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Positive thoughts on the Eppawela Phosphate Project

by C. A. Gunawardhana

Former Vice-President of the
Organization of Professional
Associations of Sri Lanka
National Expert (Sri Lanka) Asian
Productivity Organization
Member, Franco-Ceylonese
Technologists Association

The current debate on the Eppawela phosphate project bears little resemblance to historical facts. The events that led to its discovery in 1971, by a team from the Geological Survey Department, headed by Dr. Willie Herath, assisted by S. B. Senanayake and a number of other geologists, and the scientific investigations that followed appear to be a forgotten chapter.

Those who agitate for a fresh geological survey should be reminded that this very task was carried out in an extremely hostile environment [thick unexplored jungle] under trying conditions, two decades ago. Moreover, the difficult and dangerous security situation that prevailed at the time [the discovery coincided with the JVP insurrection] was not a source of encouragement either. I remember Dr. Herath telling me, that whilst the GSD was combing the jungle for minerals, the JVP was combing the terrain for yet another purpose. Despite the vagaries described, to the credit of the GSD the task was successfully completed.

The events that led to this exercise are well documented. Armed with primitive equipment [by today's standards] Dr. Herath and his team conducted exploratory drilling of the apatite deposit to a cumulative depth of over 5,000 feet, with numerous drill paths ranging from 100 to 500 ft. He estimated the depth to be in excess of approximately 500 ft. from the surface, and estimated the deposit to be in the region of 25 million m.t. The phosphate rich zone radiated to a depth of 60 m from the surface, with an average phosphorous pentoxide content of 35% which drops to 10% at lower levels. He also postulated that the unexplored area would contain a further 40 million tons.

Deposits of calcium phosphates and this includes calcium fluophosphate [also spelt as fluorophosphate] are geological formations, the origins of which can be traced to the remains of bones, teeth and other animal tissues of past geological eras. It normally occurs alongside calcium carbonate, which has similar origins. Sometimes the two minerals are distributed within the same matrix. These occur as igneous deposits, such as in Eppawela or sedimentary deposits, as it occurs in Florida. The deep ocean beds are rich in sedimentary phosphates and calcium carbonate.

Sri Lankan soils are rich in phosphates. An index of this is the ever-present coconut tree, which grows all over the country. The coconut kernel extract [free of fibre] contains 75 mg phosphorus per 100 gm. It is common knowledge that coconut grows equally well with or without the application of phosphates. The dormant phosphate is reactivated by a process of weathering, dry spells followed by rain, or reactivated by surface heat, as in the case of slash & burn [chena] cultivation, a technique described in the ancient philosophical treatises such as in the Vedas. Moreover, phosphate inclusions are common in Sri Lankan granites [igneous], and here, the phosphate present is leached out during the process of weathering.

Phosphate chemistry in relation to agriculture is not fully understood. The empirical data collected over a century does not always correspond to field trials. Field trials on phosphate response, cannot be replicated, even on the same trial plot. Some plants do not respond to soluble phosphates [incidentally, soluble phosphates become insoluble on contact with the soil]. Yet some plants, have the capacity secrete complex acids through the root system and still absorb phosphate ions from the soil. Plants have a preference for a particular phosphate, depending on the source of phosphates. In soils known to be deficient in phosphates [as in some temperate climates] plants respond favourably to farmyard manure, and may not respond to soluble mineral phosphates].

It is against this background, that the Geological Survey Department sought external assistance to further exploit the apatite deposit. I am aware that the mineral compo-

sition of the deposit was analyzed in great detail, and the results of such investigations are well documented. I remember, Dr. Herath presenting papers on the subject on numerous occasions, and in fact some of them were published the Geological Survey Department.

The failure to capture this deposit as a means of economic development was prompted by a number of reasons. There were a number of state agencies, which were managed not by policy, but by pure personal interventions. There were the state administrative machinery, the industrial corporations, there were about 60 of them and the co-operative movement. The Land Reform Laws came into being and the plantations were linked onto the state machinery. The Petroleum Corporation, which was the successor to the Anglo American petroleum distribution system, embarked on a project to manufacture urea using naphtha, an unutilized fraction from its distilling column at Sapugaskanda. In this melee, the Ministry of Planning & Economic Affairs, in addition to sponsoring a large number of development co-operatives, set its foot in Eppawela.

There was only one option available in relation to the deposit at Eppawela. To quar-

namely, graphite, ilmenite, quartz, biotite [mica] and a host of other mineral resources.

The recent development, where the Ministry of Industries Science & Technology invited worldwide proposals to set up a joint venture for the manufacture of phosphate fertilizer, is a major departure from the practice that were employed in the past. It was prompted by the structural changes that are necessary to overcome the declining trend in productivity. Over the last decade, the per capita income dropped by a factor of a 3rd from 294 US dollars to 188 US dollars. The only sources of visible revenue are from excise duties from tobacco, alcohol and petroleum. The BOI projects though important in terms of employment [employs about 100,000 workers] have failed to contribute in any tangible way to the economy. The employment in Middle East, which is a significant factor contributing to our foreign exchange reserves, would not be a permanent feature. In fact the growth of employment opportunities in the ME is dwindling at an alarming rate. The tourist industry too has suffered acute set backs, which are yet to be evaluated.

Whenever a major development project is proposed, there is always a protest, amounting to a rejection of such a proposal; these centre round allegations of environmental damage, that such projects would affect the rivers, water courses, paddy fields or the dislocation of human settlements etc. This kind of protest was witnessed in the recent past on developments at Kandalama, Iranawila [VOA] and many others. When the Gal Oya project was launched several decades ago, there were similar protests. One has to only visit the Gal Oya valley to experience the immense benefit that the project created. These protests are

an unfortunate trend.

It was Sri Lanka's good fortune that a multinational specializing in the manufacture of phosphate derivatives from mineral deposits responded to the invitation. By all records, this company has established itself as the market leader in this sphere. They have developed the technology, which is hard to match, and is the standard reference in the world of mining. They are the owners of patent rights covering acidulation by new methods, in the United States. These patents are protected in Sri Lanka and under the Code of Intellectual Property Act No. 52 of 1979; they obtained the patents for their processes as far back as 1983.

I myself, had the occasion of consulting specialists on phosphate mining, manufacture of derivatives, in the Netherlands, at the Delft University of Technology and in the US at St. Davis in California. Their only advice was that the mining was an extremely expensive business, and Sri Lanka did not have the resources within the country to embark on such a project. It goes beyond mining. The technology for conversion to derivatives of phosphate as additives in the manufacture of feed grades, food additives beverages [Coca Cola & Pepsi Cola], pharmaceutical products, cosmetics [soaps, detergents &c] and a host of other applications and access to markets are beyond the scope of any company in the region.

It is in the light of these developments, even countries such as the Peoples Republic of China and Russia have sought expertise from US companies in the exploitation of their phosphate deposits. Today, in Peru, the general public is agitating against the government of President Fujimoro for delaying the development of the Bayovar phosphate mine, which bears a proven reserve of 200 million tons, with the support of multinationals who possess the process technology. Similarly, Saudi Arabia is currently developing a program to exploit its reserves, which exceeds 200 million tons.

In the absence of an appropriate policy on environment, this project will set standards in conservation of the environment. The investor guarantees environment audits which will be accessible to the general public. This fact is relevant in the context of unchecked ecological damage such as the ruthless exploitation of the coral reef in the Southern coast, which has caused irreparable damage. The extent of erosion is so acute, that the coastline is receding in an alarming rate. The ecological damage with respect to the conservation of forest cover is a more serious threat to the total environment of Sri Lanka than what has been documented.

On the other hand, Puttalam Cement which

has been mining the limestone deposits for over a decade, the ceramic industry led by Noritake has been exploiting the quartz and feldspar deposits in the Matala District, has contributed in significant measure to generate employment and economic benefits to the country.

At the same time they have ensured that there is no environmental damage caused by their mining activities. Moreover, graphite mining which has a history of over 100 years, has not caused any environmental damage, despite the fact that they have mined to a cumulative depth of over 1,000 feet in each mine, and at the same time, they have ensured that there is no seepage of water to damage the ground water resources at all. Thus it can be inferred that when adequate hydrological assessments and precautions are

taken during mining of minerals, natural water courses are not in any way affected.

The realization of the project proposal will definitely pave way for economic renaissance of the country. It is an investment exceeding \$ 300,000,000 U.S. dollars, and it will, beyond any degree of doubt, inspire confidence amongst other investors to establish themselves in Sri Lanka. In turn, it will also pave way for the development of not only the North Central and the Eastern Provinces but the whole of Sri Lanka as well.

The views against the mining of the phosphate deposit are not clear. The demand for fresh surveys to be carried out, when such surveys have already been done is tantamount to mischief and irresponsible behaviour and likely to misguide the general public, and at best, serve vested interests.



A protest against Eppawela project

ry and grind the mineral and offer it as rock phosphate fertilizer. It was a specific project, and it did not recognize its value as fertilizer by itself, nor did it recognize the relevance of its application as fertilizer within Sri Lanka. Despite ample evidence that crops did not respond to rock phosphate fertilizer, the project went on. To date, no one has conducted field trials on response confined to the application of rock phosphate or the soluble phosphates. This is a glaring omission, and it is not too late check this wasteful exercise.

The rock phosphate project was placed under the Divisional Development Councils programme, which came within the purview of the Ministry of Planning & Economic Affairs. The deposit was quarried, in the manner of the common granite quarries of the day. The fabrication of the machinery and equipment was an interesting exercise. The finer grinding had to be done in a ball mill. This was not available, and the Director, Regional Development requested me to design and get it fabricated locally. I vaguely remembered the concrete tunnel mixers lying at the Ingra scrapyard at Polgolla, which I felt, met the requirements of the project. I went to the site and with my colleague, W. A. Jayasinghe [of Kotmale blacksmiths' fame] selected one and got it across to a small workshop, located at Hospital Street at Dehiwela. The workshop was aptly called Practical Engineers. One Mr. Kalubowila, was the owner, manager and the engineer, welder, electrician - all put in to one human frame. The internal lining of the ball mill was fabricated out of discarded railway springs, and the iron spheres were cast locally. This was installed at Eppawela, [Mr. Welaratne assisted in the installation and subsequently managed the project] and the results were dramatic. The rock phosphate particles were so fine that around 45% of the charge passed through 100 mesh; the rest passed through the norm for rock phosphate fertilizer - 20 mesh.

As to whether, this product stood the test, as a fertilizer at the time is debatable. The trials conducted at the agricultural research stations were negative. This was attributed to the fact that the rock phosphate was insoluble. Strangely, the parallel trials with soluble phosphates too were negative. This important observation was not taken seriously at the time. One reason that clouded these observations was that the fertilizer mixtures were compounded in an ad hoc manner and the NPK recipe was thrust upon the consumers in an arbitrary manner.

Since its discovery nearly three decades ago, no significant steps have been taken to exploit the deposit. It continues to suffer the same fate as our other mineral deposits,