from the present bed of the canal, and measures in breadth about 50 feet; the level of the higher spill-water is about 10 feet higher, and was 150 in breadth, and through it are two sluices, nearly at the level of the canal, each two feet square. The length was nearly 200 feet. Large waste plains are described as lying below this water, once, doubtless, rich Paddy fields; and the natives described an embankment similar to that which we had observed at the other spill-water. This, however, we had no time to explore.

The second sluice was so dilapidated, that we could not distinguish its plan. There was, evidently, no spill-water here, and the natives could give us no information concerning it.

Terminus
of Trunk
Canal.

The direct line of canals and lagoons from Ellehara terminates beyond this sluice, in a stone spill-water, at a short distance above which branch off two canals, the one on the right, leading to Giritella Tank, and that to the left, said to lead to Minnery. The spill-water at the extremity of the canal consists of a solid mass of masonry, 112 feet in length, and 56 feet in breadth, and like the one which we noticed before, is at two different elevations, the lower one having a breadth of 20 feet, and the upper of 36 feet. The level of the one is about four feet above that of the other. The masonry of this spill-water is bounded together in a very peculiar manner, combining every possible mode of presenting resistance to the flood of water over it. The inner faces of the embankment here were protected from the action of the water by strong wing walls.

The distance from the mouth of Mahasen's Canal to the spill water is about 24 miles.

Exploring
the branch
leading to
Minneriya.

On the morning of the 11th, we sent our tents and people direct to Minnery, by the native path, and, having obtained a guide who undertook to bring us by the Canal to that place, we proceeded with our survey, preferring the main branch to Minnery to the smaller one to Giritella. After chaining for one and a half miles, we found that the direction of this canal bore considerably to the westward; and after some hesitation, our guides confessed that they had never been there before, and that they now believed that this canal led to Pecolom, instead of to Minnery, the only connection with the latter place being, they averred, by means of a sandy stream called the Talawatura, which conveyed the surplus of the great canal over the spill-water.

As we had sent all our baggage to Minnery, and could form no idea of the distance to to Pécolom, we were reluctantly obliged to abandon the exploration of this canal, resolving however, to return, on the first opportunity, and satisfy ourselves as to its direction. We accordingly left the canal by one of its breaches, and following the Talawatura for a considerable distance, reached Minnery Lake through the old Tank of Katukaliawe.

Fever brought
on by
exposure.

Fever, brought on by exposure, compelled us to halt here the whole of the following day, and on the 13th we proceeded, through Giritella, to visit the ruins at Pollinura. Here we remained for three days, as we were all suffering more or less from fever, and on the 17th we returned, passing through the village of Minnery, and encamped between the outlets of

Gantalawe and Kowdella canals. These outlets were for the escape of the surplus water of the Minnery Lake ; the lower one, which is called the Mahawana, conveyed the water to the once enormous tank of Kowdella ; the upper, or agalawana, led the water to the Gantalawe or Kandelly Tank.

We chose the latter, as it was the principal work, and on the morning of the 18th, under the guidance of an intelligent Weddah, we commenced tracing this canal, the course of which, except for the first three miles, has never before been explored. At the Weddah village of Rotewewa we found the people most primitive. They have been settled here from a very remote period, and said, that they once owned all the adjoining lands. This village and that of Potane, they told us, are presided over by a Weddah chief, who bears the title of the Rangdoon, or the "Golden bow." Unfortunately for us, this Chief was from home on a shooting expedition, and we had not an opportunity of making his acquaintance, but we saw his quiver, full of arrows, which he had left behind.

Leaving our tent and people here, we proceeded to inspect the great breach in the Kowdella Tank, which we were informed was only two miles off ; the distance, however, turned out to be at least six, the path lying through part of the bed of the Tank, now a vast Forest. The walk, fatiguing as it was, well repaid us, for nothing could have given us so good an idea of the immense size of the Kowdella Tank, as the view of this, the principal breach in it. The Gal-oya has breached the embankment of Kowdella, where the river had been dammed across, at a point where two natural hills approached its banks. These are not less than 90 feet above the present level of the water. The breadth of the breach cannot be less than 200 feet at the top ; the bottom of the breach is now a large and deep pool of water, in which we saw several huge alligators. We had not time to go on to examine the stone bund, which has already been described by Mr. Bertolacci and Dr. Davy.

We returned to Rotewewa for breakfast, and afterwards followed the canal for three miles further on, where the Gal-oya has breached it. At about a quarter of a mile up the river, we found the ruins of a palace said to have been built by Mahasen which is now called Nana Morella Maligawe, and encamped in a plain adjoining it.

Having now ascertained that the course of the canal, from Minnery to Gantalawe, lay at a higher level than the Kowdella Tank, and not through it, as supposed by Mr. Turnour, and having found that the difficulties of proceeding along the bed of the canal were so great, as to render it probable that cutting our way through the dense jungle would occupy more of our time than we could spare, we struck from this point on the morning of the 19th, to the high road to Trincomalee, which we reached at Gal-oya resthouse.

We continued along the high road towards Gantalawe, and came again upon the canal, where it crosses the road, near Kitoolouta, at the point noticed by Lieut. Atcheson.

That officer observes, "About 4 miles from the Tank of Dantalawa or Kandalla, the road crosses a canal from 20 to 30 feet broad, formed by an immense embankment thrown up on the lower side. This canal is said to be supplied by the waters of the Ambanganga, that river being dammed up and turned into this channel at Ellehara, feeding the Tanks of Minnery and Kowdella, in its course to Dantalawa." (See Ceylon Almanac for 1833, page 281.)

The tradition of the origin of this canal was correctly given to Lieut. Atcheson, but he seems to have fallen into the same mistake as Mr. Turnour, in supposing that it passed through Kowdella Tank in its way to Gantalawe.

We continued our journey to Kandelly but found that there the tradition had become very faint and vague, in consequence of a Malabar population having superseded the Singhalese. The following morning we went to the Tank, but as our time was too limited to admit of a lengthened search, and in the absence of native information to guide us, we could not ascertain with any degree of certainty, the point at which the canal enters it. An old man, almost the only one who appeared to have ever heard of the canal, pointed out to us a sandy river, which he said, he always understood was the point where the canal came in, and near it we thought we could trace the remains of an embankment.

We do not, however, regard our failure at this point, as a matter of any importance, as the existence of a range of hills on the western side of the road, extending from the place at which the canal crosses it, to the Tank, renders it impossible that it could have led any where else than to Kandelly. We were informed by the villagers that an embankment exists, leading from Gantalawe Tank to Indiriweye, a Tank a short distance to the North.

We now returned to Gal-oya, and determined to complete the link between Kondrowawe and Minnery, which we had lost by the misrepresentations of the people of the former place. We proceeded through Seegiri to Pécolom. To judge by its embankment, which is the largest we have seen, Pécolom must have been one of the most considerable tanks in this neighbourhood, inferior only to Minnery and Kowdella. The revetments were continued nearly to the top of its embankment, proving that its depth must have been very great. We ascertained that this Tank was filled by the Kiri-oya, a large stream, almost deserving the name of a river, which rises in Nuweragalla Kandy, in the north-east part of Matelle, and is divided from the Ambanganga by the Kondrowawe hills. It flowed into Pécolom, and thence a part of its surplus water flowed, through the Mada Horowe, or low level sluice, where it has broken the bund, to Minnery ; and the remainder escaped through the Goda Horowe, or high level sluice towards Kondrowawe, irrigating Meegahawelle, Talacolapitia and other tracts of lands, and eventually falling into the Ellehara canal. The Goda Horowe still exists, and the water collected by the ruined embankment in wet weather, flows down in a large stream now called the Radawige-oya, which as we before mentioned, breached the canal embankment near Talacolapitiya.

From Pécolom we proceeded to Kondrowawe, a distance of about four miles, and having brought with us guides, in whom we could place greater reliance than in our former ones, we commenced, on the 22nd to follow out the canal towards Minnery, which we had formerly been obliged to abandon. Having satisfied ourselves that the canal, most probably, did lead to Minnery, we started on the morning of the 23rd, having sent our horses by the path to the village of Ihekoolowadia, on the banks of that lake, and surveyed the canal into the village tank, which is separated from Minnery by its embankment only. The distance was five miles, and the canal was found to be much smaller and less perfect than any we had previously surveyed. The numerous breaches are to be attributed to the close proximity of the hills. The greater

Tracing the branch to Kantalai.

Veddah Tribes.

Kowdella Tank.

At Gal-oya.

Observation by Lt. Atcheson.

Tradition at Kantalai.

Pécolom Tank.

The link between Kondurawewa and Minneriya.

part of it is excavated, instead of being embanked. Not far from the point where the canal enters Ihikoolooewe, we found a stone breakwater, dividing the stream. We followed the larger and lower branch, having gone along the other one for a short distance, and found it very indistinct and at a much higher level. We consider that this branch was simply for the escape of surplus water, lest the swollen stream of the canal should destroy the embankment of the Tank, which is not far from the point at which it enters it.

Conclusive evidence of canal from Elahera to Kantalai.

We have thus satisfactorily ascertained, that the water was conveyed from the Ambanganga, near Ellehara to Kondrowawe, and thence into Minnery Lake. That another canal led the water of that Lake above the level of Kowdella to Gantalawe, thus verifying the native tradition, which we found consistent and unvarying throughout the whole line, until we reached the Malabar country, a distance of not less than 57 miles. Mr. Turnour, in his notes on canals and water courses, in the Ceylon Almanac for 1833, remarks, that "under the most favourable circumstances, their length is double, and in some instances, four and five times the direct distance. Judging from these peculiarities, and giving a conjectural opinion, in each instance, of the nature of the country, a Canal from Ellehara to Kandelly would exceed one hundred miles." Our survey shews that Mr. Turnour over estimated the length of the canal.

Kowdella filled by a branch canal.

We have also ascertained, that Kowdella was filled by another canal from Minnery. That a canal connected Kondrowawe with Giritelle, we have no moral doubt, although our time was too limited to enable us to explore it. We had it cleared for six miles, and rode along it nearly two miles, and the traditions at Kondrowawe and the neighbourhood of Giritella, entirely coincide. It will be seen, that there are still other canals connected with these, which we have not been able to explore; but we trust that the results of this expedition may afford a clue to the unravelling, at some future time, of the wonderful net work of canals with which this part of the country was intersected.

"To have traced the line of the Ellehara canal through a mountainous country, alone evinces the knowledge and great exertions of the natives of a former date."

Had Mr. Brooke been in possession of the information which we have since obtained, the foregoing remarks would have told with ten-fold force, for not merely did the projectors of this canal display profound engineering skill, in completing the work, but they formed, and carried into effect, the still more wonderful conception, of uniting a portion of the waters of the Kiri Oya, a river flowing on the opposite side of a high range of hills, with those of the Ambanganga at Kondrowawe, thence distributing them by minor canals throughout the country, and eventually reuniting the waters of the Kiri Oya on the Minnery Lake.

Country originally opened up.

From our observations during the survey, we think it probable that the face of the country was at that time comparatively free from jungle; and that, therefore, the difficulty of taking accurate levels was not then nearly so great as it would be at present. It seems, however, probable, from the growth of the forest in the bed of the canal, that many centuries have elapsed since it fell into disrepair.

Work cannot fail to excite wonder and admiration.

In contemplating the grand conception of the projectors of these works, the economy of labour in availing themselves of the natural features of the country, and thus securing such great results by the construction of a single embankment;—the wisdom displayed in diverting a large river from its profitless course, and thus diffusing wealth and prosperity through a previously barren waste,—and the forethought in turning to account the drainage of the vast expanse of country, through which the canal passes,—cannot fail to excite wonder and admiration.

It is melancholy to regard the present altered condition of a country once brought by so much skill and labour to a state of perfect fertility. The Ambanganga now rolls on in its former unprofitable course. The streams, once checked and diverted into numberless Tanks, flow through the breaches of the embankment, and are lost in the forest; and the whole country has become again a desolate and unhealthy jungle. Even at this, the most healthy season of the year, out of about 40 people who accompanied us, only seven have escaped fever and dysentery.

Melancholy prospect presented by abandonment.

The population of the few remaining villages is annually decreasing. Between Ellehara and Kondrowawe, we passed near five villages recently deserted, and many places were pointed out to us as the sites of villages abandoned within the last century. Some idea may be formed of the depopulated state of the country by the fact, that in a distance of 24 miles, there is not one inhabited village, although we passed some fields which are still occasionally cultivated by the people of either Ellehara or Kondrowawe.

Feasibility of restoring the work.

The excellent state of repair in which we found the embankment from Ellehara to Kondrowawe, suggests to us the feasibility of restoring these works to their former state; but we do not think that any benefit would arise from the repair of the canal from Kondrowawe to Minnery, as the waste water would naturally fall over the spill-water, into the Talawatura, and so into that lake, and the canal which we traced, can only have been formed in order to complete the line of navigation. We are not in a position to speak with any degree of certainty as to the practicability, or otherwise, of repairing the line from Minnery to Gantalawe.

To revert to the first part of the work. The Dam across the Ambanganga could easily be rebuilt; and the repair of the fourteen important breaches which occur in the entire line of embankment, present no serious engineering difficulties. A natural bed of rock having in every instance been selected for the spill-waters, their restoration would be comparatively easy. To effect these repairs, a large force of men, would be necessary, as operations could only be carried on for about three and a half months in each year, owing to the floods during the rainy season. A great obstacle, too, would be found in the difficulty of obtaining a sufficient supply of water for the workmen.

It would be useless, however, to attempt these repairs, unless Government were prepared to import population, on an extensive scale, for the cultivation of the lands which would be made available by the vast supply of water, which would then be at command. But this does not seem an insuperable obstacle, when we take into consideration the over-populated state of parts of the South of India, which is such, that in one of the 20 provinces of the Madras Presidency alone, a few years back, no less than 200,000 people died from famine in one year; and we believe we are correct in stating, that last year, the Government was compelled to support 100,000 people to prevent them from meeting the same fate.

Before entertaining the idea of repairing these works, a trigonometrical survey of that part of the Island would be indispensable, in order to ascertain what the effect of the accumulation of so large a body of water would be upon the adjacent country; and for this, great natural facilities exist, in consequence of the numerous isolated hills with which the neighbourhood is studded. We have ascended several of these isolated points, and examined the country with a view of ascertaining the feasibility of a thoroughly organized system of triangulation.

We originally planned this expedition for our own satisfaction; but finding that its results have so greatly exceeded our expectations, we have resolved to communicate them to Government, hoping that they may prove not devoid of interest.

A survey
advocated.

September 9, 1855.

ALEX. YOUNG ADAMS,
JOHN F. CHURCHILL, C.E.,
J. BAILEY.

APPENDIX II.

*Report on Levels taken near Wahalkada and Padawiya Tanks, North-Central Province—
By Mr. J. B. M. Ridout of the Ceylon Survey Department in 1900.*

I forward herewith 2-inch sheets of D 11 and D 16 showing the result of my levels at Wahalkada and Padawiya. Unfortunately I was unable to finish the fieldwork before the rains set in, and consequently my report on these tanks is not a complete one. In addition to the lines of levels that I was instructed to run, more work will be required at Padawiya and a line about 4 miles long in connection with Wahalkada to complete the work satisfactorily. I refer to this later on in my report.

Further
Fieldwork
required.

There is no close in my work anywhere on to an old bench mark, as I did not get far enough with it; but I ran a second independent line of levels all the way from my starting point alongside the other, comparing the two lines at each bench mark, and the greatest difference between the two lines was $2\frac{1}{4}$ hundredths of a foot. I have not sent in a diagram showing my work south of sheet D 16, as it runs through another watershed and does not give much information about the lie of the country.

I started my levels from a bench mark on the Anuradhapura-Trincomalee road, a rock mark near the 80th milepost; I could not find any other bench mark near the junction: and from this I levelled up the Vavuniya road for a quarter of a mile to the pinpara running north, which I followed as far as Dunuwattagama, about 7 miles. From the Vavuniya road the ground rises gradually for three-quarters of a mile, and then falls as far as the 2nd milepost; after which it runs nearly level until you come to the ridge at the 5th milepost. This ridge separates the valley of the Kapugollewa-ela from that of the Yan-oya, and runs on northwards just east of the pinpara. After reaching Dunuwattagama I began my investigation of Wahalkada tank. This tank has already been reported on by Mr. Wickwar, and as my report is practically a supplement to his I have only referred to matters reported on by him as far as they concern my present work.

From
Horowapotana
to Dunuwatte-
gama :
Wahalkada
Tank.

My levels began at the top end of the tank; and as I had no clue as to the probable spill level, I was obliged to go by Mr. Wickwar's report upon the tank and what I was able to gather from the villagers. As the contour, according to local legend, is a long way (more than 70 feet) above the true contour, this resulted in my taking levels to possible and reported spills at gaps in the Maha Hinna, which I subsequently found to be unnecessary. It did not, however, involve much extra work, the whole of the unnecessary levels only amounting to 142 chains.

Reported
contour.

As Mr. Wickwar suggested the probability of a spill at Ihala Divulwewa, I ran a line of levels there from Dunuwattagama. This tank (Divulwewa) is formed by building short pieces of bund across breaks in the ridge, and while the spill water flows to the east of the ridge and runs below Dunuwattagama paddy fields into Maha Kapugollewa and so below Wahalkada, the water from the sluice runs through the fields into the Tavalam Hammillewa-oya and on into Wahalkada. The ridge forming the bund is a continuation of the Maha Hinna, and it runs on from Ihala Divulwewa with breaks in it till it meets the cross range just north of Ihala Aliyakimbulagala. It rises to some height at the northern end of Ihala Divulwewa, and is here called Mana Hinna. I found that for Wahalkada to spill at Ihala Divulwewa the water would have to rise to a height of about 250 feet mean sea level. Divulwewa village is about 230 feet

Ihala
Divulwewa.

My line of levels from Dunuwattagama to Kunchukkulam crossed the ridge at a height of $242\frac{1}{2}$ feet. At this point the ridge is covered with thick thorny scrub, and it was impossible to see from the ridge itself whether it rose or fell. Having got a fair idea of how it ran from a distance, I explored it one afternoon and found what appeared to be a channel falling into the Ihala Divulwewa spill channel. This seemed to come from the place where the low ridge runs into the higher hill near Maha Kapugollewa. The ridge at this spot is somewhat lower than where my levels crossed it.

Ridge
north of
Mana Hinna.

My line of levels then went on through Galahitiyagama, which lies about 200 feet above mean sea level, falling steadily till I crossed the Tavalam Hammillewa-oya south of Migaskada. The level of the bed of the stream here is 171. This was the first clue that I had to the level of Wahalkada tank, and it showed me what an enormous head of water would be required, if the contour of the tank really ran as reported. Migaskada village lies about 175. In re-crossing the oya between Migaskada and Kunchukkulam I found the level of the bed to be 159. Kunchukkulam contour is about 175. From this point my instructions were to level across to Puliyanukulam, but as going direct would have necessitated clearing a new line through thorny scrub, and more useful information would be gained by levelling through Wirasole and Bandara Hammillewa, I went round.

Country
west of the
ridge.

From Kunchukkulam the ground gradually rises to Wirasole, the village lying about 192, and the contour of the tank being about 202. I was informed that there was a "galpennuma," where the path from Wirasole to Maha Kapugollewa crosses the ridge, and levelling up to it I found the height of the gap to be $233\frac{1}{2}$ feet mean sea level.

Wirasole
gap.

Bandara
Hammillewa
gap.

Levels of gaps
agree with the
reported
contour.

On to
Wahalkada
"Gal
Pennuma."

Levels
at the
Breach.

The Eastern
Bund.

The
Bisokotuwa.

"Gal
Pennuma."

Western
Bund.

Spill.

From Wirasole to Bandara Hammillewa the path undulates a good deal. I think that it passes over a spur of the Maha Hinna. Bandara Hammillewa is a very small village, with only about three houses, inhabited by low-country Sinhalese. It lies about 186. There is also a "gal pennuma" here, where the path to Pahala Divulwewa crosses the Hinna, and the level of this gap I found to be 235.

It is a very strange thing, though it can only be a coincidence, that this is practically the same level as the Wirasole gap, and must be very nearly the same as the level of the place I found between Dunuwattagama and Galahitiyagama, which I took to be a spill, and it also agrees with the contour of Wahalkada tank as described by the villagers. Everything, except the great height about the Tavalam Hammillewa-o-ya, seemed to show that the rumours about the great size of Wahalkada tank were correct.

From Bandara Hammillewa my levels ran on to Puliyanukulam, the spill level of this tank being about 152. From this point there is no footpath, and I had to clear lines through the jungle. I ran round to the east of Medakanda, rising up to a large rock called Ikiriyagala, on the top of which there are the remains of a small dagoba and some other ancient buildings. The level of the top of this rock is 243. From here I descended to the foot of the Maha Hinna, 168, and then ran along the foot of the Hinna, the levels falling all the while. I levelled up to the "gal pennuma" situated 20 chains south of the breach, which is mentioned by Mr. Wickwar, and found the level of the top of the gap 182½.

At the breach my levels gave the following results. The level of the gallery mentioned by Mr. Wickwar is 124, and it would consequently be submerged. The bed of the small ela is 102, ground level 110, and the bed of the oya 100 feet mean sea level.

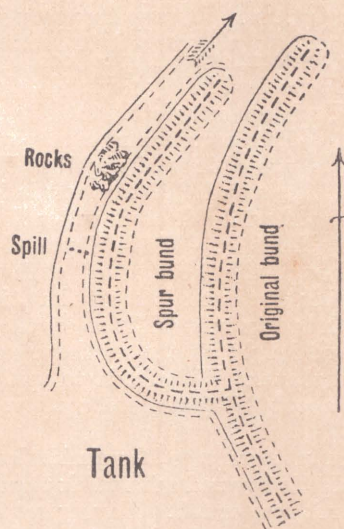
From the breach I ran my levels along the foot of Yakinikanda to the eastern bund, and then along the top of the bund. The level of this is approximately 175, though in places it is more; while the top of the "relapana" was 171 at one place and 165 at another.

The bisokotuwa, or "goda" sluice as it is called, lies 6 chains from the western end of this portion of the bund. The present ground level in the tank is within a few inches of the top of the inlet culverts, and I had to dig through a lot of fallen brickwork to get down to the sill. There appears to be a channel cut in the tank to bring the water to this sluice. I found the level of the sill of the inlet culvert to be 121½. It is a double culvert, divided down the middle by a stone wall about 2 feet thick, each opening being 2 feet wide by 4 feet 3 inches high.

At the point where the bund runs into the Goda Hinna (which is also called Akirikanda) there is another "gal pennuma," the level of which is 166½, and this probably served as a high-level spill. There is no spill before you come to this place and, besides the spill at the western end of the bund, it is the only one possible, unless there was another at the breach, which is most improbable.

From the "gal pennuma" I took my levels due west across the Goda Hinna, below the tank, as it was very much shorter than going round by the old cleared lines. The highest point I touched on the Goda Hinna was 201. I ran on to the western bund about 30 chains from the spill, and then went along inside the tank. Where I crossed the bund the level of the top was again 175, the top of the "relapana" being 164.

The spill is peculiar. A spur bund has been run out, as shown in the sketch, which



turns round and runs parallel to the original bund. The spill is about where I have shown it, and is a natural one, the level of it being 160 feet above mean sea level. There are some rocks in the bed of the spill channel three chains further on, but they are four feet lower, and there is no sign of any masonry. I do not think that they had anything to do with the spill. The bunds both end a short distance beyond this.

My lines of levels give a very good idea of the contour of the tank at spill level and of the contours above it, except in one place. One of the lines of levels which I was unable to run goes from Lewapanikiyawa through Marakalaetawirawewa, and passing to the south of Tamarawewa closes on my work at Migaskada. A line from this traverse through Tamarawewa and Palu Pattewa, closing on my line from Puliyanukulam to Rambewa, would, I think, give all the further information required, and would in addition be a valuable check on my work in the event of the levels not closing well at Migaskada. The distance to be levelled would be about 4 miles, and there would probably be plenty of clearing to be done, but it would make the work complete; whereas now I have to sketch in the contour from levels taken some way off, and by allowing for a regular fall in the streams. I think, however, that the contour, as I have sketched it there, will be found very nearly right. It cannot be much higher, as the

Contour.

ridge which divides the valleys of the Mora-oya and the Tavalam Hammillewa-oya, must run about where I have shown it on the plan. Where I crossed this ridge between Rambewa and Kahatagollewa the level of the top was 216, and though of course it does not follow that it is as high as this near Andawawewa, I think from the lie of the land that it probably is.

Taking the contour, as I have sketched it, as being correct, it gives an area at spill level of 3,820 acres, or close on 6 square miles. What the average depth will be my levels are not sufficient for me to judge. The spill being at 160 feet, this gives a head of water of $38\frac{1}{4}$ feet at the "goda" sluice. It is 50 feet above the ground level and 60 feet above the bed of the oya at the breach. I conclude that this means a head of 50 feet at the low-level sluice, as although I gather that the water from this sluice was originally run along the present bed of the oya, the extra 10 feet head of water gained by putting the sluice at the level of the river bed would only give the water actually contained between the banks of the oya, and the extra pressure to contend with on the sluice doors would be considerable.

Only one village, Puliyanikulam, would be submerged by the restoration of Wahalkada. It is not a large village. It contains 9 houses, and the inhabitants number about 40. The sowing extent of the paddy fields is 4 amunas, which they tell me means about 16 acres here, though I believe that 8 to 10 acres is usually 4 amunas sowing extent.

I think that the bottom of Rambewa fields would be submerged. This is a "nindagama" of Ulagala Ratamahatmaya. The village itself lies about 166, and might possibly go under in the case of a heavy flood. It contains 9 houses and about 60 inhabitants. The paddy fields are said to be of $1\frac{1}{2}$ amuna sowing extent, but must be much more. Altogether there are about 30 acres of land below the tank belonging to Ulagala Ratamahatmaya.

As regards Palu Pattewa, I cannot say anything for certain without more levels, but I think that it is within the Wahalkada contour. It is an uninhabited tank, and was until very recently abandoned. About three years ago some men of Namadawewa and Titagonnewa purchased a piece of Crown land, 6 acres in extent, below this tank, and this land must be within the contour. It has, I believe, been cleared and sown with dry grain, but has not yet been asweddumized. Some of the breaches have been filled in, but there are more to be attended to. I gathered that a little more than half the earthwork had been completed.

It is impossible that the waters of Wahalkada and Padawiya can ever have joined. It is wonderful how similar these tanks are in every way. Of the history of Wahalkada I have not been able to gather anything, except that it is said to have been constructed by Mahasena, which I think very likely. It was probably one of the sixteen great tanks made by him, though what its name was in those days I could not ascertain. I was informed by a priest that Padawiya was called Maha Sagara, Wahalkada Bena Sagara, and Nambakada Mati Sagara. This may or may not be correct. I cannot find any mention of tanks of these names in the *Mahavamsa*.

The spur bund at the spill which I described above must be a later addition to the tank, as the original bund has the "relapana" right on to the end, where the water cannot now touch it. What the object of this addition was I am unable to say, unless it was to raise the spill level. The repaired breach mentioned by Mr. Wickwar in the western bund near the Goda Hinna was repaired, like the breach at Padawiya, by building a new bund round it on the tank side.

I think that the so-called "gal pennuma" in the Maha Hinna to the south of the breach must be natural. It is too high for a spill, being $7\frac{1}{2}$ feet above the top of the bund, and I do not see what purpose a pathway there would serve, as the ruins near the breach would be under water, unless the tank was nearly empty, being at a level of certainly not more than 120 feet.

As regards the reparation of Wahalkada, on the western bund nothing is required but a few cubes of earth to fill in the "elephant tracks." The eastern bund is only just over half a mile in length, and is practically perfect. In the tank itself this leaves only the sluices and filling in the breach. The goda sluice is in a very fair repair. The culverts seem to be all right, but the well, of the bisokotuwa is falling in, and will have to be rebuilt. The other sluice was at the breach, and all that is left of it is the cut stones found by Mr. Wickwar down the stream. As to filling in the breach, I cannot say that I think it would be so simple a matter as Mr. Wickwar says in his report. The breach is over 100 yards wide at the bottom, and rapidly gets wider as you go up, and the bund will have to be built of sufficient height and solidity to withstand a pressure of over 60 feet head of water at the base. The end of the ridge to the south of the breach is of rock, and it will be no easy matter to make a water-tight joint here, especially as so large a bund will mean a lot of settlement. This seems to me to be the one weak point in the tank, and it was very likely the original cause of the tank breaching.

In his report Mr. Wickwar states that the Yodi-ela from the Mora-oya is in a good state of repair. Where I have seen it, it is a natural stream; but apparently he only found the remains of the anicut at the Mora-oya, and this would also have to be rebuilt. The supply of water from the Tavalam Hammillewa-oya cannot be very great, as the drainage area is particularly small; but unless Tavalam Hammillewa tank is restored, all the water in the oya will run straight into Wahalkada, as there seem to be no other irrigation works in connection with this oya.

There is a ridge of rock called the "gal palama," which crosses the oya about 30 chains above the breach. This banks up the water, so that water is always to be obtained in the bed of the stream between the "gal palama" and Puliyanikulam.

I have not gone into the question of the benefits to be obtained by the restoration of Wahalkada, as that is outside my present work, and has, I believe, been already gone into by Mr. Wickwar. He states that the amount of irrigable land below the "goda" sluice is small in extent, and as the water supply of the tank is small, I should think that the water from the low-level sluice was probably only used when the water in the Yan-oya was found to be insufficient for irrigating the lands below the "wanatti palama."

After levelling to Wahalkada spill I started again at the top of Puliyanikulam and levelled through Rambewa to Kahatagollewa, cutting the Wahalkada Yodi-ela almost exactly at spill level. The water parting between the valleys of the Tavalam Hammillewa-oya and the Mora-oya lies about 30 chains to the east of Kahatagollewa village. From here I followed the footpath leading northwards to Alut Hammillewa, going above Dikwewa and through Siyambalawa paddy fields, turning off to the Kebitigollewa-Alut Hammillewa pinpara near Bogahewa. This footpath lies almost entirely between the 180 and 200 contours. From

Area and
Head of
Water.

Land
within the
Contour:
Puliyanikulam.

Rambewa.

Palu
Pattewa.

Wahalkada
and
Padawiya
History.

General.

Restoration.

Water Supply.

Use of
Wahalkada,
if restored.

Line to
Padawiya;
line of
Levels at
Padawiya
and beyond.

Bogahewa I levelled about half a mile along the footpath to Padawiya, and then cut across through Kanadigalawewa, striking the Padawiya bund at the eastern end. I then levelled along the bund and to a short distance beyond, after which I levelled some way along the footpath leading to Nambakada, and then struck across below Nambakada to Unagaswewa and Sinahayaulpota Pansalawewa. I had only got about a mile beyond the latter when the rains set in, and I was obliged to abandon fieldwork.

Pitawana.

At the eastern end of Padawiya bund, just where it runs into high land, there is what the natives call the "pitawana." This was not seen by Mr. Parker, when he visited Padawiya and wrote his report on the tank. There is a breach here, and the site of this spill is now an island with a stream on both sides of it. All that now remains on the island is a quantity of cut stone, some of it still in position. I see in Mr. Wickwar's report, which was of course written before any levels had been taken, that he thinks this was a sluice, but I am inclined to think that Mr. Mortimer was right, and that it is a spill. It is too much of a ruin to really make out what it was, but as the level of the top of the masonry is very nearly the same as the spill level at the other end of the bund, I think that there cannot be much doubt about it. The level of the bottom of the breach here is $150\frac{1}{2}$, and I took spill level to be about 163. It is, however, impossible to be certain about it, and it might be a foot or even two feet higher. The ground beyond this is well above the bund level, being 182 feet.

The Bund.

At the "pitawana" the bund begins, and there are two big breaches in it before you come to the Ma-oya breach, which is 62 chains distant. The level of the top of the bund varies from 175 to 177, but in the last 10 chains it rises gradually from 177 to 186, which is the level on the eastern edge of the breach.

The Big Breach.

The Ma-oya breach is 230 feet wide at the top and about 150 feet at water level. There is a deep pool in the breach which never dries, and the natives say that it is over 80 feet deep, giving as their authority a Government Agent who had a raft made and soundings taken. What we found the actual depth to be I have been unable to ascertain. I had no boat to enable me to take soundings, but I got a rough idea of the depth by getting long straight poles, which I weighted by tying heavy stones on to one end and threw into the pond in different places. I peeled the bark off every alternate 5 feet of the poles, and though this was of course a very rough way of taking soundings, it was sufficiently accurate for my purpose. As far as I could make out, when the pond is full the depth of water at the breach is about 22 feet.

Levels at Breach.

At the breach the level of the top of the bund is 186 on the east side and $184\frac{1}{2}$ on the west. When the pool of water is full, the water level is about $132\frac{1}{2}$. From this the banks go straight down to 121, and then fall at a steep slope to 117, the level of deepest place that I found in the pool being 111 approximately.

Low-level Sluice.

This breach must have been the site of the low-level sluice, but there is nothing to show what the sluice was. I put it as being 143, and in calculating the head of water, &c., I think that this is the best level to take for the following reasons. In going up the oya I found that there is a bank across it at a distance of about a quarter of a mile from the breach, which ponds up the water for some distance back. The level of this bank is $143\frac{1}{4}$. Now, although the water in the pool at the breach runs out at $132\frac{1}{2}$, and the sluice might be put down to this level, the extra 10 feet gained, as in the case of Wahalkada, gives you all the extra pressure to contend with on the sluice doors, whereas the extra supply of water gained is practically nil.

Bund Level.

From the Ma-oya breach till the bund runs into high land at Deyiyanekanda the level of the top varies between 180 and 189, the level of the top of the "relapana" being 171 near the breach and $173\frac{1}{2}$ at the other end. From Deyiyanekanda to the goda sluice the top of the bund varies between 178 and 185, the top of the "relapana" being $173\frac{1}{2}$ near the hill and $175\frac{1}{2}$ at the sluice.

Goda Sluice.

The sluice has been fully described by Mr. Parker. It has a double culvert, divided by a longitudinal stone wall 2 feet thick, each opening being 2 feet wide by 4 feet 8 inches high. The level of the sill of the inlet culverts is 146 feet mean sea level.

Spill.

Beyond the sluice the bund varies in level from $182\frac{1}{2}$ to 179 feet until you come to the spill described by Mr. Parker in his report, beyond which I found no defined bund. I carried my levels on 24 chains further, as far as the stream shown on my plan, to ascertain how the land lay in that direction, as it seemed to me that the spill described by Mr. Parker was too high. The portion of the tank round this spill really wants more investigation than I was able to make. It is all under thick jungle, and there may be higher land within the tank for all I can say. It is impossible to say within a foot at what level the water would spill here. I put it down at $169\frac{1}{2}$. My levels beyond this show, however, that the water would spill naturally into the stream to the west at a level of $164\frac{1}{2}$ to 165. This agrees with my levels at the "pitawana," where I put spill level at 163 to 165. The place mentioned by Mr. Parker undoubtedly was a spill, as it proved by the large stream which begins at the back of it, but it can, I think, have been only a high-level spill. As I have said above, I put the level of it at $169\frac{1}{2}$. There is a small ditch here (it is really nothing more) which would let water over at 167, but the tank would have to rise to 171 before the water went over in any quantity. I think that if the spill level of Padawiya is taken at 165, it will be near enough for all practical purposes. Even this does not leave too large a margin for safety in the height of the bund. When you take into consideration the fact that the level of the top is only 175 to 177 at the eastern end, and that the top of the "relapana" between the Ma-oya breach and Deyiyanekanda is only 171 to $173\frac{1}{2}$, it will, I think, show that the spill described by Mr. Parker can only have been a high-level spill.

Contour.

As regards the contour of Padawiya when full, I can say very little, as my lines of levels are well above it everywhere but at the western corner of the tank. Had the contour been where it was supposed to be, I could have found out all that I wanted to know from my levels, but unfortunately this was not the case. I have sketched in pencil on my plan what I think from the general lay of the country will be the approximate contour, but I cannot do more without further fieldwork. The level of the bed of the Mugunu-oya, where my line of levels crossed it between Unagaswewa and Sinahayaulpota, was 170, and I tried to find roughly the point where the contour crosses this oya by allowing for a regular fall in the oya and banks about 10 feet high, but this was useless, as it was evident from my other levels that the fall in the oya is anything but regular.

Taking my sketched contour as being correct enough to give a rough idea of the size of Padawiya, we have an area of 4,040 acres, or approximately $6\frac{1}{2}$ square miles. Taking the level of the spill to be 165, we get a head of water of 19 feet at the goda sluice and 22 feet at the low-level sluice, taking sill level at the latter to be 143.

There is, I think, very little else to be reported about Padawiya that has not already been dealt with by Mr. Parker. In addition to the big breach there are three others of considerable size to the east of it, as well as smaller ones and "elephant tracks." I think, too, that the portion of the bund towards the "pitawana" would have to be raised and strengthened. The length of the bund is as follows:—From the "pitawana" to the Ma-oya breach 62 chains; breach, 230 feet across; from the breach to Deyiyanekanda 33 chains; high land at Deyiyanekanda 25 chains approximately; and from this to the spill 99 chains: giving a total length from end to end of the bund of nearly 200 chains.

It is surprising that Padawiya should be so well, and Wahalkada so little known. In area Padawiya is slightly larger than Wahalkada, but as regards head of water Wahalkada is a very much larger work. I cannot judge what the capacity of either of these tanks is, as my levels do not give me the contours inside the tanks.

I do not think that any villages or private lands would be submerged by the restoration of Padawiya. There is a small tank, Kadawatta, close to the Kebitigollewa-Alut Hammillewa pinpara, but this will, I feel certain, prove to be outside the contour. It is an uninhabited tank, a "nindagama" of Ulagala Ratemahatmaya. The paddy fields are only of $1\frac{1}{2}$ amuna sowing extent, and there is no claimed high land, so that even if it is within the contour the compensation to be given when Padawiya is restored will be small.

The nearest inhabited village to this is Morakewa. This village contains 11 houses, and the inhabitants number 51. The paddy fields are small, only $1\frac{1}{4}$ amuna sowing extent.

Palu Nikawewa must also be well above the contour. It is an abandoned and breached tank. Four acres of Crown land were applied for below it, and the lot was surveyed four years ago, but it has, I am told, not yet been put up for sale.

In my opinion, Nambakada tank would repay investigation. It is not a large tank when compared with the other two; but still it is a large tank, and there can be no doubt that the three tanks all belong to the same irrigation scheme. It was probably used to irrigate lands too high to be irrigated from the goda sluice at Padawiya; and is mentioned by Mr. Parker in his report.

Of the further levels required, in addition to those which I was unable to run, I would suggest a line down the pinpara from Bogahewa to Lewapanikiyawa, and an east and west line joining this to my line of levels to the west of the Mugunu-oya; and also a more thorough investigation of Padawiya spill. Whether these will prove sufficient can only be found out by the result of the fieldwork.

Fieldwork in connection with these works was begun on 31st July and stopped on 11th October. I ran a double line of levels 47 miles 62 chains and a single line 68 chains, and established 98 bench marks. It is very unsatisfactory to me that I was not able to complete this work or to find out more about it, but the time at my disposal was not enough for me to make a fuller investigation.

Area and
Head of
Water.

General:
length of the
Bund.

Padawiya and
Wahalkada.

Land
submerged:
Kadawatta.

Morakewa.

Palu
Nikawewa

Nambakada.

Further
Levels
required.

Work done.

