The Feasibility of a Nauruan Limestone Industry and Its Linkage with Rehabilitation

by

W. Jackson Davis, Ph. D.

Scientific and Environment Advisor to Nauru
Professor Emeritus, University of California at Santa Cruz and
Monterey Institute of International Studies
and President
The Environmental Studies Institute
(a U.S. Non-Profit Corporation)
7298 Siena Way
Boulder, CO 80301-3722
Telephone: +US (303) 530-3135
Fax: +US (303) 530-3135
Mobile Phone: +US (831) 277-0737
Email: jacksondavis@earthlink.net

August 2010

Published by The Environmental Studies Institute, Boulder Colorado

Printed by Newmark Advanced Print and Fulfillment Services, Englewood, Colorado

Bound by the Denver Bookbinding Co., Inc., Denver, Colorado

This volume appears in electronic form on a CD at the end. The CD was produced by Alpine Media Duplication, Boulder, Colorado

August 2010

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ABSTRACT
(Proprietary Information Redacted)

This report evaluates the feasibility of establishing an industry on Nauru based on the processing of limestone, selling the products on the international dimension stone market, and linking this limestone industry to the rehabilitation and sustainable development of Nauru. Part I explores the geology of the limestone pinnacles and their relation to the origin of Nauru Island. The pinnacles project vertically about 11 m from elongated ridges of limestone parallel to the shoreline and connected to a solid limestone cap that extends below sea level. The geological evidence supports the hypothesis that the limestone was formed by wave action in a shallow tropical sea. Evidence is presented that phosphate was deposited between the pinnacles by upwelling of marine organisms during repeated climate cycles, and did not originate from avian guano.

Part II demonstrates that the limestone pinnacles can be readily quarried using conventional quarrying equipment and methods. Evidence is presented that the most efficient and cost-effective quarrying method is drill-and-split. Calculation of the volume of the pinnacles and sub-surface limestone cap indicates that Nauruan limestone is, for practical purposes, unlimited in supply. Quantitative calculation of the volume of troughs between pinnacles, which contain secondary phosphate, indicates that the reserves of secondary phosphate are [redacted] Preparation of limestone samples for laboratory and market evaluation is detailed. Part II concludes with the demonstration that Nauruan limestone can be split using conventional hydraulic guillotine equipment to produce blocks and bricks of limestone, a model for Phase 1 of Nauru's limestone industry.

Part III evaluates samples cut from pinnacles, boulders, and deep cores. The results show that the pinnacles are pure, high-density dolomitic limestone with high compressive strength and physical/chemical properties that make it uniquely ideal for the dimension stone market. Nauruan pinnacle and deep stone meets the commercial definition and most scientific criteria for marble. Preliminary market analysis shows that Nauruan stone will have relatively high value on the international dimension stone market, supported by a “green” market narrative that will help differentiate Nauruan limestone products. The final chapter of Part III concludes with the steps by which the limestone industry can be initiated while minimizing developmental risk to Nauru, in two years and on a budget estimated at US$1 million.

Part IV links the proposed limestone industry with the rehabilitation and sustainable development of Nauru. This linkage can be achieved by integrating the limestone industry with the secondary phosphate industry and rehabilitation, in a mutually-reinforcing interactive industry that can restore Nauru’s tropical ecosystems and yield a fully sustainable Nauruan economy within a few generations. Industrial processes and managerial structures for such an integrated industry are described and evaluated.

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