

150 years of managing national geological assets: celebrating the sesquicentennial of the first Official Geological Survey in Jamaica

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ABSTRACT. The Government-commissioned geological survey of Jamaica officially began in 1859 but the events leading to the institution occurred many years before. In the early 1800s Henry De La Beche applied his practical geological skills while surveying eastern Jamaica. This experience assisted him in his geological survey work in England and qualified him as the Head for the first geological survey in the world, the Geological Survey of Great Britain. This Survey became the platform for the establishment of other national geological Surveys including that of Jamaica. The Jamaican Survey, first headed by Lucas Barrett and later by James Sawkins, within 10 years, mapped the entire island and produced several reports and supporting geological maps. These became the standard documents of reference used by other researchers of the earth sciences in their studies pertaining to Jamaica. A 52-year period of dormancy occurred until the employment of Charles Matley as Government Geologist. By 1949 the Geological Survey Department was established, headed by Verners Zans. This new Government department became intimately involved in studies of regional mapping, economic geology, geotechnical engineering and many other fields of geology. Many other Government organizations were formed from this institution, specializing in education, energy, water resources, mineral research and disaster preparedness. The Survey, now the Mines and Geology Division, has maintained its core functions of geological mapping, engineering and economic geology, but also regulates mining activities and collects royalties payable to the People of Jamaica.

Key words: survey, sesquicentennial, national geological survey.

1. INTRODUCTION

The sesquicentennial of any organization is worthy of recognition. The Government-commissioned geological survey of Jamaica, one of the oldest in the world, had an interesting start, being a daughter of the first national geological survey in the world, the Geological Survey of Great Britain. The first official Jamaican geological survey was undertaken in 1859 as the result of an adamant request from the Governor of the island, Sir Henry Barkley, for a complete and systematic evaluation of the mineral potential of the colony (Chubb, 1964). The appeal was granted and the survey was undertaken and completed within ten years. For a period of 52 years the island would be without a stable government geologist until 1921 when Englishman Charles Alfred Matley was employed. His was only a short stint and by 1924 he was on his way back to England with the Survey being discontinued. In 1949 however, the Survey was resurrected (Cover, 1953). The Geological Survey has persisted and evolved with time but after 150 years, service to the People of Jamaica has remained the utmost priority.

2. EARLY GEOLOGICAL RESEARCH

The foundation for geological research in Jamaica was cast by Sir Henry Thomas De La Beche (**Figure 1**), owner of the Halse Hall Estate, Clarendon (Sharpe, 1997). Funded by the profits of his sugar estate he conducted the first geological mapping of the eastern side of the island between 1823 and 1824. After leaving Jamaica, he continued his practical geology conducting surveys of Devon. His surveys were funded by the profits of his sugar estate in Jamaica. The Jamaican estate soon placed him in financial difficulties and in order to continue his studies, he resorted to the English Government for assistance. After much persuasion and defence of his technical capabilities, funding was finally approved and the survey of Cornwall began in 1835 (Sharpe, 1997). This geological survey of Cornwall is taken as the official date of establishment for the Geological Survey of Great Britain.

3. THE FIRST SURVEY

The Spaniards colonized Jamaica in search of gold and other valuable natural resources. When the



Figure 1. Sir Henry Thomas De La Beche (Photographer and date unknown)



Figure 2. Lucas Barrett (Photographer and date unknown)

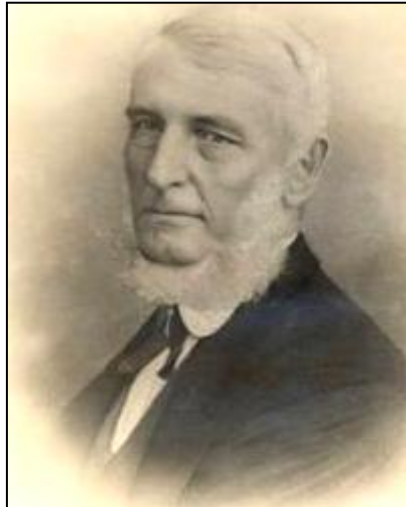
English conquered the island in 1655, they continued the quest, but their measure of discovery success was only minimal. Several mining ventures were started, mainly for the extraction of gold and copper; many were unsuccessful. The California Gold Rush of 1849 triggered a boom in exploration and mining world-wide including Jamaica. However, exploration in the colony was highly disorganized due to poor understanding of the local geology. This mining fever peaked between 1850 and 1858 (Zans, 1955), but there were many failures, and

financial losses were exorbitant. The bust period was described as a ‘collapsed parachute’ (Scotland, 1890).

The confidence of English capitalists in the metallic mineral potential of Jamaica started to wane and the mining companies pressed the Crown for assistance in the form of a proper geological survey. Earlier in 1853, on seeing the need for a thorough understanding of the geology of the island, Governor Henry Barkly, made strong appeal on behalf of the colony for a survey of the economic geology of the island. Sir Barkly’s request, though strongly implored, was approved several years later. However, the survey of Jamaica would be second to the survey of Trinidad, Part I of the West India Geological Survey of 1856 (Chubb, 1964).

It was not until April 1859 that the Government geologists arrived in Jamaica and Part II of the West India Geological Survey would begin. The Jamaica Geological Survey would be headed by English naturalist and geologist Lucas Barrett, a youth of 22 years, assisted by James Gay Sawkins, an English professor of art with interests in mining (**Figures 2 and 3**; Chubb, 1964). Youthful exuberance led to the untimely death of Barrett three years later. This led to the promotion of Sawkins as Director of Surveys and the employment of four other geologists over a period of 10 years since the time of inception.

After this period the Survey became dormant but the Reports on Geology of 1869 and the quarter inch to the mile geological map published by Sawkins and his Assistant Geologist Charles B. Brown dated 1865 would remain the standard documents of reference for the geology of Jamaica for the next 80 years (**Figure 4**). By February 7, 1870, through the Colonial Secretariat Law, the Jamaica Geological Survey was officially endorsed as the standard survey of the island (Aratram, 1999). Eight years later, on July 20, 1878, James Gay Sawkins, the second Director, passed away (Sorby, 1879). Professor Robert T. Hill of Harvard College and the American Geological Survey attempted a correction of the Survey reports. This he presented as a memoir published as a bulletin of the Museum of Comparative Zoology of Harvard. He also presented a revised geological map. Though identical to that of Sawkins and Brown he corrected the ages of some formations. Unfortunately, new mistakes were presented; one such being a formation containing both Cretaceous and Eocene fossils. Additionally, the sparseness of comments on economic geology restricted the usefulness of his work (Zans, 1955).



**Figure 3. James Gay Sawkins
(Photographer and date unknown)**

4. THE WAR YEARS

The priority of the Colonial Government to understand the natural resources of the island had shifted from the development of the minerals to the exploration for a steady supply of water, possibly due to the great drought of 1914 (Matley, 1951). Between the times of the two World Wars, the Colonial Government temporarily resurrected the post of a Government Geologist, employing Charles Alfred Matley for little under three years to study the water resources of the island (**Figure 5**).

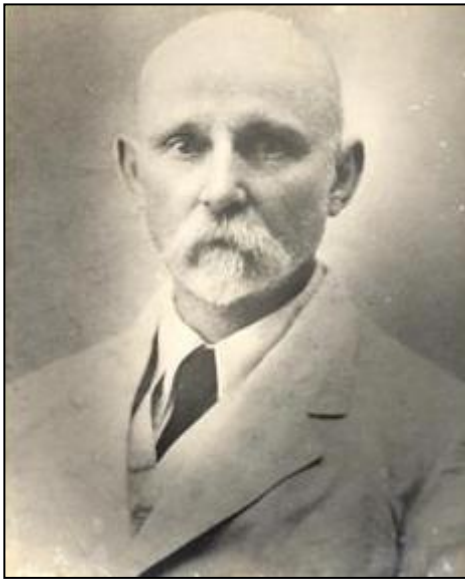
Assisted by Gordon Murray Stockley, Matley not only studied the water resources but made several reports on the mineral and fossil fuel resources. One of the main contributions of the survey of this time is a detailed study of the geology and physiography of Kingston. Due to financial constraints, the geologists were relieved of their duties in 1924 and the Survey was again discontinued (Zans, 1955).

5. THE MODERN SURVEY

Twenty six years elapsed before the new Geological Survey Department was established in October 1949, attached to the Lands Department located at the Institute of Jamaica (Cover, 1953). The Survey, headed by Director Verners Aleksandrs Zans, (**Figure 6**) was given the mandate to map the country geologically and to investigate the mineral resources of the island. The geological maps so produced by the Survey would serve as the basis for investigations of water supply and soils, and will supply information for engineering purposes and metallic and non-metallic mineral exploration and development. The mineral potential of the Blue Mountains and the water resources of drought-stricken areas were first studied. Special investigations for other Government departments and private firms were also part of the duties of the new Survey (Cover, 1953).



Figure 4. Geological map of Jamaica from the Jamaica Geological Survey of 1859-1869, dated 1865.



**Figure 5. Charles Alfred Matley
(Photographer and date unknown)**

By 1952 a new simplified geological map of the island was available and by 1958 a provisional edition was published (Figure 7). Discoveries of new mineral resources were also being made, such as the large bodies of iron ore at Mavis Banks, St. Andrew in 1951, and silica sand and kaolinitic clay at Hodges, St. Elizabeth in 1955 (Geological



**Figure 6. Verners Aleksandrs Zans at the
International Geological Congress, Mexico City in
1956 (Williams, 1980)**

Survey Department, 1958). Geotechnical studies were also undertaken. Assistance to the Public Service Company to cut a 2,200 feet long tunnel for

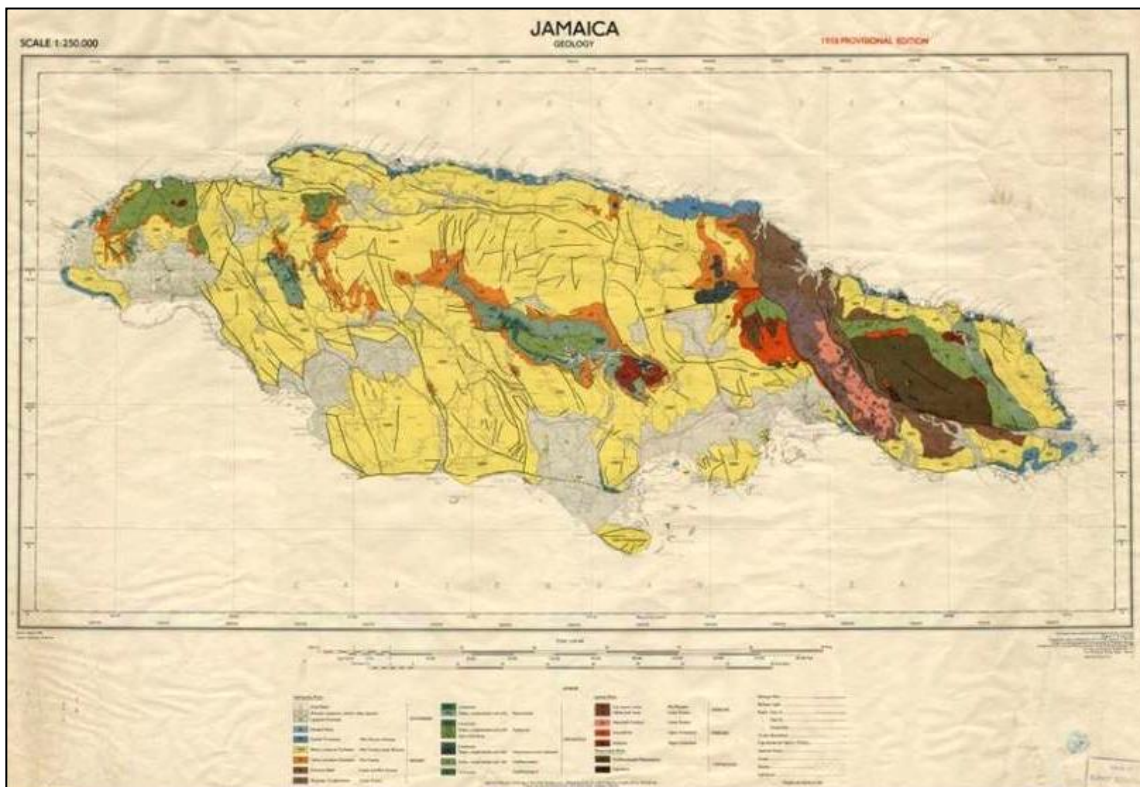


Figure 7. Original provisional geological map of Jamaica produced under the tenure of V. A. Zans in 1958

the Rio Bueno hydroelectric power station in 1954, the study of the mega-landslide at Judgment Cliff, St. Thomas and the survey of Discovery Bay for the widening of the shipping channel, both in 1959, are just a few (Geological Survey Department, 1961). In the 1940s, deposits of bauxite were accidentally discovered and this had triggered another mining boom in the island. Major aluminium producers seized the opportunity to establish a supply from Jamaica. The occurrence of the aluminium ore was never fully understood and this triggered research into the genesis of the bauxite. Two schools of theory developed; one defending the Residual hypothesis and the other supporting the Alluvial hypothesis. The first idea proposed that the bauxite is derived from impurities in the white limestone that were not susceptible to chemical decomposition. The Survey represented the school defending the Alluvial hypothesis. This theory considered the detrital sediments of the large Cretaceous inliers as the parent material for the ore. The sediments washed from the topographically higher inliers into the limestone terrain and were deposited on the limestone surface (Sinclair, 1967). Several documents promoting this genetic model were published by the Survey.

The Survey became intimately involved in educating the public of the importance of geology and the work of the survey. This involved participation in the exhibitions, such as the Tercentenary Diamond Jubilee Agricultural Show at Denbigh, Clarendon in 1955 (commemorating 300 years under the Imperial Government), radio broadcasts and articles in the press, lectures and the teaching of geology at several high schools.

The promotion of geology and the study of this subject led to the establishment of the Jamaica Group of the Geologists' Association (of London) in 1955, which later became the Geological Society of Jamaica (Chubb and Williams, 1961). By 1961, the Department of Geology at the University College of the West Indies was established, housed in an old wooden hut, once occupied by the Chemical Technology Department, which was moved to Trinidad; one of the two lecturers being a geologist from the Survey (Williams, 1962a).

Also in August 1961, after 10 years at the Institute of Jamaica, the Geological Survey Department moved from the Institute of Jamaica to the newly constructed headquarters at Hope (Williams, 1962b). Director Zans however, did not move with the rest of his staff. In the same month he got a heart attack. He seemingly appeared to recover but on September 5, 1961, a second heart attack occurred which proved fatal (Chubb and Williams, 1961). The first Director of the

modern Survey had died. Like Lucas Barrett, Prof. Zans died during his tenure of service to the People of Jamaica.

The new headquarters at Hope boasted the first modern seismograph station in Jamaica. This came through a request from the Survey during the tenure of Director Zans, to the Seismic Research Unit of Trinidad, for seismic equipment, following the dreadful March 1957 earthquake in western Jamaica. By October 1961 a network of modern seismograph stations was set up across Jamaica (Chubb and Williams, 1961). The instruments were installed at the Survey headquarters at Hope (St. Andrew), Black River (St. Elizabeth), and Beverly (St. Ann). The St. Ann station however, was disabled due to the lack of electricity. The data collected from the seismic stations were analyzed and interpreted at the Seismic Research Unit headquarters in Trinidad. By 1963 the instrument installed at Hope was moved to the Mona Campus of the University of the West Indies and the Earthquake Unit was thereby established in order to monitor the stations and process the seismic data.

The periods of long drought in the 1960s led to active research on Jamaica's water resources. By 1968, the Water Resources Section of the Public Works Department was transferred to the Geological Survey, forming the Water Resources Division, the agency responsible for monitoring surface and groundwater resources (Williams, 1969). This agency in 1973, was merged with the Underground Water Authority, and later, under the Water Resources Act 1995, form the Water Resources Authority.

By 1972, the Geological Survey Department was merged with the Department of Mines to form for the first time, the Mines and Geology Division (MGD) and was headed by a Commissioner of Mines. Five years later, in April 1978, the two agencies were separated into two Divisions; the Geological Survey Division (GSD) and the Mines and Quarries Division (MQD) (Crooks, 1987). The Mines and Quarries Division was set up to administer the mining and quarrying laws of the island. During the time of merger, in 1976, the bauxite-related research services of the Geological Survey had expanded. A separate government organization was needed and so the services were transferred and the Jamaica Bauxite Institute was established. The oil crisis of 1973 had generated interests in fossil fuel research and exploration. Peat drying experiments and pilot studies were conducted. Studies on the oil and gas potential were ongoing and soon the Government decided that again a separate agency was needed to undertake

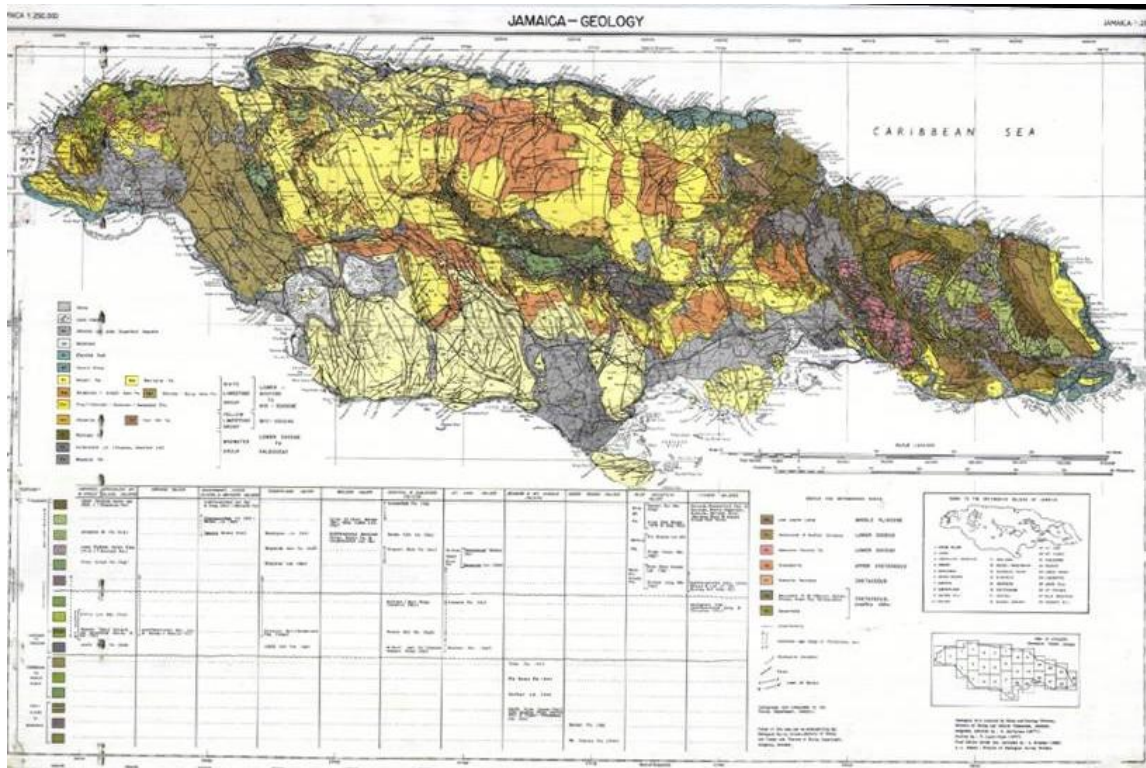


Figure 8. Geological map of Jamaica published in 1984 by the Geological Survey Division (Brookes, 1984). The geology was first compiled in 1977 by Government Geologist N. McFarlane but later in 1984 it was edited and corrected by S. Brookes.

and manage the exploration activities. By 1979 the fossil fuel research and exploration services of the GSD were transferred and the Petroleum Corporation of Jamaica was established, with its first head being a past Commissioner of Mines (L. Henry, pers. comm.).

Flooding of Newmarket and other places in western Jamaica in 1979 highlighted the need for a permanent disaster management agency. The Geological Survey Department had spear-headed the research on this disaster area and produced detail reports of such. The Government identified that it was indeed necessary to coordinate and monitor the response to hazards and educate the public on disaster management. The knowledge and expertise of the GSD was again utilized to establish the Office of Disaster Preparedness and Emergency Relief Coordination in 1980; this agency was headed by the out-going Director of Surveys (L. Henry, pers. comm.).

The GSD continued to fulfil its mandate, conducting geological mapping of the island. In the 1970s, of the thirty imperial 1:50,000 geological sheets, 25 were published. Many became available during early and mid 1974 with about three in 1978. Three maps were coloured geologically, the first being geological sheet 22

‘Above Rocks’ dated 1972 followed by sheets 25 ‘Kingston’ and 23 ‘Hellshire’ in 1974. Five sheets covering the eastern end of the island were drafted in 1985 and 1987 but were never formally published.

In the 1980s, through several large projects funded by international bodies such as the United Nations Development Programme, Swedish Geological Survey and the Canadian International Development Agency, assessments of the metallic and non-metallic mineral resources were conducted. This included evaluations of marble and high-grade limestone deposits and a regional-scale metallic mineral (geochemical) survey of the Cretaceous inliers and the Eocene clastic sedimentary and igneous rocks. Geotechnical investigations were also a primary focus, as it was the GSD that monitored the large landslide at Preston, St. Mary, and recommended the relocation of 17 families (Bryce et al., 1987). A new island-wide geological map also became available in the 1980s (**Figure 8**). This represented the edited and corrected version of the 1977 ‘McFarlane’ map (informally named after the surveyor who compiled the information) which was a compilation of all the geological sheets.

6. THE SURVEY OF THE 21ST CENTURY

The merger of the GSD and the MQD in 1996 led to the establishment, for the first time, of the Mines and Geology Division. This agency has persisted into the 21st century after undergoing many changes in parent government ministries. The Division has continued to fulfil its mandate to conduct extensive research on the geology of Jamaica. Geological maps are continually updated and several mineral deposits are being explored and developed. Geotechnical research is also ongoing, with the production of landslide susceptibility maps for the eastern parishes; important tools to guide development. Geological advice is also provided to

other Government and private agencies seeking to conduct development of different kinds. MGD continues to administer the laws related to mining and quarrying, and mine safety, and it is also responsible for the collection of royalties on minerals payable to the People of Jamaica.

As geological knowledge advances, the Survey continues to improve its services to the People. For the future, dedicated service will remain priority. It is also envisioned that service will cross national borders, assisting those countries that currently do not have geological surveys. The Jamaican geological survey started 150 years ago, and will continue beyond this, managing geological assets for national development.

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