



# SHADOWS ON THE LAND

AN ECONOMIC GEOGRAPHY  
OF THE PHILIPPINES

# SHADOWS ON THE LAND:

AN ECONOMIC GEOGRAPHY OF THE PHILIPPINES

ROBERT E. HUK



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## Foreword

The completion of this book is a memorable event in scholarship. It deserves some special comment which the public may find interesting. It represents highly significant and rewarding developments which I feel very fortunate in understanding and sharing with Dr. Robert E. Huke, whose work on this book helps to advance greatly our knowledge of Philippine geography and simultaneously demonstrates some of the best motivations and principles in the lives of scholars and of institutions devoted to scholarship and public education.

Eight years ago, I welcomed Dr. Huke on his first appointment to the University of the Philippines as a Fulbright lecturer, bringing with him a great enthusiasm generated by his doctoral field research on Southeast Asia, particularly in Burma. This enthusiasm brightened the seriousness about scholarship which he had gained from his professional training and his teaching experience at Dartmouth College. We needed and used his help to open the eyes of students, educational officials, and government and business leaders to the essential and incalculable, but then neglected, value to our country of the advanced study of geography. The joint efforts of the University of the Philippines and the United States Educational Foundation in the Philippines have achieved substantial success in developing this field of study—witness the emergence of young Filipino specialists with their Master's degrees, one with his Doctor's degree—Dr. Telesforo Luna, Jr.—in the University faculty, and the local publication of more extensive professional literature on Philippine geography.

Dr. Huke has thus experienced the profound satisfaction of bringing to life a long cherished and at first, an elusive, dream. Many people are aware of his manifold problems, hardships, and troubles in the course of his work. We also know he has felt many joys. Through it all he kept faith not only

with himself but with his Filipino friends and fellow-scholars. The make-up of this book illustrates both his friendly leadership and acknowledged dependence on others. Coming as a teacher, he gladly learned himself, and he fostered mutual cooperation. Between the lines of the imposing specialized scholarship for which one comes to this book, there can be discovered a deeply satisfying record of some of the desirable qualities at work in international intellectual fellowship, in pioneer curricular planning and execution significant to Philippine and Asian studies, in indomitable scholarly research, and in rounded and fruitful creativeness.

ALFREDO T. MORALES

Dean of the Graduate College of Education  
and

Vice-President for External Studies

May 16, 1963

## Author's Note

*Economic geography is concerned primarily with the nature of man's environment and in the ways that man uses that environment to suit his purposes. Factors of physical geography are of equal importance with cultural factors and historical tradition. Thus, to the residents of Cebu prior to the arrival of the Spaniards and the introduction of corn, the economic geography was far different from that of today. In this case, the physical base has remained the same and the cultural base was at the root of the change. On the other hand, man's use of the Taal Volcano area changed significantly and suddenly in 1911. Here the change was precipitated by a rapid and violent altering of the physical base while the culture did not change.*

*Economic geography may be studied from either the topical point of view or from the regional approach. In the present volume, the topical or systematic approach has been used as it is felt that such a method of organization for a nation the size of the Philippines is less repetitious than a regional one. The topical approach has the added advantage of being already familiar to college and university students in this country as it is the approach used in most courses in economics, geology, and several other disciplines.*

*Throughout the reading of this volume, careful and detailed study of a large scale map of the country will be found useful. It is suggested that each student hang such a map on the wall beside his desk and make constant reference to it. Maps in the body of the text are designed to illustrate general patterns of distribution of the various factors discussed, but are clearly inadequate for detailed reference in any specific region. It will be noted that the maps are designed to show portions of North Borneo, but that no data has been plotted in that area. This volume limits itself to the political borders as recognized in*



early 1963. North Borneo is shown only for orientation of the reader.

Most statistics in this volume have been derived from two series: Department of Agriculture and Natural Resources, Agricultural Economics Division, Crop and Livestock Statistics, Diliman, published every second year; and Central Bank of the Philippines, Department of Economic Research, Statistical Bulletin, Manila, published quarterly.

This volume was completed during a year at the University of the Philippines as a Fulbright Professor of Geography. Without the help of the United States Educational Foundation in the Philippines and of Dartmouth College this work would have been impossible. My sincere appreciation is extended to both of these institutions.

The work was also made possible with the able and continued assistance and encouragement of the co-authors listed on the title page. In addition to these seven gentlemen who have done yeoman service, I wish to express my gratitude for less tangible but nevertheless significant assistance from Professors Mateo Tupas, Arsenio Gonzales, and Jose Encarnación, Jr. of the University of the Philippines; to Dominador Z. Rosell, President, Philippine Geographical Society; to Fernando Sison, Jr. and Vicente Lava, Jr.; and to my wife, Eleanor. While all of the above have contributed in some way to the completion of this volume, the responsibility for opinions expressed is entirely my own.

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*Diliman, Quezon City, May, 1963*



*Plains are scattered widely throughout the Philippines and it is on these level areas that the great bulk of the population has settled. Even on the largest plain, it is virtually impossible to be out of sight of mountains which dominate so much of the landscape, as Mt. Arayat, above, dominates Luzon's Central Plain. In some cases active volcanoes cast their shadows on the land; sometimes the mountains produce marked rain shadows; often they hold important forest reserves and frequently they are sources of mineral wealth. Mountains and plains comprise the major units of the physical landscape and give that landscape a distinctive charm.*



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*Bookmark*

Manila

Cebu

Makati

1963

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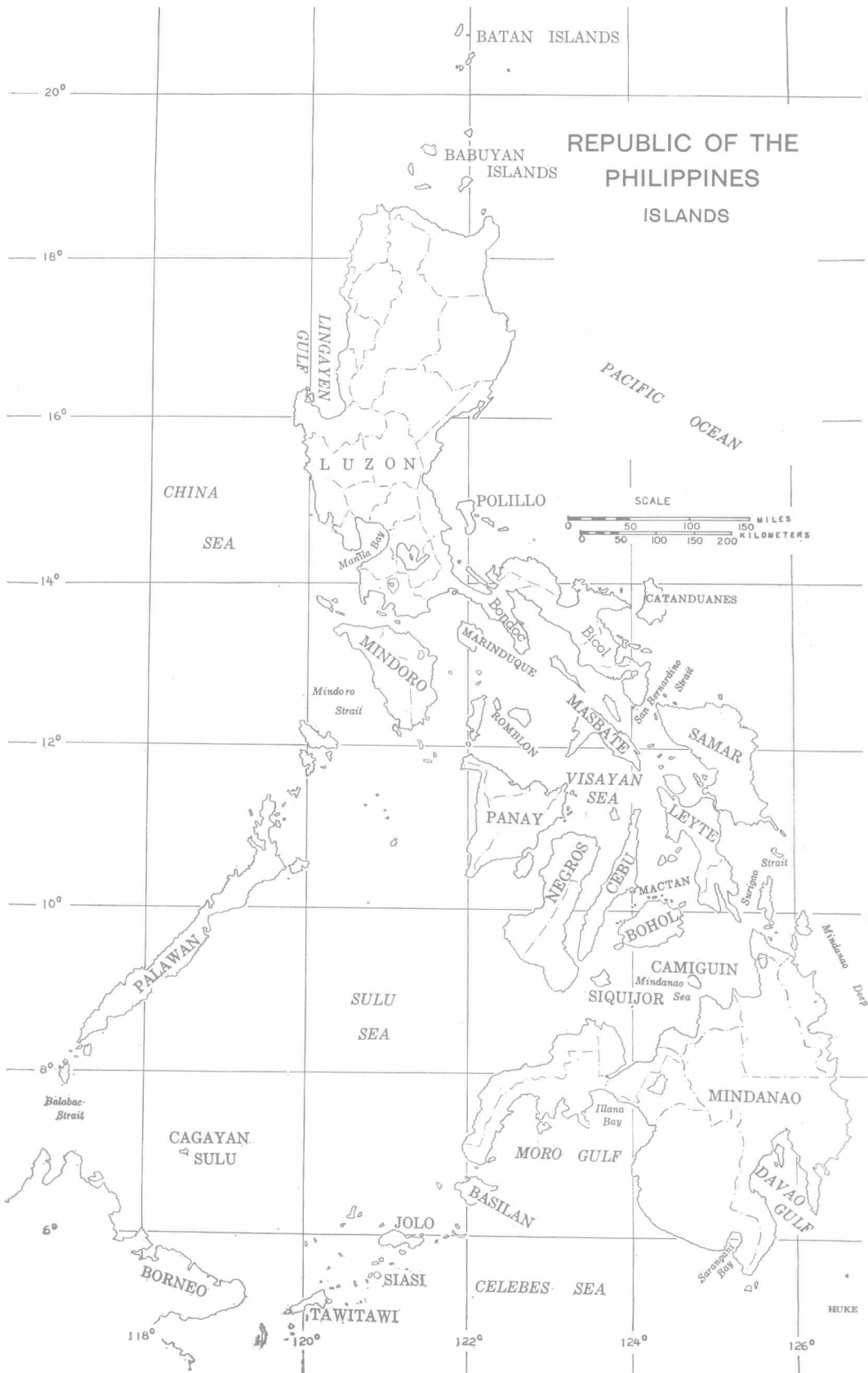
## CHAPTER I

# LANDFORMS

The location of the Philippines on the western margin of the Pacific Ocean helps to explain the pattern of landform development in the islands. This entire margin of the Pacific Basin from Kamchatka south to Japan, Formosa, the Philippines, Indonesia, and on through New Zealand owes much of its development to a vast and exceedingly complex series of stress lines along which faulting, folding, and volcanic activity have taken place. This western Pacific series of arcs, together with their continuations through western North and South America, form an almost continuous ring around the Pacific Ocean. This ring is related by some geologists to the fact that the moon may possibly have been torn from the Pacific Basin, and that to restore the balance of the Earth, the various continents are slowly drifting toward the resulting gap. Persons subscribing to this theory of "Continental Drift" further point out that the leading edges of all the continents drifting toward the Pacific Basin are badly crumpled and marked by severe faulting and folding, as well as by volcanic and earthquake activity. Whatever the ultimate truth may be, it is certain that the Philippine Islands lie in this zone of major earth movement and that they are in fact a surface expression of this "fiery circle".

Philippine folklore indicates quite different origins for the islands. Thus, "Long ago there was no land, only water, sky and a bird. The bird, seeking a resting place, incited a battle between the sea and the sky. The sea threw huge waves at the sky until, finally, the angry sky hurled rocks at the sea and pacified it. Out of those rocks grew the first land, and a resting place for the bird — the Philippines."

Stones thrown by the sky or the crumpled leading edge of a drifting continent — both explanations offer interesting and partly valid take-off points for a discussion of Philippine land-



BATAN ISLANDS

BABUYAN ISLANDS

# REPUBLIC OF THE PHILIPPINES ISLANDS

LINGAYEN GULF

LUZON

CHINA  
SEA

POLILLO

Manila Bay

MINDORO

Mindoro Strait

BORNEO

MARINDUQUE

ROMBLON

MASBATE

PANAY

VISAYAN SEA

NEGROS

CEBU

MACTAN

BOHOL

SAMAR

LEYTE

Surigao Strait

CAMIGUIN

SIQUIJOR Sea

SULU  
SEA

PALAWAN

Balabac Strait

CAGAYAN  
SULU

BORNEO

MORO GULF

BASILAN

Illana Bay

MINDANAO

DAVAO GULF

CELEBES SEA

SIASI

TAWITAWI

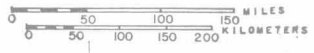
JOLO

Sarangani Bay

RUKE

PACIFIC OCEAN

SCALE



Mindanao Deep



forms. The stone theory gives a faint comprehension of the vast number of separate islands and islets in the archipelago. The continental drift theory helps an understanding of the arching and parallel alignment of many of the mountain ranges.

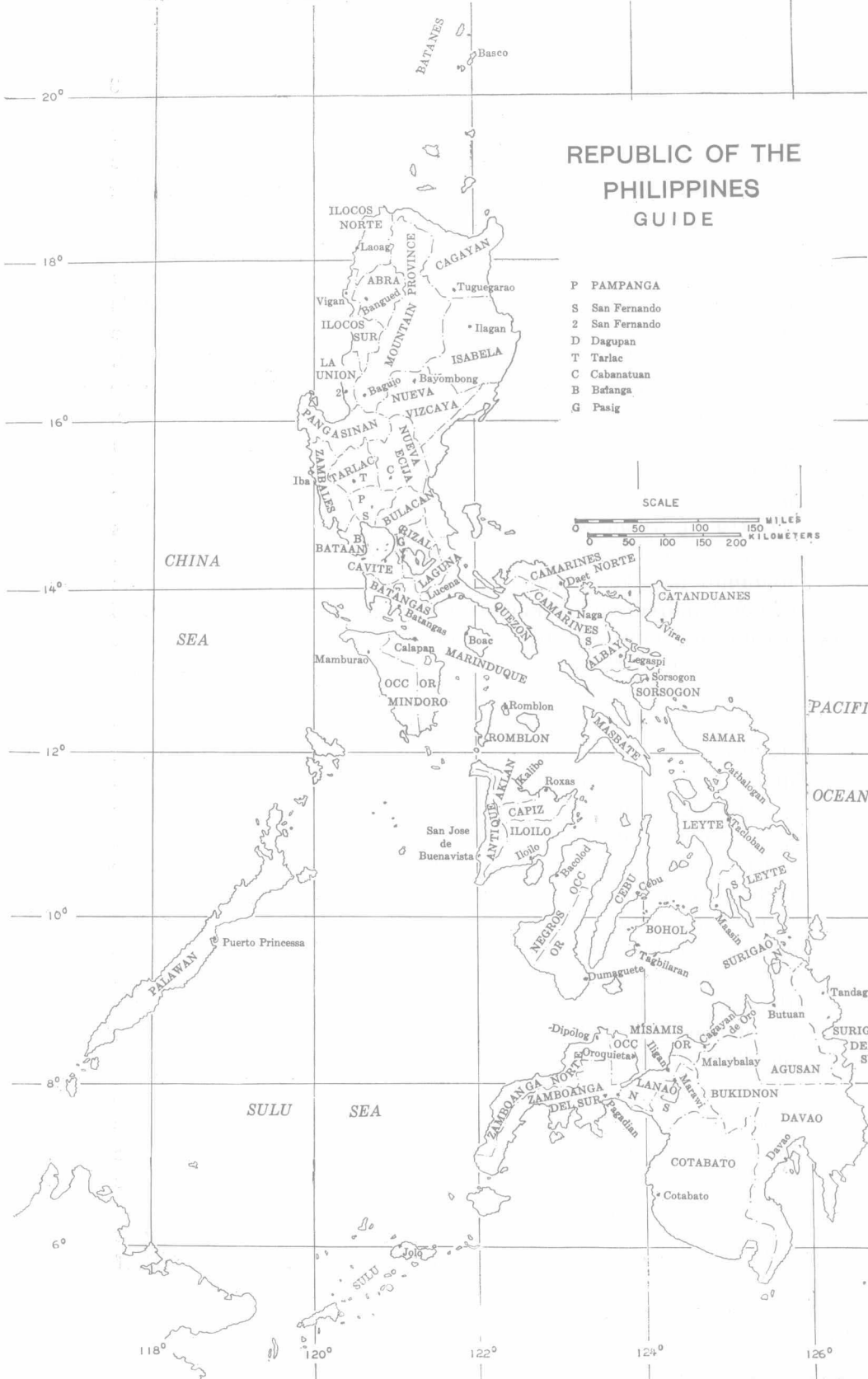
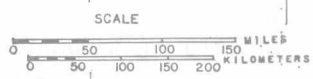
The numbers of distinct land units are legion. An oft quoted figure is 7,100, making this the largest archipelago in the world in terms of sheer numbers. This figure, however, is not as precise as it appears because some of the smaller coralline islets have a history of alternate exposure and submersion. Occasionally, volcanic materials build up on the sea floor to emerge temporarily as islets, only to be lost again. Two islands, Luzon measuring 104,688 square kilometers and Mindanao with 94,630 sq. kilometers, are the giants of the group, together comprising almost exactly two-thirds of the nation's total area of 297,410 sq. kilometers. Others are far smaller, ranging from Samar, third largest with an area only 1/7 that of Mindanao, to minute islets of an acre or less. Forty-five islands have areas of one hundred square kilometers or more. Together, these 45 account for 98 percent of the land area, leaving only two percent to be shared by the 7,055 other islands.

The shapes of the islands vary as profoundly as the sizes and often give some indication of the character of the surface features. Mindanao has been likened in shape to an as yet undiscovered member of the *Archaeopteryx* family, flying reptiles of the Cretaceous period. The head, neck, and beak, ready to swallow Basilan, represent one mountain arc; the twin tail feathers, another arc; the tightly folded legs, a third arc; and the body represents the confluence of several arcs. Cebu has the shape of a famous Philippine cigar, indicating tightly compressed and folded hills in a northeast-southwest orientation. Masbate looks like a primitive adz, shaped by the right angle confluence of two lines of faulting and uplift. Luzon appears as a complex ink blot representing several zones of mountain building.

The major alignment of the Philippine mountain masses assumes roughly the shape of an inverted "Y" ( $\lambda$ ). The arms of the  $\lambda$  appear to converge in the Visayan Islands and on the southern peninsulas of Luzon. These arms or trend lines are marked by recent faulting and folding and by volcanic activity which continues to the present day. The main Philippine fault zone extends northwest to southeast from the Lingayen Gulf

REPUBLIC OF THE  
PHILIPPINES  
GUIDE

- P PAMPANGA
- S San Fernando
- 2 San Fernando
- D Dagupan
- T Tarlac
- C Cabanatuan
- B Batanga
- G Pasig



across north central Luzon. It crosses the Bicol Peninsula, continues through eastern Masbate and central Leyte before turning southward through the mountains of eastern Mindanao. A belt paralleling this fault line is marked by many of the highest elevations in the Philippines as well as by numerous of the recently active volcanoes.

A less pronounced fault line runs from southwest to northeast connecting Borneo and southwest Luzon through the 250-mile long island of Palawan. Still another reaches from northeast Borneo through the Sulu Islands and into the tail-like Zamboanga Peninsula of Mindanao. Much of the present day pattern of island distribution and of local mountain building has resulted from the fact that the Philippines lies in the zone of convergence of several Pacific mountain building zones. That there has been pronounced recent movement along these lines is demonstrated by the limestone, formed of coral and built up at or below present sea level, which is now lying at considerable elevations on numerous islands in such diverse locations as Palawan, Mindanao, Cebu, and northern Luzon.

## LUZON

The mountain ranges of central and northern Luzon have the pattern of an upright "Y" with an outlier parallel to the main arm of the Y on the west coast in Zambales, Bataan, and Pangasinan Provinces. Along the east coast the mountains abut directly on the Pacific Ocean and leave only small discontinuous patches of level land composed mostly of Tertiary and Quaternary sediments. The mountains here are known collectively as the Sierra Madre and extend with only one break from Cape Engaño at the extreme northeast to a point east of Laguna de Bay in central Quezon Province. Twenty-five miles southwest of Baler in Quezon Province the continuity of the Sierra Madre is interrupted by a transverse gap extending northwest to southeast for a distance of some 20 miles and having a width varying from one to five miles. This gap lies very close to the axis of the main Philippine fault line and provides a possible transportation link with a maximum elevation of 250 meters between the central plain to the west and Dingalan on the east coast. Throughout most of their extent the Sierra Madre reach peaks of between 1,100 and 1,400 meters. The two highest peaks, Mingan Mountain just north of the Dingalan Gap and an un-