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13 ABSTRACT

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ECONOMIC RESOURCES OF THE UNION OF BURMA

by

Nafis Ahmad

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FOREWORD

This study is designed to provide insight into the character of the physical and cultural environment of Burma. The significant features of the production and distribution of food, the impact of climate on human activity, growth and distribution of population and problems of transportation have been particularly stressed. These factors are elements of considerable practical importance in military geography.

Evaluations, interpretations, and judgments as well as any errors and oversights are the responsibility of the author alone. Information and suggestions relevant to the subject will be gratefully received.

An extensive bibliography on Burma has been prepared and updated to 1967.

I am indebted to a great many people for information and ideas. Many of the authors are named and listed in the bibliography, but many remain unnamed.

I am grateful to the National Academy of Sciences through their National Research Council (NRC), Washington, D. C., for offering me a Senior Research Associateship for two years (1966-68) and giving me the opportunity of doing the work at the Earth Sciences Laboratory of the U. S. Army Natick Laboratories at Natick, Massachusetts. I owe a debt of gratitude to the Director of the Earth Sciences Laboratory, Dr. L. W. Trueblood, for extending a warm welcome to me and placing all possible laboratory facilities at my disposal, including typing and cartographic assistance. My most sincere thanks are due to Dr. Robert L Anstey, Chief of the Military Applications Division, whose constant advice and encouragement provided the stimulus for making this contribution to the knowledge of Burma.

The help and assistance received from Mr Aubrey Greenwald, Chief of the Cartography Office and especially from Miss Pernel Leuvelink, who was the cartographer responsible for researching, planning, and drafting all of the maps, has been invaluable The typing and drafting owes much to Mrs. Stella Lacouture and here assistants in the Administrative Office of the Laboratory.

Material was consulted in several libraries in the United States, such as the Widener Library, Harvard University, Cambridge, Massachusetts; the Library of Congress, Washington, D. C.; U. S. Government Department Libraries (Commerce, Agriculture, Bureau of Census); the Hammarskjold Library of the United Nations; the Library of the American Geographical Society, New York; and the Technical Library, U. S. Army Natick Laboratories, Natick, Massachusetts. In all these places both the staff and specialists offered help and advice which it is not possible to acknowledge individually, but the author is grateful to all of them.

ECONOMIC RESOURCES OF THE UNION OF BURMA

C O N T E N T S

List of Maps vi

List of Tables vii

Abstract xii

PART ONE

I. An Introduction to Burma 1

II. Human Resources 23

PART TWO

III. The Physical Setting 41

IV. Climate 56

V. Vegetation, Forests and Soils 75

PART THREE

VI. Agriculture 88

VII. Mineral Resources 140

PART FOUR

VIII. Industries and Industrial Development, Power and Energy 155

IX. Transportation 180

X. Trade and Commerce 208

XI. Resources and Economic Development 222

GLOSSARY 247

BIBLIOGRAPHY 254

MAPS

1. Location of Burma within Southeast Asia
2. Administrative Divisions and Districts
3. Hypsography and Hydrography
4. Physiographic Regions
5. Climatic Regions
6. Annual Rainfall
7. Rainfall - Dry Season
8. Rainfall - Main Wet Season
9. Density of Population, Major Cities and Towns
10. Reserved Forests and Major Teak Areas
11. Soils
12. Land Use
13. Principal Areas Regularly under Irrigation
14. Principal Crops of the Dry Zone of Burma
15. Burma Industries and Minerals
16. Transportation

TABLES

AN INTRODUCTION TO BURMA

I.	Divisions and Districts	10
II.	Gross National Product, 1963-64 at Current Prices (million kyats)	15

HUMAN RESOURCES

III.	Burma: Population, 1826 to 1967	24
IV.	Employment of Working Population, 1966	25
V.	Burma: Population: 1931: Tribal and Racial Groups	27
VI.	Population of Religious Groups, 1931	31
VII.	Density, Area and Population of Divisions and Districts	34
VIII.	Districts with High Density of Population	36
IX.	Populations of 28 Larger District Headquarters Towns	38

CLIMATE

X.	Mean Annual Minimum and Maximum and Annual Absolute Maximum Temperatures, Rainfall, and Relative Humidity	58
XI.	Mean Daily Minimum Temperatures (°F)	59
XII.	Mean Daily Maximum Temperatures (°F)	61
XIII.	Absolute Maximum Temperatures (°F)	62
XIV.	Mean Relative Humidity (Precentage) at Specified Hours	63
XV.	Some Dates for Commencement of the Monsoon	65

XVI.	Mean Number of Days with Thunderstorms	66
XVII.	Number of Tropical Cyclones Crossing Sections of the Bay of Bengal in 50 Years	67
XVIII.	Mean Precipitation (inches)	68
XIX.	Mean Number of Days with Precipitation (Selected Stations)	71
	VEGETATION, FORESTS AND SOILS	
XX.	Production of Timber	81
	AGRICULTURE	
XXI.	Agricultural Production: Major Crops	89
XXII.	Major Crops: Area, Yield, and Production, 1948-49 to 1964-65	90
XXIII.	Yields of Paddy per Acre, 1936-41 to 1959-60 (per cent of Pre-War Average) in Baskets and Pounds	95
XXIV.	Cultivated Land under Irrigation, 1948 (by divisions)	97
XXV.	Dry Zone: Irrigated Land and Status of Agricultural Land (by districts) 1952	101
XXVI.	Area under Irrigation, 1961-62 through 1965-66 (by various Methods)	103
XXVII.	Burma and Neighboring Countries: Area Under Irrigation, 1962	104
XXVIII.	Leading Producers and Exporters of Rice in the World, mid-1960's	111
XXIX.	Cotton; Area and Production: 1936-37 to 1964-65	122

XXX.	Livestock and Fishery Products, 1961-62 to 1965-66 (in thousand Kyat)	126
XXXI.	Livestock and Other Animals, Pre-War and Post-war	127
XXXII.	Food Balance Sheet, 1958	130
XXXIII.	Plough Cattle and Tractors in Use, 1961-62 to 1965-66.	135
	MINERAL RESOURCES	
XXXIV.	Mineral Production, 1939-1940 to 1965-1966 (in tons)	141
XXXV.	Exports of Minerals: 1939-40 to 1960-1961 (by quantity and value)	142
XXXVI.	Production of Petroleum 1939-1966 (in tons)	152
XXXVII.	Production of Petroleum and its Products in Recent Years, 1954-1955 to 1963-1964 (in thousand gallons)	152
	INDUSTRIES AND INDUSTRIAL DEVELOPMENT, POWER AND ENERGY	
XXXVIII.	Pre-war Industry: 1938 (itemized)	156
XXXIX.	Value and Precentage of Industrial Production, 1952-53 to 1962-63	163
XL.	Yearly Power Generation in RES and EBS Areas (in million Kilowatt hours)	177
XLI.	Yearly Power Consumption in RES and EBS areas (in million Kilowatt hours)	178

TRANSPORTATION

XLII.	Burma: Passenger Traffic of the Principal Carriers, 1937 to 1961	184
XLIII.	Port of Rangoon: Some Equipment and Facilities, 1961 to 1966	193
XLIV.	Freight Traffic of the Principal Carriers, 1937 to 1961	207

TRADE AND COMMERCE

XLV.	Exports: 1868 to 1936 (million rupees)	210
XLVI.	Imports: 1868 to 1936 (million rupees)	210
XLVII.	Foreign Trade, 1955-56 to 1964-65 (value in million Kyat)	213
XLVIII.	Main Commodities Traded, 1961-62 through 1963-64: Exports and Imports	215
XLIX.	Burma: Main Trading Partners, Prcent of Total Value 1962 and 1963	215
L.	Direction of Foreign Trade, 1959 to 1961 (millions of dollars)	216
LI.	Direction of Rice Exports, 1958-59 to 1963-64, by Value (K million) and Tonnage (thousand tons)	219

RESOURCES AND ECONOMIC DEVELOPMENT

LII.	Production by Value, 1961-62 to 1965-66 (million Kyat)	231
LIII.	Precentage Changes in Different Sectors of Production, 1961-62 to 1965-66	231
LIV.	National Production by value, 1965-66 to 1967-68	232
LV.	Manufacturing Production, Quantity and Value, 1964-65 to 1965-66.	234

LVI. Burma: Industrial Production of Chief Commodities, 1960-61 to 1962-63 235

LVII. Gross Domestic Product in 1961-62 Prices (K million) 1960-61 to 1963-64 237

LVIII. Consumption and Output per Capita (in 1961-62 prices) 1960-61 to 1963-64. 238

LIX. Imports of Principal Commodities (K million) 1937-41 through 1963-64 241

LX. Exports (selected data) 1938-39 through 1962-63 242

ECONOMIC RESOURCES OF THE UNION OF BURMA

ABSTRACT

Presents an in-depth study of the economic geography of Burma. Part One includes an introductory chapter on the historical background of the country and its economy to 1967, and a consideration of the population distribution and of the various tribal and racial groups. Part Two outlines Burma's physical base of geology and geomorphology, climate, vegetation, forests and soils. Part Three examines the agriculture and mineral resources and Part Four, the industries, transportation, trade and commerce. A final chapter analyzes and evaluates economic development in Burma, and especially the economic programs and policies which were formulated in the early years of independence from colonial status. The bibliography is extensive.

PART ONE

I. AN INTRODUCTION TO BURMA

Western interest in Burma has been aroused as a result of the significance of Southeast Asia in world affairs. The closeness of the war in Vietnam and the long common border with China focus attention on the area from the military point of view; also, raw materials such as fine teakwood, rice for Asian deficit areas, and rubber and minerals for the world market lend importance to Burma's position in world economy and trade.

Burma lies in the heart of Continental Southeast Asia, has 1,400 miles of common boundary with India[1], and a long rugged 1,300-mile frontier with mainland China.

The country is roughly the size of Texas and has the shape of a kite with a long tail fluttering towards Malaysia forming the 500-mile Tenasserim coast. Its population was estimated at 25.25 million in mid-June 1966.

Long seacoasts constitute a doorway from the south into the Irrawaddy Delta, which merges into the main valley lowlands and provides access to the Chinese and Indian backdoors on either side. Rangoon's nodality (see Map No. 1) is an important feature of the geography of Southeast Asia as a whole.

The lowland delta areas of Southeast Asia such as those of the Irrawaddy, Menam and Mekong and the coastal lowlands of Vietnam (Annam) are cut off from each other by dense forest-covered highland areas, with rugged mountain ranges, inhabited by primitive tribal peoples practicing a slash-and-burn agricultural economy. Also intervening here and there are plateau regions, like the Shan upland and areas of similar relief in Cambodia and Laos. Before the advent of the Europeans, these plateaus were somewhat like no-man's land, dominated by one or the other of the rival lowland kingdoms. Thus these vast areas remained politically disturbed over decades, particularly since the later medieval times.

---

[1]The boundary agreement was signed in Rangoon on March 10, 1967. See "India News", Washington, D. C., June 23, 1967.

Though this land of paddy cultivation, monsoon rain, and humid sub-tropical warmth has inherited many ingredients of culture and religion from the ancientcivilizations of China and India, geographical isolation has helped Burma to maintain a sharp identity of its own. Burma's limited population and surplus rice make her the rice bowl of South Asia.

People and History

The historians[2], archaeologists, and anthropologists seem to be at odds with each other on several aspects of Burmese history, and the cobwebs of the past do not seem to have been entirely cleared. The most commonly accepted view is supported by Harvey[3], who says that perhaps the earliest inhabitants of Burma were Indonesians, but they seem to have left little trace of their occupance. Later they were displaced by the Mongolian tribes from Western China. It is conjectured that these were the Mon and the Tibeto-Burman tribes from eastern Tibet. They came down the gorges of the great river valleys and prominent passes in the mountain wall. No reconstruction of these routes is possible since it was all before written history in Burma.

The Mons (Talaings) spread south of Henzada. The traditional names of Tibeto-Burman tribes are Pyu, Kanran, and Thet. It is surmised that the Thets, maybe the Chins and the Kanran, are possibly the Arakanese. Harvey[3] says that the Pyu, now extinct, may be a racial ingredient in what afterwards became the Burmans. Perhaps they were pushed northward or inland from the Delta by the pressure of Talaings from the southeast.

Harvey describes these early tribal movements in colorful language: "These races moved, perhaps owing to causes such as drought and ethnic pressure in successive infiltrations, each driving its predecessor further south. Down from the north they came, tribe after tribe of hungry yellow men with the dust of the world's end upon their feet, seeking food and warmth, making tiny homesteads along the fertile river banks, seeking that place in the sun which has been the dream of the northern races in so many ages."[3] The process may have taken several centuries. Many of the immigrants must have been settled before the beginning of the Christian era. The Shans did not enter the plains from the Shan plateau till the 13th Century A.D. and the Kachins, from their

[2]The account is based upon the commonly accepted views of well-known historians and writers like Scott, Mason, Marshall, Hunter, Phayre, Harvey, Furnivall, Tin Pe Maung, Christian, Hall, Cady, Luce, Musgrave, Milne, Collis, Trager, Maung Maung, Johnstone, Pye and Woodman (see Bibliography).

[3]Harvey: Outline of Burmese History, Bombay, 1954.

North Burma homeland, were penetrating upper Burma when the English annexation checked their movement at the end of the 19th century. The Kayahs and Karens occupied areas south of the Shan plateau.

The Burmese are largely a Mongolian people, but none of their traditions hark back to China or Mongolia; most point to India. Their chronicles relate to early Buddhism and their folklore is largely Hindu. Fairy tales smack of Indian background, and numerous place names originated in Sanskrit and Pali. Indian, Buddhist, and Hindu influences have been continuous and paramount in the Irrawaddy Delta and Central Burma.

Pegu was colonized from Orissa; its old name, Ussa, bears testimony to this It appears that these colonists came into the Burmese area in two main streams, dictated by geography, namely overland from Assam into Upper Burma, and by sea from South India to Lower Burma. Some say that even the name "Talaing" is derived from Telingana in South India. The Hindu immigrants built many small shrines and temples. The Buddhist elements probably started coming around B.C. 260 when Asoka invaded South India and introduced Buddhism there. But heavier strains probably started pouring in from the Buddhist center of Conjeueram in South India in the 5th century A.D. Some hold the view that Buddhism came to Burma as a part of the Indian overseas expansion which swamped a large part of Southeast Asia during those centuries.[4]

The Burmese colonization of Upper Burma and Northern Arakan probably started in the later half of the 9th century. These Burmese elements came from the Kingdom of Nanchao (Yunnan) in Southwestern China, which around 835 A.D. had destroyed the Pyu Kingdom of Central and Upper Burma.

For several centuries to the outside world, "Burma" meant Lower Burma or the delta area, drained by its south-flowing rivers. Roman sailors knew Burma, Malaya, Bengal and Ceylon. The Arabs who frequented these seas before as well as after the advent of Islam, had even better acquaintance than the Romans with the Delta area. During the 6th to 14th century A.D., the area formed a sort of link in their trade with China. They obtained from Burma many lightweight exotic stuffs such as gold, silver, silk, pepper, ivory, gems, aloes, precious stones, rhinoceros horns, birds, and animals.

At this time, most of the delta face was an uncleared tidal forest area. There were heavy tides which penetrated into the interior and cut up the area into small densely forested islands with margins of mud. This made the approach through the sea face of the delta difficult. The approach was easier and this led to the early development of Thaton as a port.

[4]Hall: Atlas of Southeast Asia, London, 1964, pp. 72-75

Here a brief mention may be made of the Kingdom of Pagan to which Burma owes some of its remarkable shrines in the Dry Zone and also lasting cultural strains.

The ruins of Pagan are located on the eastern bank of the Irrawaddy River about 120 miles south of Mandalay. They extend along the river for nearly 20 miles with a width of about 5 miles. The ruins of Pagan are located 17 miles from Chauk, the present day oil-drilling center. Pagan was founded in the 9th century, A.D. and was the capital from 1044 to 1097. It is said that in this area there are the ruins of not less than 5,000 temples and pagodas. The Kingdom of Pagan fell in 1287, when the grandson of Kublai Khan from China captured the capital.

The last great kingdom of Burma was founded at Shwebo. Ava, and later Mandalay, became centers of power. King Thibaw, was overthrown by the British in 1885. During the period 1782-1819, the Burmese Kingdom reached its apogee, extending from Assam in India to the Tenasserim coast in Burma.

Advent of Europeans

The country was unknown to Europeans, until mentioned by Marco Polo in his so-called "visit" with the Chinese invading armies from Yunnan in 1277. After the Portuguese capture of Malacca in 1511, some contact was made with the ruler of Pegu by Albuquerque their viceroy at Calicut on the Malabar coast of India. A little later the Portuguese adventurers took service as mercenaries in the fighting forces of rulers in Arakan and Pegu. Their use of firearms, faster and better sailing vessels, and intrigue were great assets in meddling with local politics. The Dutch and the English later arrived on the scene, mainly as traders, but they did not take an active interest in Burma.

The Dutch and English East India Companies carried on trade actively with the Bengal and Burma areas. The next period of active European contact with Burma was marked by the Anglo-French rivalry. The Burmese Kingdom expanded into Manipur and Assam in India and the conquest of Arakan gave them common borders with British Bengal. The Burmese were proud and ignorant of the outside world; the English were keen to counter the French on the Indochina frontiers, and therefore, a clash between the English and the Burmese was inevitable.

English-Burmese relations remained in a condition of equilibrium, until war erupted in 1824. The fortunes of the campaign were dictated by superior technology and the influence of the geography of Burma, rather than masses of men hurled by the Burmese into Assam across the most difficult hill country. The British naval and land forces which approached from the sea and sailed up the Irrawaddy eventually dictated terms of peace.

As a result of the First Burmese War, the English changed their position from that of traders to that of masters of the Arakan and Tenasserim areas. The second Burmese War in 1852 was fought with the help of the native soldiers of the East India Company's Madras and Bengal Armies, supported by units of the Queen's Army. The British victory earned them the delta area of the Irrawaddy.

After the Second Burmese War in 1852 Mindon, the Burmese King, was desirous of establishing contacts with the outside world. He sent a mission to Europe under the leadership of his Chief Minister Kim Wum Mingyi to explore the possibilities of opening trade and diplomatic relations directly. His next step was a mission to America bearing gifts for the President of the United States and letters of greetings The first students were also sent out to learn modern science and technology. King Mindon's objective was to get Burma's sovereignty internationally recognized. The diplomatic mission to the United States was headed by an American missionary, Dr. Eugenio Kincaid who had spent 20 years in Burma.

As a result of the Burmese mission to Europe, the first treaty concluded between the Kingdom of Burma and a foreign country was signed with Italy, at Mandalay[5] on March 3, 1871.

In 1872 and 1874, Burmese foreign missions were received in France and with the first of these missions a convention was signed by the French Government at Paris. The last Burmese bid to establish international contact was made in the middle of 1883 when a mission for scientific and industrial purposes was dispatched to the West. A special convention was signed with France on January 1885, advocating friendship and commerce. A similar convention was signed with Germany on April 4, 1885.

British Rule

The Third Burmese War lasted only two weeks. It ended by the Proclamation of January 1, 1886, by Lord Dufferin, the Viceroy of India. King Thibaw had already left his land as a captive on December 3, 1885

Thus the British became the rulers of the whole of Burma, governed by their Viceroy of India from Calcutta. The occupation of Mandalay cost the British only ten men, but the control and absorption of Upper Burma was difficult and costly. The many tribes spread over unfamiliar and difficult terrain were a constant source of trouble and the pacification was no easy problem. It is said that the British General in Rangoon declared that he could capture Mandalay with 500 men, but would require 5,000 to take Upper Burma.

---

[5]Maung Maung: Burma in the Family of Nations, New York, 1956, p. 54.

It is interesting to note that ultimately, 35,000 men were employed for five years in the pacification of this area[6]; yet disturbed conditions, marauding, and sniping continued for several years more.

World War I was rather enjoyed by the Burmese, young and old - the distant war with artillery barrages, men in trenches, submarine chasing, and sinking of ships all seemed exciting; at home soldiers were recruited, fairs were held and merchants and others grew rich selling rice, teak, oil, tin, and rubber. But the end of the war witnessed a political ferment. Like the Indians next door, the Burmese began demanding home rule.

The Government of Burma Act was passed in 1935 and it came into force on April 1, 1937. The Act separated Burma from India and gave the status of a self-governing Crown Colony. The Council of Ministers exercised substantial powers, but all matters relating to defense finance and currency, foreign affairs and minority territories were reserved to the British Governor. The Burmese Nationalists were not wholly satisfied with this form of political advance. World War II started in September 1939, and the Japanese conquered Burma in early 1942. After the defeat of Japan in 1945 and the attainment of independence from Britain in 1948, Burma fashioned its own destiny.

Development of Burma Under British Rule

After the Second Burmese War in 1852, the Irrawaddy Delta was annexed to the British possessions in Burma and became the new province of Pegu. In 1869, the Suez Canal was opened and through commerce with the West and India, immigration of people into the delta, and stable government, the new Burma under the British began to prosper. Indian labor came in thousands, particularly from South India, and rice cultivation increased in the delta area by leaps and bounds. In a few years rice outstripped teak as the leading export from Burma. In 1890 Burma had 5.76 million acres under rice and exported 1.85 million tons. In 1930, the acreage was 12.37 million and rice exports amounted to 2.93 million tons.

The waterways remained the primary means of transport, and roads were built after 1852 from Rangoon to Prome and from Rangoon through Pegu to Toungoo. The Irrawaddy Flotilla Company came into its own in 1885 and developed river transport. The first railroad, the Irrawaddy Stage Railway from Rangoon to Prome, was built in 1877. Interestingly, in 1852 there was a plan for a railway from Rangoon through the hills of Karenni and Northern Thailand to Yunnan in Southwestern China. But the decision was to develop the old road

[6]Christian: Modern Burma, 1941, p. 37.

link to China via Mandalay and Bhamo. Due to the Taiping Rebellion in China, the coastal route was interrupted and the British thought that the land corridor to Yunnan was a valuable alternative. Eventually this project also failed due to Burmese as well as Chinese hostility The Burmese Railways were extended to Mandalay after 1886, and by 1903 a line had been carried from Mandalay to Lashio.[7]

During the Sino-Japanese War of 1894-95, the Chinese Treaty ports on the eastern seaboard were closed and the Chinese suddenly realized the importance of the Burmese corridor to their southwestern province of Yunnan. The old caravan route from Bhamo to Yunnanfu (Kunming) came to life and materials were transported through this artery into China.

With tension mounting between Kuomintang China and militant Japan, Chinese coastal trade in 1937 came under severe stress. China was once again made conscious of the value of Burma's geographical position. The Bhamo route in Burma was linked with the port of Rangoon. The construction of the Burma Road was begun, and within a year the Salween and Mekong gorges were bridged to carry motor traffic. It was a tribute to Chinese industry, ingenuity, and endurance and was acclaimed throughout the world. It was reported that no less than 300,000 workers were employed for road construction at various sections between the Burmese border and Chungking. The road was officially opened for traffic on January 10, 1939. It is said that it was a marvel of physical labor since the only modern aids were survey instruments and dynamite fuses. The railway connection between the Yunnan-Burmese border toward Lashio was built and the Chinese offered to construct the section up to Lashio in British Burma to link with the Burmese railway system. This was expected to promote traffic in addition to the Burma Road.

Attention was once again focused on Burma in July 1940, nine months after the start of World War II, when under pressure by the still uncommitted Japan, the British offered to close the Burma Road into China for three months. A little earlier the Japanese had virtually neutralized the gateway of Hong Kong into China by occupying the adjoining mainland. Therefore, supplies could go into China only through Burma, which then provided the only door to Southeast Asia through the Indian Ocean from the West. But with continuing Japanese agression in the Indochinese area, Britain reopened the Burma Road and henceforward a steady flow of war materials from Britain and the United States began to wind its way into Nationalist China. Rangoon became the gateway, instead of Hong Kong and the eastern seaboard ports of China.

---

[7] Burma Pamphlet, No. 1, 1941, p 41.

The Japanese invaded Burma on December 9, 1941, (soon after the Pearl Harbor attack) by attacking Victoria Point. In a few days they were masters of Mergui and Tavoy. Rangoon was bombed on December 23 and on Christmas day, badly damaging the docks and harbor. The British pulled out of Moulmein after the fall of Singapore on February 15, 1942. On April 28, 1942 the Allied Commanders decided to end the campaign by pulling their forces out of Burma. The Japanese had conquered Burma with only four divisions!

The death toll was heavy for the retreating British. The number of refugees arriving in the Assam valley and Bengal was estimated at over half a million. The number of deaths on all routes was not less than 10 to 12 thousand. The door to India through Burma was thrown open and the backdoor to China was closed.

Before the Japanese entered the war, the British had tried to induce the Burmese to give wholehearted support to the conflict against the Axis powers; but nationalist opinion would not go along.[8] When eventually the Japanese became masters of Burma, they supported the creation of an independent Burma to win over nationalist opinion in the country. But no real friendship developed and the Burmese eventually rose in opposition to their occupiers.[9]

Large American forces were committed to the aid of the British for the reconquest of Burma from the Japanese. The American forces pushed into the less known parts of North Burma along the Ledo Road in 1944-45 and established links with the Chinese via the Stillwell Road. The British advance was directed from bases in Manipur and Bengal, but eventually resulted in the capture of Rangoon from the north and by sea[10] in May 1945. Most of Burma was once again badly battered.

Immediately after the end of the war the Burmese sought independent nationhood for Burma. Burma became independent on January 4, 1948 and shortly afterward, members of war time resistance groups (against the Japanese) formed rebel bands. The Communists had already mounted an insurrection. The rebellion reached its peak in 1949, but thereafter the rebels were pushed into isolated areas, though they still (1969) remain active locally in several areas.

---

[8] Ba Maw: Breakthrough in Burma, 1968, pp 40-44.

[9] U Hla Pe's Narrative, Cornell Univ, 1961, p. 2 et seq. Also, see Burma During the Japanese Occupation Burma Intelligence Bureau, Simla, India, October 1943, p. 17 et seq.

[10] The 15th Corps landed from the sea in advance of the main elements of the 14th Army, driving down from Central Burma. (See Lord Mountbatten's Report, London, 1951).

The Constitution

The Constitution of Independent Burma provided for the "Union of Burma" including all the areas that were British Burma. The mountain fringes of the Union of Burma through which run the international boundaries with China, Laos, Thailand India, and East Pakistan are occupied by peoples and tribes who are not Burmese in speech and have different cultures. This amalgam of tribes includes such groups as the Chin, Lushai, Naga, Kachin, Shan, Karen and Mon, who during British rule, were under a special administrative jurisdiction.

In independent Burma these tribal minority groups have been expressing dissatisfaction with their position in the Union and have been the cause of the prolongation of a good deal of insurgency in the past 20 years. The lack of cohesion between tribe and nation in Burma has remained a vexing problem. The Constitution of Burma was so framed that blocks of minority peoples, the Kayah, Shan, Kachin, and Karen, are states within the Union. The Chin area constitutes a 'special division', not quite a state. Secessionist threats have been based partly on the aspirations of minority groups. The Burma Army Revolutionary Council, on coming to power in March 1962 under the leadership of General Ne Win, laid a heavy hand on these aspirations.

Administratively, Burma is divided into eight Divisions including the States. There are 38 districts in the seven Divisions of Burma excluding the Shan and Kayah states. The Divisions and Districts are shown on map 2, and with their areas are given in Table I.

Unfortunately, since the birth of independence in 1948, Burma has been beset with internal dissensions. Even in mid-1967, there were reported to be at least 15,000 insurgents[11] in the country including Communists, Shans, Karens, and others. This lingering insurgency has made the task of complete and unfettered economic rehabilitation difficult. Serious law and order problems still impede national progress.

Foreign Policy

In the sphere of foreign policy, both under the Constitution as well as under the Military Rule, Burma has supported what it calls the doctrine of positive neutralism, peace, and non-alignment. In the United Nations, Burma has been generally lending support to the policies of the Afro-Asian group of nations. Burma has also lent support for humanitarian measures. It has expressed total rejection of war as a solution to international disputes. It has advocated a

[11] New York Times (Weekly News Review), Sunday July 9, 1967.

TABLE I

BURMA DIVISIONS AND DISTRICTS
(with Area in Square Miles)

DIVISIONS AND DISTRICTS		SQUARE MILES
I.	Arakan Division	17,422
1	Akyab District	5,252
2	Arakan Hill Tracts	3,228
3	Kyaukpya District	4,793
4	Sandoway District	4,149
II.	Pegu Division	20,221
5	Rangoon Town District	85
6	Pegu District	4,114
7	Tharawaddy District	2,782
8	Hanthawaddy District	1,927
9	Insein District	1,903
10	Prome District	2,953
11	Toungoo District	6,457
III.	Irrawaddy Division	13,580
12	Bassein District	4,149
13	Henzada District	2,809
14	Myaungmya District	2,835
15	Maubin District	1,642
16	Pyapon District	2,145
IV.	Tenasserim Division	31,588
17	Salween District	2,577
18	Thaton District	4,872
19	Amherst District	7,410
20	Tavoy District	5,404
21	Mergui District	11,325
V.	Magwe Division	27,977
22	Thayetmyo District	4,626
23	Minbu District	3,602
24	Magwe District	3,724
25	Pakokku District	3,724
26	Chin Hills	10,675

TABLE I (Cont.)

DIVISIONS AND DISTRICTS		SQUARE MILES
VI.	Mandalay Division	12,494
27	Mandalay Division	2,113
28	Kyaukse District	1,241
29	Meiktila District	2,232
30	Myingyan District	2,707
31	Yamethin District	4,201
VII.	Sagaing Division	72,911
32	Bhamo District	4,180
33	Myitkyina District	29,723
34	Shwebo District	7,605
35	Sagaing District	1,870
36	Katha District	5,723
37	Lower Chindwin District	3,676
38	Upper Chindwin District	10,599
VIII.	Shan States	
	Eastern States	65,596
	Northern Shan States	Not Known
	Wa States	24,682
	Southern Shan States	36,409
	Karenni	4,506
	Burma Total	261,789

gradual creation and expansion of a "no war" area.[12] Burma has consistently acted to support the United Nations and has repeatedly expressed strong faith in the existence of that organization. It is indeed a tribute to this sincerity that one of her ablest citizens, U Thant has twice been appointed to the Office of the Secretary General of the U. N.

Prewar Economy of Burma

In terms of basic resources--land, people, water, minerals, and forests--Burma has great possibilities and vast potential for economic development. The main features of the pre-war economy of Burma may be summarized briefly.[13]

Under British rule the main stress was on processing of raw material and the promotion of maximum investment and effort on trade and export of commodities. British investments in industry totaled over $260 million by 1940.

Burma had become the leading rice-exporting country in the world and sent out a surplus of about 3.5 million tons annually in pre-war years. Total rice exports in the world during this period amounted to only 8 million tons.

Nearly 70 percent of the pre-war population of Burma worked on farms which had a total acreage of over 19 million. Of the acreage under the various crops, about 60 percent was devoted to paddy. But the yields were low, only about 28 bushels per acre (United States' yields are about 50 bushels per acre). Other major crops were groundnuts, sesame, pulses, sugar cane, cotton, tobacco, and millet.

Some 53,000 persons were employed in forestry. Timber constituted about 7 percent of the country's output in 1938-39. It also made up nearly 7 percent by value of the total exports of Burma. The chief timber was teak wood, with an annual production of 450,000 tons.

Minerals constituted approximately 35 percent of the value of Burma's exports. Over 50,000 workers were employed in this sector of the national economy; the mineral products made up 5.5 percent of the value of the total output in the country.

The most important mineral product was petroleum, with an output of 276 million imperial gallons, of which over 200 million gallons were exported. In 1930, Burma yielded between 2 and 3

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[12] Maung Maung: Burma in the Family of Nations, New York, 1956, p. 147.

[13] Statistics quoted are from a variety of official data. Also, see Walinsky: Economic Development of Burma, 1951-60, pp. 40-45.

percent of world oil exports. Other mineral items were: tungsten concentrates (4,300 tons); tin concentrates (5,400 tons); mixed tin and tungsten concentrates (5,600 tons); lead and lead concentrates (77,200 tons); zinc concentrates (59,300 tons); iron ore (26,000 tons). Production included 6 million ounces of silver; 212,000 carats of rubies; 11,000 carats of sapphires; 18,000 carats of spinel; 17 tons of Jadeite; 84 pounds of amber, and small amounts of galena, copper, nickel, and antimonial lead. Petroleum exports accounted for about 23 percent, and other mineral exports for some 12 percent of the value of all exports. Three British firms monopolized the oil industry: Burmah Oil Company (accounting for 75 percent of the output); Indo-Burma Petroleum Company (12 percent); and British Burmah Petroleum Company (9.5 percent). In 1938, the Burmans comprised about 60 percent of the labor force in the oil industry as compared with the non-Burmans.

The British-owned Mawchi Mines, ranked as the largest individual tungsten-producing mine in the world, supplied roughly half of Burma's tin and tungsten production. The other half came from the Tenasserim mines. The labor force was mostly Indian and Gurkha.

In sum, it can be said that on the eve of World War II, agriculture was still backward and tradition-ridden and remained in the grip of the money lender. Industry and transportation were mainly in foreign hands and the majority of the industrial labor force was also non-Burman.[14] About 70 percent of the working population was engaged in agriculture and extractive pursuits.

World War II had disastrous results for Burma. There was disruption in all branches of the national economy. Before the war there were 1,027 factories employing 83,383 workers. In 1946, about a year after the cessation of hostilities, only 355 factories were in operation, employing 31,521 workers.[15]

Almost all the mechanically propelled boats, 90 percent of other boats, 85 percent of the locomotives nearly all the passenger coaches and most of the freight cars had been destroyed. The oil fields and refineries had been dismantled.

Six million acres of rice fields out of a total of 12.5 million were abandoned. At the end of 1946, there were only 272 rice-husking mills in operation compared with 673 before the war; they employed only 11,439 workers as against 41,626 before the war. Rice exports, which before the war were at the rate of 3.50 million tons annually, were reduced to about 1.2 million. Timber and mineral exports were greatly reduced and Burma began to import petroleum.

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[14]Hagen: Economic Development of Burma, 1956, p. 23.

[15]Mission. Labor Office, Geneva, 1961, p. 12.

Economy after Independence

The economy of the new state was planned upon principles of socialism and the country was committed to the concept of a welfare state. A Two-Year Plan of Economic Development was ready in April 1948.[16] The great significance of the plan was that until 1960, it was the only attempt at comprehensive economic planning made by Burma without the assistance of foreign advisors. It continued to shape and influence basic agricultural and industrial planning and policy for several years. Indeed, the planners were conscious of the fact that the pattern of the colonial economy could not be altered within a period of two years and that numerous limitations stood in the way of measurable success, but they felt it was essential to make a beginning.[17]

In agriculture, the first steps were to be the redistribution of land with a view to eliminating landlordism and promoting modern methods in cultivation. After proper surveys, all basic industries were to be established and developed as state enterprises. Other proposals were for: complete nationalization of electric power generation, development of all forms of transportation, the nationalization of inland water transport services and employment of Burmans in all of them. Fishing and fisheries were to be encouraged and organized along modern lines.

The estimated population of Burma in mid-1968 was about 26 million, making a density of about 100 per square mile. Burmans number about 16 million. The various major tribal and other non-Burman elements in the population are Shans, Karens, Kachins, Mons, Chins, Nagas, Arakanese, Palaung-Wa, Kayahs, Lolos, Tavoyans, Indians, Pakistanis, Chinese and Anglo-Burmans. Indians and Pakistanis are now (1969) less than a million and Chinese are approximately 300,000.

Eighty percent of the people are Buddhists, but the vast majority of tribal people are animists. There are many Muslims, Hindus and Christians.

The total area of Burma is 67,792,000 hectares and of this 8,553,000 hectares are arable land and land under tree crops: 39,099,000 hectares are forested land; 7,807,000 hectares are unused but potentially productive land: and 12,338,000 hectares are built-up areas and waste land.

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[16] Two-Year Plan, 1948, p 1. (foreward). Also, U Thet Tun, op. cit. p. 1. (foreward)

[17] Ibid., p. 2.

About 60 percent of the working population is engaged in agriculture. Rice occupies two thirds of the cropped area with about 10 million acres; other major crops occupy only a bit over 3.192 million acres. The Government fixes prices, makes purchases, and markets the major agricultural products.

The total Gross National Product (GNP) at current prices in 1963 64 was K 7,674 million distributed as follows:

TABLE II

BURMA: GROSS NATIONAL PRODUCT, 1963-64

At Current Prices (million Kyats)*

Total Gross Domestic Product	7,674
Agriculture	1,789
Manufacturing	1,157
Trade	1,868
Mining	731
Forestry	351
Livestock and Fisheries	381
Others	1,397

SOURCE: Economic Survey of Burma, Rangoon, 1964, pt. I, Table I, p. 1., (adjusted and rearranged).

*One Burmese Kyat is equal to approximately 21 U.S. cents.

Fish are important in the Burmese diet and fisheries give employment to about 80,000 persons.

The more important minerals are: tin concentrates, tungsten concentrates, mixed tin and tungsten, lead ores and concentrates, zinc concentrates, iron ore, crude petroleum, and coal. Attempts are being made to expand the mining of precious stones and gems in North Burma. The entire petroleum industry and most of the mining industry have been nationalized.

Large-scale manufacturing in the private sector is reduced to less than 40 percent. Manufacturing consists of, mainly, the processing of agricultural products. Rice milling is the most important industry and accounts for about two-fifths of the manufacturing output. Other private-sector industries are mostly small-scale units, engaged in saw milling, food processing, bakery and confectionary products, oil and flour milling, brine salt, textiles and weaving and knitting, footwear and hosiery, and housewares. Cottage industries, using mostly family labor, produce textiles, furniture, cigars, and pottery.

The Government owns and operates four sugar mills, a cement plant, a steel mill, a cotton-weaving and spinning mill, a jute bag plant, the pharmaceutical industry, a canning factory, electronic works, a garment plant, brick and tile works, seven cigarette companies, and other enterprises. Only cement production seems to meet the domestic requirements at present.

The Government-owned railways operate 1,860 route miles of track, and move about 3 million tons of freight per year. There are about 9,000 miles of main and rural roads and registered vehicles at the end of 1962 totalled 44,660.

The Irrawaddy and Chindwin Rivers are the principal navigable rivers but timber is floated down to mills on the Sittang and Salween Rivers. About 1.20 million tons of freight were carried by the State Inland Waterways Transport Board in 1963-64. Private carriers, it is estimated, carry more than twice that amount of freight. Rangoon is the focus of all forms of transport. The State-owned Burma Five Star Line operates a small ocean fleet in overseas and coastal trade. Air transport is the monopoly of the Union of Burma Airways. Rangoon is served by several foreign airlines, and is the hub of the internal services.

There are 110 radio stations. Direct wireless telegraph links are available to Calcutta, Colombo, Dacca, Bangkok, Hong Kong, Shanghai, Osaka, and Manila. Overseas telephone communications are available to many countries. Telephone, telegraph, and radio are State monopolies. In 1967, there was no television in Burma.

The Government's Electricity Supply Board operates the electric system in all of Burma. For Rangoon, there is a separate system called the Rangoon Electric Supply. The Balu-Chaung hydroelectric power station (in Kayah State) accounts for 84,000 Kw out of a total installed capacity of 191,000 Kw for the country in 1967, and supplied 80 percent of the power needs for Rangoon. Two large steam stations (30,000 Kw and 20,000 Kw), numerous diesal stations and small hydroelectric stations comprise the balance of capacity in the production of electricity. A total of some 600 to 700 towns and villages were served by electricity in 1963-64. Of these, nearly half were in the hydro-grid area [18] The estimated consumption of electrical energy in 1963-64 in the Rangoon metropolitan area was 210 million Kwh, while in the rest of the country it was 71 million Kwh.

[18]Economic Survey of Burma, Rangoon, 1964, p. 56

According to an American view[19] there is little scope for private investment in the 'Burmese Way to Socialism'; the Nationalization Law of September 16, 1963 empowers the government to nationalize any enterprise on its own terms without recourse to courts. Future industrial development is reserved to the state and the government will take over all trade and distribution except small retail outlets in progress. The existing private enterprises are under pressure from material shortages, steeply progressive income tax, government pricing policies and other restrictions.

Foreign investment is being eliminated by nationalization. The only significant foreign investment remaining is British interest in the Anglo-Burma Tin Company, a joint venture with the Burmese Government; however, it is expected to be bought out soon. American interests own 49 percent of the partnership in this joint venture. There are no other known United States direct investments in Burma. New foreign investments are not allowed.

The total foreign loans and grants utilized by Burma, were estimated at $57 million in 1962-63.[20] They were $76 million in 1963-64, from the following sources: The US Agency for International Development $13.1 million; US Public Law 480, $5 million; Japanese Reparations, $24.2 million; Communist China, $16.8 million; International Bank for Reconstruction and Development, $5.2 million; West Germany, $3.8 million; U.S.S.R. and Czechoslovakia, $1.8 million each; Colombo Plan and U.N., $5.6 million.

Rice accounts for about one third of the Gross National Product, and rice exports amount to around one million tons. Nearly 70 percent of all export receipts arise from exports of rice and rice products. The principal customers for Burma's rice are Indonesia, India, Ceylon, Pakistan, Japan, Singapore, Malaya, and mainland China. Oilcakes, raw cotton, pulses, rubber, teak, jute, hides and skins, potatoes, maize, and base metals are other significant exports.

In recent years, Burma's foreign trade has shown a small balance in her favor. For example, in 1962-63, the level of exports was K 1,266 million while imports were valued at K 1,098 million. Exports to the United States are valued at about $1 million yearly. Items include mostly raw cotton, teak and tin. Imports consist of consumer goods (chiefly cotton textiles, dairy products, chemicals and pharmaceuticals) which account for nearly two thirds of the total. Japan is the principal supplier of imports, followed by the United Kingdom, mainland China, India and Pakistan. Machinery and transport equipment are the principal imports from the United States. Textile imports from the United States have fallen off sharply since 1960.

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[19] Overseas Business Rep., Dept Commerce. Washington, DC, Dec. 1963, p. 4

[20] Economic Survey of Burma, 1964.

Almost all external trade is nationalized. Raw materials for industrialists under individual import licenses are the only imports permitted to the private sector. The Government's boards and corporations meet their requirements by issuing open tenders, dealing directly with suppliers, and not through commission agents. Foreign exchange is strictly conserved and priority is given to only essential goods.

The Burmese Government has established a number of public enterprises which are responsible for providing the essential public utility services on which much of the economy of the country depends. These bodies are also concerned with earning most of the foreign exchange, the procurement and distribution of a large portion of imports, handling and executing most of the public development program, promoting new manufacturing and processing facilities, and encouraging and assisting private development in agriculture, mining, and industry. These enterprises range in functions from public utility to trading, economic development housing and banking and insurance.

They are listed below:

ARDC Agricultural Resources Development Corporation (later became the LRDC; see below)

CSED Central Statistical and Economics Department

CAB Civil Aviation Board

CSMB Civil Supplies Management Board

CDC Commerce Development Corporation

E&SB Economic and Social Board

ESB Electricity Supply Board

IDC Industrial Development Corporation

IWTB Inland Water Transport Board

LRDC Land Resources Development Corporation

MRDC Mineral Resources Development Corporation

MNP Ministry of National Planning

MEIC Myanma Export and Import Corporation

NHB National Housing Board

POI Peoples' Oil Industry (Formerly the Burmah Oil Company, Ltd)

PSC Peoples' Stores Corporation

PMDC Petroleum and Mineral Development Corporation

PRA Port of Rangoon Authority

RES Rangoon Electricity Supply

SAMB State Agricultural Marketing Board (later became the UBAMB; see below)

SCB State Commercial Bank

STB State Timber Board

UBAMB Union of Burma Agricultural Marketing Board

UBA Union of Burma Airways Board

UBRB Union of Burma Railway Board

UBS Union of Burma Shipping Board

Burmese-Chinese Relations

A brief mention may be made here of certain aspects of Burmese-Chinese relations. Contact between Burma and China is age-old and many cultural and religious traits in Burma are derived from China. But throughout their medieval and modern history the Burmans have demonstrated an independent attitude in their relations with China and have been conscious of their national individuality. The number of Chinese residents was never large until the beginning of the present century when immigrants from the Fukien and Kwangtung areas began to arrive by sea.

According to the Census of 1911 there were only 122,000 Chinese in Burma. By 1931, there were 193,594 and in 1941 the number had risen to 225,000. Their present number is estimated to be about 300,000. Burma-born Chinese numbered only 103,518. It is estimated that all but 20,000 Chinese continue to use their own language. The total number of Indians in 1941 was four times that of the Chinese.

In 1931 the distribution of Chinese was 86,144 in the Delta of the Irrawaddy and 12,000 in Moulmein. Forty-one percent were traders and merchants, 9 percent carpenters and metal and leather workers and 5 percent office workers. Chinese general merchandise shops were found in all cities and towns. They also held most of the opium and liquor licenses and ran the pawn shops. These latter occupations earned them the disfavor of the Burmans.

Although there were Sino-Burmese riots in 1931, the Chinese in Burma were generally regarded as next of kin and were preferred to Indo-Pakistanis for social and commercial contact. Today there are quite a number of Chinese headmen in the rural areas of the Tenasserim Coast. There are many intermarriages and many Chinese students attend Burmese schools but the Chinese people maintain their identity. All in all, one can say that the Chinese influence has been strong in Burma, but the Burmans have come to favor the imposition of reasonable restrictions on Chinese immigration into their country.

At the end of World War II, and the emergence of Burma as an independent country committed to the ideology of socialist reconstruction, the Burmese-Chinese relation took an interesting turn. The establishment of the Communist regime in China in 1949 installed a powerful socialist country across 1,300 miles of Burma's northern and eastern frontiers. Burma was the first non-Communist country to immediately recognize the new government and establish friendly relations. For many years Burma has been one of the leading proponents of Communist China's admission to the United Nations. The sensitive boundary questions also appeared to have been amicably settled. Though the Burmese-Chinese boundary had been surveyed in 1935, several unsettled stretches along the northern and eastern frontiers had been passed on to successor governments. A move for just and equitable settlement of these boundary questions was initiated by Premier U Nu in 1956 and was brought to a successful agreement by General Ne Win in 1960. This was followed by a lot of fanfare culminating in the Burma-China treaty of friendship and non-aggression.

The Burmese Government appeared to take its policy of non-alignment and neutrality seriously. Burma had accepted, from time to time, moderate amounts of foreign economic aid from the Western World as well as from the socialist countries. She agreed to accept $84 million in aid from China to set up some new industrial ventures and improve transport and communications. General Ne Win visited China and then went to the Soviet Union and Europe, and lastly to the United States in September 1966 on good-will missions stressing the non-aligned position of Burma. Thus in the international sphere, Burma seemed to get along amicably with adjoining China and yet raise no antagonisms with the Soviet Union or the United States. But due to the internal economic friction already described, the Chinese businessman shopkeeper, trader, and miner became an ever present cause of provocation to the volatile Burmans. The various nationalization measures of the Burmese Government had curbed the economic stake of the Chinese community.

In early 1967, it appears, the Chinese ethnic minority in Burma, largely concentrated in the urban areas had been emotionally and ideologically touched by the zeal of the youthful cultural revolutionaries in China Young students began to hold rallies and chant

ideas from Mao's little Red Book and demean Burmese authority. Banning the wearing of Mao Tse-tung badges and the singing of Chinese songs resulted in acts of civil disobedience by students who were then arrested. The trouble rose to a crescendo in June-July 1967 and the good relations between Burma and China were shattered in a few days. The Chinese Government warned the Burmese Government to watch its step and threatened to withdraw all economic aid. According to some newspaper reports[21] in the United States in the first week of July 1967, Peking denounced the Ne Win regime and made demands for apologies and restitution in terms that no sovereign government could accept.

These developments point out the pivotal importance of Burma in Southeast Asia. World attention is focused on the geography and strategic pattern of Southeast Asia, from Hong Kong to Rangoon. With the increased tempo of the war in Vietnam since 1965, the undefined attitude of mainland China, Burma has inevitably become one of the world's critical areas.

Burma's tropical climate, the abundance of sun and rain promote agriculture, but they also help to breed various parasites and microorganisms which infest much of the population, taking their toll in vitality and strength. Approximately one-eighth of the country's land is cultivated but a similar amount is potentially productive. If all available agricultural land is handled with care and foresight it should serve the needs of the future growth of population in Burma. The present population is approximately 26 million, with a density of no more than 100 persons to the square mile. Food is surplus, and there are resources of great potential in her fields, mines, and forests.

Modern industry is only beginning to find its feet in Burma and it is beset with many problems. Its growth and development need direction and planning in order to use the country's resources to the best advantage. The Gross National Product has been rising steadily. However, the annual income of the average Burmese family is still only about $87. Its purchasing power is much limited, and the family of the farmer lives mainly on a diet of rice, fish, and vegetables; this needs both augmentation and diversification.[22]

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[21] New York Times, Saturday, May 6, 1967, and Sunday July 9, 1967 (Weekly News Review). The Burmese-Chinese relations reached almost breaking point when on Oct. 30 the Chinese Government announced from Peking that $84 million Chinese Aid Mission Program negotiated in 1961 would end on Nov. 1, 1967. Some 390 experts would be withdrawn. The project included construction of factories for textiles, sugar, plywood and paper: irrigation projects, highways and bridges were being built (see New York Times Nov. 1, 1967).

[22] Union of Burma Nutrition Survey, Oct-Dec 1961, Washington, DC, p. 16.

Burma is a land of beauty and charm, but presents amazing contrasts. Classic Buddhism advocating peace and belief in Nirvana is professed, yet for years the country has been torn by internal strife; it produces abundant food, but some malnutrition is present; it is rich in resources, yet poverty exists; it is not a particularly active member of the international community, but one of its nationals, U Thant, keeps guard over the affairs of the United Nations as its Secretary General.

II HUMAN RESOURCES

It is estimated that the population of Burma in 1826 was no more than 4 million. In June 1966, the population of Burma[1] was estimated at about 25 and a quarter million, and the mid-1967 estimates raised the figure to 26.1 million (See Table III). The first census[2] took place in 1872 and thereafter, commencing with 1881, there were enumerations every ten years. The last complete census was the one in 1931, since most the data of the 1941 census were destroyed[3] during the Japanese invasion. A census was carried out in 252 towns in 1953, and also in over 2,000 village tracts in 1954 after seeking advice from the Director of the United States Bureau of the Census. Three volumes of data and information were prepared. But some parts of the country including the insurgent areas had little or no enumeration. Sample urban areas received more attention.

According to careful estimates, the annual rate of increase of population for the country as a whole is said to have been steady at 2.1 percent[4] since 1961. The population of some leading towns, as estimated in 1967, was: Rangoon, 1,530,434; Rangoon Metropolitan Area, 2 million; Mandalay, 322,000; and Moulmein, 190,000.

In 1966 the working population was estimated to be 10,093,000 or 74 percent of the total population aged between 15 and 59 years.[5] Of the working population, about 65 percent was employed in agriculture. It was also indicated that two-thirds of the population speaks Burmese, which is now the medium of instruction. English is taught as a compulsory second language in secondary schools. About 85 percent of the population is Buddhist by religion. About 15 percent of the population lives in towns. (See Table IV).

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[1] Quart. Econ. Rev., EIU, London Ann. Supp. 1967, p. 2.

[2] The main sources of the population statistics of Burma are Census of Burma, and Census of India Reports, Statistics of Registration of births and deaths, and Statistics of migration.

[3] Of the 1941 Census data, except for provisional total population figures by districts, all the statistical records were destroyed during the Japanese occupation.

[4] According to the UN Demographic Yearbook, 1963, Burma's rate of annual increase of population was 1.8 percent, i.e., among the lowest in Southeast Asia, but an increase of 2.1 percent is indicated by Quart. Econ., Rev., EIU, London, Ann., Supp., March 1965, p. 2.

[5] Quart. Econ., Rev, EIU, London, Ann., Supp., 1967, p. 2.

TABLE III

BURMA: POPULATION, 1826 to 1967 (Enumerated* or Estimated)
(in millions; approximately)

YEAR	POPULATION
1826	4.00
1891	7.72
1901	10.50
1911	12.11
1921	13.21
1931	14.68
1937	15.36
1941	16.82
1946	17.54
1948	18.01
1950	18.48
1952	19.25
1953	19.50
1954	20.02
1956	20.79
1958	21.55
1960	22.32
1962	23.25
1964	24.22
1965	24.73
1966	25.25
1967	26.10

* The Census years were: 1901, 1911, 1921, 1931, 1941, and 1953-1954 (partial). In recent years the rate of increase has been taken as approximately 2 percent per annum. Estimates are for mid-year.

SOURCE: Demographic Yearbook, UNO, 1965, Statistical Yearbook UNO, 1965, and other wellknown books and reference materials. See Bibliography.

TABLE IV

BURMA: EMPLOYMENT OF WORKING POPULATION, 1966
(in thousands)

Agriculture	6,636
Manufacturing	749
Trade	743
Government Services	330
Transportation	296
Other Services	183
Livestock and Fishing	150
Construction	111
Mining	52
Forestry	31
Power	10
Communications	9
Financial Institutions	5
Labor N.O.S.	888
Total	10,093

SOURCE: Report to the People by the Union of Burma Revolutionary Council. Also Quart. Econ. Rev., EIU, London, Ann. Supp., 1967, p. 2. See also Revised Govt. Budget Estimate, 1966-67, Table 2, p. 3.

Peoples and Races

Burma experienced a number of waves of migration from surrounding lands. There were three major migrations[6] in the past, namely Mon-Khmer, Tibeto-Burman peoples (the ancestors of Kachins and Chins) and the various tribal groups such as the Shans. A fourth incursion was experienced, commencing about the middle of the 19th century when many Indians and Chinese came to work and settled in Burma after the advent of British rule. The Indians came by the sea route and largely settled in the Irrawaddy Delta and along the Arakan Coast; they are now scattered over many parts of the country. The Chinese came to work in the mines of the Bawdwin-Namtu area, but later settled in many towns of Southern Burma.

As a result of these migrations, the tribal and racial groups are distributed over the country in an interesting manner. The predominant Burman[7] element, over nine and a half million in number, is spread over most parts of the central and southern Irrawaddy Valley, the delta and the Tenasserim area. The Karens are in large numbers east of the Sittang Valley and overspread into North Tenasserim, the delta and the southern Shan States; the Shans occupy the Shan Plateau, but also line in North Burma, Kayah, and Tenasserim areas. The Kachins and Nagas predominate in north and northwestern Burma respectively. The Chins and the Arakanese occupy the hills and coast of western Burma.

The proportion of various tribal and racial groups in accordance with the last detailed census of 1931 is shown in Table V.

Stevenson rightly remarked[8]: "As a result of this confusion of external and internal strife, search for empty spaces and the feuds among the kings and princes of ancient Burma, the whole country became a mass of small pockets of mutually hostile peoples, speaking languages which vary sometimes from village to village. Even within a single tribe there are groups having customs which differ in minor ways to a bewildering degree." Of course, much of this differentiation is due to variations in the physical environment, remoteness and isolation in different parts of Burma. Thus, tribal differences go hand in hand with regional and economic divergencies. The Burmese belong to many races and speak several languages. But most indigenous people are Mongolian in origin.

The Burmans are the most numerous as well as the most advanced group and generally occupy the fertile river valley lands. Religion occupies a large place in the life of the Burman Buddhists. The monastry is just outside the village walls. Every village has its pagoda, and there are thousands of old and new shrines which are subjects of worship and veneration. First among these is the magnificent Shwe Dagon Pagoda, towering high over the skyline of Rangoon.

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[6] Huke: Population: HRAF, Vol., I. p. 31.

[7] 'Burman' refers to the major racial and linguistic group, while 'Burmese' refers to the people of Burma as a whole.

[8] Stevenson: Burma Pamphlet, No. 6 1944, p. 3.

TABLE V

BURMA: POPULATION: 1931: TRIBAL AND RACIAL GROUPS

GROUPS	POPULATION
Burmans	9,627,196
Karens	1,367,673
Shans	1,037,406
Chins	348,994
Mon	336,728
Kachins	400,000
Palaung-Wa	176,382
Lolo-Muhso	93,224
Nagas	70,000
Indians	1,017,825
Chinese	193,594
Anglo Burmans	19,200
Anglo Indians	
Europeans	11,651

SOURCE: Census of India Reports, 1931, Vol. X, Part II.

The 1931 census report listed 126 native languages and dialects. There were 11 main language groups of which Burmans, Karens, and Shans constituted the major ones numerically. The Chinese, English, and Indian languages were much in use, but about 70 percent of the people spoke Burmese.

The Kachins number around half a million and occupy the complex hill and mountain area in northern Burma from the Dihing Valley on the border with Assam to the Burma-Yunnan border. In the south they spread into the Lashio area and Putao in the north is an important center of their activity.

The Kachin economy is essentially based on farming, hunting, and gathering Trade and craftsmanship play only a minor role. Most households, are selfsufficient units of production and consumption, except for very few items.

The basic crop is rice, grown by "swidden" farming on forested hillsides. The burned-over swidden is cultivated with a short-handled heavy hoe. Rice seed is planted with a planting stick and the crop reaped with a sickle or knife. Most other crops (maize, sesame, millet, tobacco, and pumpkins) are cultivated on the swidden. Rice cultivation begins in February and March when the swidden is cut and burned, and harvesting takes place in October. In swidden farming only rudimentary tools are used and no animal power is employed except in threshing. The Kachins usually do not use a swidden for more than three years in succession. But the rotation of fields does not require the shifting of settlements. A village may be moved only slightly in 40 years.[9]

The Shans are concentrated on the Shan plateau of eastern Burma, but there are scattered groups in Central and Lower Burma and a considerable number are found in north central Burma, chiefly north of 24°N latitude beyond the Wuntho area in a triangle enclosed by 24°N latitude and 96°E longitude and the Chindwin Valley on the west. They are also found southwest of Myitkyina and in the Bhamo district. Shan groups also settled north and south of Putao.

The Shans are primarily agriculturists and most of their settlements are in the lowlands and valleys. They carefully grow oranges, tea, coffee, tobacco and the tung tree. They are also excellent weavers of both cotton and silk, as well as being good silversmiths and blacksmiths.

There are thirty-two Shan states in Burma, covering a total area of 56,000 square miles. The ruling princes called "Saohpa" own the land and dominate their territories. The states vary in size and population, from tiny ones to large units.

With the Shans in their homeland live many other tribal groups who occupy different environments in the more hilly areas. Well known among these tribes are Inthas, Taungthus, Padaungs, Lisu, Lahus, Akhas, Lolos, and Palang-Wa. The Padaungs are interesting

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[9] Lebar and others: Ethnic Groups of Mainland Southeast Asia, New Haven, 1964, p. 13.

people whose home area borders on Karenni State and whose women wear numerous brass rings round their necks, giving them a giraffe-like appearance. The Lahus are among the most warlike of the peoples and wear dark blue clothes. The Palaung-Wa are found on the frontier between the Shan States and Yunnan, chiefly in the area known as the Wa States, an extremely hilly region bordered on the west by the Salween River. They are the most primitive of the tribal groups in Burma. There is some survival of the head-hunting custom, and skulls may be found placed along paths leading to their settlements. The Padaungs are closely related to the WA and are principally found in Tawnpeng State. There are also a considerable number of Kachins in the northern Shan States from the Shweh River in the west to the Salween Valley in the east.

The Nagas are generally considered to be tribal peoples of Indo-Mongoloid origin inhabiting the hill and mountain region of the India-Burma frontier. The word Naga itself refers to their mountain habitat namely, the hill people.[10] The majority of the Naga tribes are concentrated in the newly created Indian State of Nagaland across the Burmese border, but a number of tribes live within the territory of Burma. The Burmese group of Naga consists of such tribes as the Htangan, Pyengoo, Haimi and Rangpan. The Nagas are an important element among the tribal and hill people of Burma, numbering about 75,000 in 1941. Their area extends from the Patkoi Range southward and the Chindwin River generally marks the eastern limit of their area. Often a single tribe may have several different dialects, each quite distinct from the other.[11] The Nagas are adventurous and warlike, and are often restless. On the Indian side, conditions in the Nagaland have been disturbed since independence. The Nagas on the Burmese side pose a potential threat to peace and tranquility.

The Naga villages are characteristically situated on the hill summits or on spurs running off from the high ranges, about 3,000 to 4,000 feet above sea level. Locations of settlements are dictated by defense and security considerations. They are usually surrounded by barricades and fences. Nagas generally practice shifting cultivation called "jhum," but their villages are permanent. In spite of much burning of the forest, a good deal of the area is densely forested, but the main basis of the economy of the Nagas is swidden agriculture with rice, taro, maize, millet, chillies, tobacco, and cotton. Hunting, fishing and gathering are secondary occupations.

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[10] Lebar and others: Ethnic Groups of Mainland Southeast Asia, 1964, p. 44.

[11] Ibid., p. 45

The Chins may be divided into northern and southern groups divided at approximately 21°45'N lat. Most of them live in the Chin Special Division and number approximately half a million. The 1931 census of India listed 44 Chin groups with a population of 344,000. Chins live in the Arakan Range up to about 18°N lat. They are almost wholly hill people and their settlements are generally found between 3,000 and 7,000 feet above sea level Some Chin groups locate their villages on hilltops or spurs, while others prefer sites high on slopes of a ridge but below its summit. Settlements range from large concentrated villages of the Lushai Chin to the scattered and somewhat isolated houses of the Chins in Manipur. Their economy is largely based upon swidden farming, slash-and-burn practices, and tilling with hoe. The best fields among the northern Chins are used for three or four years, and lie fallow seven to nine years Poorer plots are cultivated only for a year. Most of the southern groups use a swidden (taungya) for one year with a 12-year fallow period.

The Burmese generic term, equivalent to the English word "Karen" is KAYIN. From this comes KAYIN-NI (Red Karen),whence the English "Karenni" or "Red Karens." Since 1948, the Burmese designate them as KAYA or KAYAH and by common consent, the Kayah State came into existence within the framework of the Union of Burma. The "Pwo Karens" live mainly in the Irrawaddy Delta and are called Talaing Karens, or Mon Karens, by the Burmans. Many of them live around Bassein and in villages stretching from Henzada to Bassein. The "Sgaws" are sometimes called Burmese-Karens, or "Bama Kayin." Another quite large group is the Pa-O who mostly keep to the hills around Toungoo and in Kayah State. The hill Karens tend to build their villages away from the main tracks.

The Karens are numerically second only to the Burmans in Burma. In 1931, their number was 1,367,673. The majority of Burmese Karens live in the Central Irrawaddy Delta, and in the northern end of Tenasserim at the head of the Gulf of Martaban. But the Karen heartland is the Kayah State between the Shan area and the lower Sittang Valley. From this area of concentration they spread over into Thailand, the Shan States, Tenasserim, and the delta lowlands of Burma. The majority of Karens are Buddhists, but one quarter of "Sgaw" Karens are Christians (largely Baptist) mainly due to the efforts of the American Baptist Mission which started religious work among the Karens soon after the First Burmese War (1824-26). About 8 percent of the Karens are pagans or animists.

Mons are found only in Burma and Thailand According to the census of 1931, about 97 percent of the Mons in Burma were found in the northern part of the Tenasserim panhandle, though there are scattered villages around the head of the Gulf of Martaban as far as Bassein in the west. The district of Amherst has the heaviest concentration of Mon population and Moulmein and Thaton are notable centers of Mon culture. In 1931 the Mon numbered 336,728. (See Table XIX for population of tribal and racial groups).

Religion

Religion has great significance to all the tribal peoples. In the hills of Burma the basis of religion is a combination of supernaturalism, ancestor worship, and animism. In most parts of the Shan States, Buddhism has taken root, especially among the Shans and Palaungs, but everywhere it is superimposed upon animism and has not entirely replaced it. The Christian missionaries have been active for more than a hundred years and have succeeded in converting about 300,000 persons to their faith, but Christianity in Burma is heavily dyed with the hue of local and tribal custom. Stevenson rightly remarks, "The ritual of Animist sacrifice may have in it some element of the comic in western eyes, but it is a serious matter for true believers and is deserving of a corresponding respect. The Animist regards a number of Christian observances as equally odd, but he may be polite to keep it to himself."[12]

The distribution by religions in 1931 is given in Table VI. This shows the outstandingly Buddhist character of the Burmese population.

Since the census of 1931, the numbers of all religious and racial groups have increased in proportion to their strength at the last census, except the Indians, Anglo-Burmese and Europeans, large numbers of whom left Burma during and after the last war.

TABLE VI

BURMA: POPULATION OF RELIGIOUS GROUPS, 1931

RELIGIOUS GROUPS	POPULATION
Buddhists	12,348,037
Animists	763,243
Muslims	584,839
Hindus	570,953
Christians	331,106
Others	49,319
Total	14,667,146

SOURCE: Census of India Reports 1931, Vol. X, Part II.

[12] Stevenson, op. cit.

According to reports from London[13] in 1964, the exodus of Indians (and Pakistanis) continued unabated. By July 1964, the rate of departures was about 1,000 by air and some 1,500 by ship every week. During the first six months of 1964, nearly 10,000 foreigners left Burma for good and among them there were 7,209 Indians and 2,090 Pakistanis. In 1963 the foreigners who left numbered 8,344, and it was expected that by the end of 1964 about 50,000 Indians and Pakistanis would leave. It was also estimated that by the end of 1965 almost 100,000 people would have left.[14]

Distribution of Population

A statistical and, to a considerable extent, sociological basis for a more exact study of the distribution of population in Burma is lacking. The normal census operations in several developing countries during the last three decades have furnished reasonably good results for sorting out and systematizing demographic and economic information upon which fair assessments can be made, and trends and tendencies may be forecast concerning national development. In Burma, unfortunately, the march of events has prevented the organization of full and complete census operations since Independence in 1948.

Therefore, it is the census of 1931 to which one must turn for the basic information although annually projections and estimates of a demographic nature are made, this brief discussion uses the figures of the 1931 and 1941 censuses.

Fifteen percent of Burma's population is in urban areas. Approximately 90 percent of the farm land is under food crops and about 60 percent of it is devoted to paddy (rice) cultivation. The best farm lands are in the riverine plains, irrigated tracts, and some coastal areas. These lands lie mainly in the Middle and Lower Irrawaddy and Sittang Valleys and along some parts of the Arakan Coast; they are also the areas of the heaviest densities of population. Next come the marginal areas of the Dry Zone, the Middle Irrawaddy Valley and Northern Tenasserim. The Shan Plateau, lower Tenasserim and margins of forested areas in the Irrawaddy and Sittang Valleys come next. The smallest number of Burma's inhabitants dwell in the mountainous fringes on the west, north, east and south. In general, where agricultural land use is less intensive and geographical barriers harsh, the population is sparse.[15]

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[13] Quart. Econ. Rev. EIU, London, No. 47, September 1964, p. 2.

[14] Ibid.

[15] HUKE. Population of Burma. HRAF, 1956 p 82.

At the time of Independence, almost half of the total population of Burma lived in the three southern political Divisions of Pegu, Irrawaddy, and Tenasserim. With the addition of the Mandalay and Magwe Divisions to this population, the total would be about 70 percent of the entire population. The Pegu Division, which includes Rangoon, was the most urbanized of the divisions,[16] with 33.8 percent of the population. It was followed by Mandalay (18.5), Tenasserim (15.5), and Irrawaddy (12.6). The political units with the most people were not always the most densely populated (See Table VII). This pattern of distribution prevails even today though numbers have increased and minor changes may have taken place (See Map No. 9).

The overall density for the country in 1967 was around 104 persons per square mile, but both the geographical and economic contrasts in Burma are so profound that this measure of density becomes, even in a general way, somewhat unrealistic. Of the eleven districts, largely consisting of the Irrawaddy-Sittang Delta, in 1941, no districts had a density of less than 140 persons per square mile, when the density for the whole country was only 64. Areas with density below 30 included large parts of Tenasserim, the Kayah and Shan States, the whole of northern Burma, and most of the western and Arakan highlands. Vast areas in North Burma and remote parts of the eastern Shan States have a density of less than 10 persons per square mile.

At the other end of the scale there were at least six Districts in the delta and the Dry Zone which had density above 200 persons per square mile. The Rangoon urban area, in 1941, showed a density of 5,892 persons per square mile (See Map No. 9). The districts with high density are shown in Table VIII.

It is quite obvious that the delta districts have been areas of most rapid growth of population in recent decades. They are the best rice lands in the country, farms are still moderately large by Asian standards[17] and there is still considerable possibility of bringing new lands under the plough. Several valley lands of North Burma with prospects of crop raising are likely to open out avenues of settlement with the future increase of Burma's population.

Urbanization

Urban growth is often a yardstick to measure the degree of economic advance. This may be more true of the developed countries of the world, but even elsewhere it is a fair indication of economic activity around modern industry and developing forms of economic and social organization. Burma provides an interesting example of this world-wide phenomenon.

[16] 1941 census figures available have been used as statistical basis.

[17] Huke, op. cit.

TABLE VII

BURMA: DENSITY, AREA AND POPULATION OF DIVISIONS AND DISTRICTS

1941

Divisions and Districts	Area in Square Miles	Population	Density Per Sq. Mile
Arakan Division	17,422	1,186,738	70
Akyab District	5,252	760,705	145
Arakan Hill Tracts	3,228	34,005	11
Kyaulpya District	4,793	252,281	53
Sandoway District	4,149	139,747	34
Pegu Division	20,221	3,436,107	172
Rangoon Town District	85	500,000	5,892
Pegu District	4,114	582,959	142
Tharawaddy District	2,782	593,909	213
Hanthawaddy District	1,927	459,522	238
Insein District	1,903	387,345	204
Prome District	2 953	436,714	148
Toungoo District	6,457	474,858	74
Irrawaddy Division	13,580	2,659,126	205
Bassein District	4,149	664,724	160
Henzada District	2,809	693,271	248
Myaungmya District	2,835	488,031	172
Maubin District	1,642	428,092	261
Pyapon District	2,145	385,008	179
Tenasserim Division	31,588	1,635,562	53
Salween District	2,577	56,878	22
Thaton District	4 872	592,638	122
Amherst District	7,410	593,490	80
Tavoy District	5,404	211,729	39
Mergui District	11,325	180,827*	16
Magwe Division	27,977	1,905,809	71
Thayetmyo District	4,626	297,434	64
Minbu District	3,602	302,373	84
Magwe District	3,724	559,926	150
Pakokku District	3,724	559,671	105
Chin Hills	10,675	186,405	17
Mandalay Division	12,494	1,907,703	160
Mandalay District	2,113	408,926	194
Kyaukse District	1,241	152,506	123
Meiktila District	2,232	344,025	154
Myingyan District	2,707	539,057	190
Yamethin District	4,201	463,189	110

TABLE VII - Continued

Divisions and Districts	Area in Square Miles	Population	Density Per Sq. Mile
Sagaing Division	72,911	2,322,675	32
Bhamo District	4,180	129,302	30
Myitkyina District	29,723	298,323	10
Shwebo District	7,605	496,185	87
Sagaing District	1,870	387,270	207
Katha District	5,723	290,990	38
Lower Chindwin District	3,676	427,340	116
Upper Chindwin District	10,599	209,575	20
Shan States			
Eastern States	65,596	1,770,078	3
Northern Shan States	------	689,877	28
Wa States	24,682	82,641	4
Southern Shan States	36,408	927,094	25
Karenni	4,506	70,493	16
Burma Total	261,789	16,823,798	64

SOURCE: Burma, HRAF, Vol. I, pp. 85-86 (revised and adjusted).

TABLE VIII

BURMA: DISTRICTS WITH HIGH DENSITY OF POPULATION

1941

Districts	Density (per sq. mile)	Area (sq. miles)	Population
Rangoon	5,892	85	500,800
Maubin	261	1,642	428,092
Henzada	248	2,809	693,271
Hanthawaddy	238	1,927	459,522
Tharawaddy	213	2,782	593,909
Sagaing	207	1,870	387,270
Insein	204	1,903	539,057
Mandalay	194	2,113	387,345
Myingyan	190	2,707	408,926
Pyapon	179	2,145	385,008
Myaungmya	172	2,835	488,031
Bassein	160	4,149	664,724
Meiktila	154	2,232	344,025
Magwe	150	3,724	559,926

SOURCE. Census of Burma Reports, 1941.

A striking feature of recent growth and movement of population in many of the developing countries of Southeast Asia is the trend towards urbanization, although the urban sector of the population in these areas is still small as compared with the rural segment. In recent years, it has increased at a rate twice that of the overall population growth. Moreover, the cities and towns which were already the largest have tended to grow fastest of all, frequently creating serious regional disequilibrium.

The rural out-migration represents significant proportions of influx into the urban areas. Both the pull and the push factors operate in promoting urban overcrowding and exert pressure on the already inadequate housing and other services. It leads to considerable urban unemployment, replacing traditional rural under-employment and many social problems are created in the newly inflated urban areas. This demographic revolution must be considered in schemes of national development and planning.

A study of the distribution of population in Burma reveals that on the whole, urbanization proceeded slowly until 1931. The process was the slowest in the central and northern parts of the country, while the growth and size of the urban area of Rangoon was the most significant feature of the demographic picture.

Between 1921 and 1941 the proportion of the total urban population was somewhat constant at 6.4 percent. There has been a marked increase in the urban population since 1941. In spite of war and political confusion during 1941-53 the growth was about 8 percent. Rangoon grew rapidly, and by 1966 it was estimated to have between 20 and 25 percent of the total urban population of Burma.

TOWNS:

The small urban population of Burma is reflected in the number of towns listed in each census year since the turn of the century. (See Table IX.) By 1931 the larger district towns had started gaining considerably. This tendency was clearly revealed in the enumeration of urban population in 1953. That census named 252 towns with a total population of 2,940,704. Of these, the five largest towns were Rangoon (737,079); Mandalay (185,867); Moulmein (102,777); Bassein (77,905); Henzada (61,972).

Rangoon's situation at the southern edge of the high ground merging into the slopes of the Pegu Yoma in the north, and a wide water frontage in the south makes it a convenient point for transport and communications. The Hlaing River, on which the city stands; is connected by means of navigable creeks and canals with both the Irrawaddy water system in the west and the Pegu and Sittang Rivers in the east. Its port, 26 miles from the sea on a navigable river,

TABLE IX

BURMA: POPULATIONS OF 28 LARGER DISTRICT HEADQUARTERS TOWNS,*

1931, 1941, 1953

Towns	1931	1941	1953	Per cent Increase 1931 to 1941	Per cent Increase 1941 to 195?
1. Rangoon	398,967	500,800	711,520	25.5	42.1
2. Mandalay	147,932	163,243	182,367	10.4	11.7
3. Moulmein	65,506	71,181	101,720	8.7	39.6
4. Bassein	45,662	50,277	77,382	10.1	53.9
5. Akyab	38,094	48,492	41,589	27.3	-14.2
6. Tavoy	29,018	32,964	40,066	13.6	21.5
7. Henzada	28,542	31,114	60,666	9.0	95.0
8. Prome	28,295	31,114	36,762	10.1	18.0
9. Insein	20,487	27,491	28,672	34.2	4.3
10. Myingyan	25,457	26,895	36,439	5.6	35.5
11. Pegu	21,712	26,234	45,941	20.8	75.1
12. Toungoo	23,223	25,960	31,180	11.8	20.1
13. Pakokku	23,115	23,558	29,824	1.9	26.6
14. Mergui	20,405	23,074	33,578	13.1	45.6
15. Thaton	16,851	18,820	37,981	11.7	101.8
16. Pyapon	12,338	15,501	19,180	25.6	23.7
17. Sageing	14,127	13,631	15,382	-3.5	12.8
18. Shwebo	11,286	13,590	17,827	20.4	31.2
19. Monywa	10,800	13,414	26,279	24.2	95.9
20. Meiktila	9,195	12,321	19,474	34.0	58.5
21. Thayetmyo	9,279	11,847	11,679	27.7	-1.4
22. Yamethin	9,291	10,126	11,167	9.0	10.3
23. Myaungmya	7,773	10,066	24,252	29.5	140.9
24. Maubin	8,897	9,637	23,442	8.3	143.2
25. Magwe	8,209	9,353	12,229	13.9	30.7
26. Tharawaddy	7,131	8,326	7,637	16.8	-8.3
27. Kyaukse	7,353	8,117	8,668	10.4	6.8
28. Minbu	6,005	6,404	9,093	6.6	42.0
Total	1,054,950	1,243,580	1,702,005	17.9	36.7

*According to the complete data of the 1931 census, the first 14 towns were the largest towns in Burma at that time. The others ranked from 16th to 68th in size.

SOURCE: KTA, 1953, Vol, I, p. 17. Also see various census reports.

is the doorway to international contact. The convergence of waterways and the country's rail and road system give it a nodal position and make it the focal point of Burmese life.

The central part of the city, between the railway and the river, was laid out in a rectangular form after 1852. To the north of the town there remained many wide open spaces. The entire urban area is dominated by the great gilded mass of the celebrated Shwe-dagon Pagoda, one of the noblest structures in Burma, perched on its prominent lakeside hill. Across the Pegu River is the important oil refinery of Syriam, lying north of the oil storage points of Seikgyi and Thilawa. Along the adjoining creeks are located large rice mills, and the big dockyard of Dalla lies across the river opposite the wharves and jetties of the Rangoon port.

The population of Rangoon in 1931 was 400,000 (of which 3/5 was of Indian origin). In 1941 the population was 500,800, and in 1963 it rose to 821,800. The estimates in the middle of 1967 placed its population, including the Metropolitan area, at around 2 million.[16]

In the small towns, and even in some of the larger ones, the center of the town or the urban core area is fairly well distinguishable. It is the busiest center of activity with the best retail shopping, eating houses, district or sub-divisional offices of government, the courts, police headquarters, often the railroad station or central bus stop, college or high school, hospital and a crowded bazaar. The streets are paved and better lighted, and local amusement places are also found there. Around this core and emanating from it, run formless streets with crowded housing and occasional kyaungs (Buddhist monasteries) and small rice mills. Generally, a little removed from this conglomeration of urban activity in a distinct suburb, there are better teak bungalows where the local officials and some prosperous members of the community live. The modernity that is found in towns like Rangoon and Maymyo, which reflect western influences, is not typical of Burmese towns. Indeed, the dividing line between the large overgrown village and a small town is hard to draw. Muncipal regulations often promote villages into the urban category, but their gamut of life remains a mixture of rural and urban functions.

The Burmese towns may be classified into: (1) The large cities with multiple functions like Rangoon and Mandalay; (2) sea ports like Moulmein Akyab, Bassein, and Tavoy; (3) river ports like Prome, Magwe, Myingyan, Bhamo, Henzada, and Pegu; (4) centers for the collection of local agricultural produce, sometimes with a few industries such as oil presses, rice mills, and cotton gins like Pyinmana and Myingyan; (5) towns with large new industrial enterprises like Thayetmyo and Bilin; (6) oilfield towns like Chauk and Minbu; (7) mining towns like Mawchi, Mogok, and Mogaung; (8) railroad junctions

[16]Quart.

and road and river transport centers like Toungoo, Pyinmana, Henzada, and Meiktila; (9) airports and strategic points like Myitkyina, Monywa, and Bhamo; (10) administrative division or district headquarters; (11) hill-stations like Maymyo, Taunggyi; and (12) historical and religious centers like Pagan, Thaton, and Pegu.

Burmese villages in the plains are rather large; it is a land of nucleated villages, not of dispersed farmsteads. Topography and the needs of the community are largely responsible for this. For example, settlements tend to group around water points in the Dry Zone, and on leaves, embankments, and raised ground in the delta. Security and defense requirements also cause people to group together. At harvest time, temporary huts are built near the fields.

The village, generally, has an irregular pattern. The betelvine gardens, vegetable patches and gourds are planted along the paths and tracks radiating out of the village. The hamlets consist of platform houses, half verandah and half rooms, built on stakes. They are thatched with "dhani" (palm leaves); and the walls are woven with long strips of bamboo, often of different shades, to make a basket-work pattern. The habitations are surrounded with many trees to ensure privacy. If there is a banyan tree, it is used to shelter a little shrine which is decked with candles and flowers. Often a white-washed pagoda and a "pongyi-kyaung" (Buddhist monastery), are also to be found in the settlement.

In these nucleated villages of the rural areas, the civil head of the village is the "Thugyi," or headman. who is chosen by the community and is recognized by the central government. The spiritual head of the village is the "Hpoongi." The system of holding village markets during the week on fixed days is quite common.

The Upper Burma villages are surrounded by bamboo fences with a gate; each house separated from the other by a cactus hedge or a bamboo fence. In Lower Burma, the villages are not fenced.

PART TWO

III. THE PHYSICAL SETTING

The physical geography of Burma is closely related to the main geological sequences in the area. These may be described briefly.

The oldest rocks lie in the Shan States, where molten material consolidated to form Archaean Gneisses. Later on, the Shan area was submerged under advancing seas. The seas receded and then again overran the area. Towards the late Mesozoic Era, though Burma proper was still submerged, the sea receded from the Shan Plateau and perhaps its western edge formed the coastline. Probably the whole area of the plateau, with the exception of some lake basins, has been above water since that time.

In late Mesozoic times, the Arakan Yoma with its northern continuation appears to have been uplifted in the form of a low, narrow island. The upheaval of the Arakan Yomas continued in three different phases which were contemporaneous with the major Alpine-Himalayan movements during the Tertiary Period. Towards the end of the Tertiary Period, the uplift of the Pegu Yoma took place and geologically they constitute the youngest mountains of Burma.

Finally, the area of Central Burma lying between the Shan Plateau in the east and the Arakan Yoma in the west came into existence. This part is roughly comprised by the basins of the Chindwin, Irrawaddy, and Sittang rivers. The uplift of the Arakan Yoma divided the sea into two gulfs one comprising the central belt of Burma, known as the Burmese Gulf, and the other on the west, called the Assamese Gulf. Both these gulfs were eventually filled with river-borne sediments from the north and marine deposits from the south, mainly by fresh water deposits. Thus generally speaking, it can be said that there has been a gradual movement southwards of deltaic conditions and a consequent retreat of the sea towards the south. In the final Tertiary epoch, the Irrawaddian sedimentation was entirely fluviatile. It is generally accepted that the Irrawaddian sediments were deposited by a river which was considerably larger than the present Chindwin-Irrawaddy and which may at that time have been continuous with the Tsang-po of Tibet.[1] The gradual filling of the trough was interrupted at intervals by lateral movements of folding. These movements resulted in the steady uplift of the Arakan Yoma and, at a somewhat later stage, of the Pegu Yoma.

Marine conditions gradually penetrated further north. Therefore, it was in these two gulfs that the oil-bearing deposits of Central Burma, the Arakan Coast, and Assam were laid down. The gulfs were succeeded by rivers and their sediments were also folded in the course

[1] Pascoe: Manual of the Geology of India, p. 56.

of time by continued movements. Large parts of Central Burma were covered by volcanic ashe which give origin to the red earth deposits. It may be noted that these red earth deposits as well as the Quaternary silt and some of the sandy loams of the Irrawaddy tract have produced the soils which give fertility to the Irrawaddy Valley.

Volcanic activity has been a significant part of the geological sequences in Burma. There is considerable evidence of it in the Shan Plateau, the Mergui Archipelago, Thaton district of Lower Burma, the Mount Popa area of the Pegu Yoma, the Mount Loimye Complex in the Kachin Hills, the Hukawng Valley area, the Lower Chindwin region and the Arakan Yoma volcanic line. Burma offers an excellent record of volcanic activity during both the early and later parts of the Earth's history.

Hot springs are usually associated with the later stages of volcanic activity. They are said to occur all over Burma including many parts of the Shan States. In some places, the temperature reaches within 10 or 12 degrees of the boiling point. The pools are filled with grey mud, and no distinct openings are visible on the surface, though bubbles and steam rise continuously from the bottom. There is frequently a strong smell of sulphuretted hydrogen. The water is usually highly charged with salts, the principal ones being sulphate of lime and sulphate of magnesia. Traces of alkali, chiefly potash, also occur.

Except the geologically old area of the Shan Plateau, most of Burma is structurally of younger origin and has been subjected to successive and intense tectonic stresses, and it is apparent that the area has not attained a final state of equilibrium. There is frequent occurrence of earthquakes.

Burma has an interesting area of mud volcanoes bordering either side of the Arakan Yoma. These mud volcanoes have very little to do with volcanic activity. They owe their origin to escaping gas associated with petroliferous strata. The extrusions of mud, etc., are brought about by pressure of lighter petroleum hydrocarbons along a line of weakness in the strata. Owing to faulting or accidental fissuring, the pressure is relieved and the gasses breaking through the remaining superimposed strata form a mud volcano. The majority of vents show a temperature between 75° and 82° F. Thus the temperature is much lower than that recorded in any of the pitwells in the Yenaungyaung oil field. This shows that the source of the mud is close to the surface.[2] The eastern coast of the Bay of Bengal and the islands fringing it from Chittagong to Cape Negrais are subject to these outbursts. With the escape of some oil and gas these cones of mud are formed to become a part of the natural scenery.

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[2] Chhibber: Geology of Burma, p. 85.

The mud volcanoes on the eastern side of the Arakan Yoma include those of the Minbu, Prome, and Henzada Districts. Some are also in the Lower Chindwin district. Those on the western flanks of the Arakan Yoma are well-known for their violent activity and magnitude of eruptions. The prominent ones are in the Ramree, Cheduba, and other smaller adjacent islands in the Kyaukpyu and Sandoway Districts.

Mud volcanoes are of two types: quiet ones in which blue mud comes out along with the escaping gas; and violent or paroxysmal ones where the ejected material, including broken fragments of the rock, is thrown to considerable heights with great force.

The eruptions of the mud volcanoes produce, besides gas (marsh gas with petroleum hydrocarbons) and mud, a small quantity of petroleum, as well as saline matter which consists chiefly of common salt with sodium and calcium sulphates. The angular fragments of rock which are ejected in forceful eruptions, vary from half an inch or less to 4 or 6 inches in diameter, while sometimes even stones of half a cubic foot come out.

These volcanoes seem to be more active during the rains. This may be due to the accumulation of water, which exerts great pressure on the gas. It has also been shown that there is an intimate connection between the Ramree mud volcanoes and seismic disturbances.

Physiographic Divisions

Elevations (hypsography) and physiographic regions are shown in maps 3 and 4, respectively. Broad physiographic divisions are generally made on the basis of structure, while the superimposition of climatic condsiderations makes further subdivisions possible. Geologists who have studied the area suggest the following five divisions:[3]

1) Shan Plateau

2) Central Belt: Covering roughly the basin of the Lower Irrawaddy and its tributary, the Chindwin, and the basin of the Sittang and the Tertiary area of Pegu Yoma.

3) The folded ranges of the Arakan Yoma, Chin, Naga, and Manipur Hills and the Lushai and Patkai Hills in the north.

4) The coastal strips of Arakan and Tenasserim.

5) Hills and Ridges of the Tenasserim.

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[3] Chhibber: Physiography of Burma, pp 1-4. Also Chhibber: Geology of Burma, pp 1-9. Stamp: Outline of Tertiary Geology of Burma: Geog. Mag. Nov 1922, pp 481-501. Hellmut de Terra: Component Geographic Factors of Natural Regions of Burma: Ann. Asoc. Am. Geog. Vol XXXIV, No. 2, 1944. Also views of other authorities on the geology of Burma. (See Bibliography)

Shan Plateau. This feature dominates the eastern part of Burma. It is a region of highly folded rocks, with the ridges on the plateau running north and south. The plateau continues south through Karenni and Tenasserim.

There is an almost continuous vegetation-covered scarp running from north to south, forming the western edge of the Shan Plateau, which in many places is some 2000 feet above the Central Valley.

The youngest rocks involved in the folding of the plateau belong to the Cretaceous Period. The strata are intensely folded in a north-south direction and, as a result, the hills and valleys have an almost parallel arrangement. After the Jurassic Period, it appears that the Shan Plateau formed a land mass with many lakes occupying the hollows on the surface; the shrunken remnants of one of these water bodies is the present-day Inle Lake.

The surface of the Shan Plateau is for the most part undulating and dissected and the mountains rise gently from the surface of the plateau, the highest, Loi Ling, rising to 8,771 feet above sea level. The general elevation of the Shan Plateau is from 3,000 to 4,000 feet. A large area is composed of limestone into which the rivers have cut deep gorges such as the famous Gokteik Gorge. The two well-known Hill Stations, Kalaw and Maymyo, are situated amidst beautiful scenery of open plains, rounded and oval basins, each separated from its neighbors by rough mountain ridges. A continous and prominent through on the eastern side is occupied by the Salween River.

The physical geography of the area hinders rather than helps political and cultural unity. As most of the river valleys between the north-south ridges run longitudinally, transverse communications are made difficult. In fact, most of the dirt roads and tracks follow the north-south valleys. The only trunk road across the central part of the Shan area, from Thazi near the western edge via Kalaw, Shwenyaung, Taunggyi, Loilem, Namsang, Kunming, Ta-Kaw (on the Salween River) and Keng-Tung, goes up and down valleys all the way to the east. Physiographic problems hinder the development of road communications with China, Laos, and Thailand. Air transportation seems to be the answer for civil uses as well as military logistics.

Both the northern and southern parts of the plateau are mineralized, and this is of great consequence to the development of the economic resources of Burma.

Central Belt: Lower Irrawaddy, Chindwin, and Sittang Valleys. According to some geologists,[4] the large central area of Burma from the Upper Irrawaddy to the Delta region was for a considerable time during the Tertiary Period the "Burmese Gulf" between the Arakan Yomas and the Shan Plateau. After a prolonged period of silting, the lower course of the Irrawaddy extended into this area. The chief rocks are sandstone and clays. Due to later stresses and earth movements, they were thrown into anticlinal and synclinal folds, and this is emphasized in the mass of hills forming the Pegu Yoma in the middle of the belt. The valleys of the Irrawaddy and the Sittang Rivers and their delta areas are filled with recent sedimentary material and alluvium.

The Pegu Yoma separate the Lower Irrawaddy and Sittang Valleys and are the youngest mountains in Burma. Directly to the north are the Mingin Range and the Singpho hills. The far southern edge of the Pegu Yoma is marked by the ridge on which stands the Shwe Dagon Pagoda of Rangoon. Mount Popa, a volcanic cone at their northernmost extremity, rises to 5,000 feet above sea level.

Folded Ranges. The two sides of Burma's mountain box are constituted by the Arakan Yoma and associated highlands farther north on the west, and by the Shan Plateau on the east. A strong back is formed by the highlands of Northern Burma.

The Himalayas swing to the south in northeastern Burma and many highlands branch off from them. These hill ranges are the Patkai, Naga, Manipur, Letha, Lushai and Chin Hills, all of which merge into the Range of the Arakan Yoma which runs to the south almost to the vicinity of Cape Negrais The extreme north of Burma, has a tangle of hills and mountains which cuts off the country from China and India. These wild and imperfectly surveyed highland areas afford passes into Tibet and China, like Namni Diphu, Izu, Razi, Talu, Thala Hpimaw Hkyet, Kauliang Hkyet, and others. Some of these passes are at elevations of over 19,000 feet and many of their peaks are still unnamed The highest peak in Southeast Asia, Hkakabo Rizi, rising to 19,296 feet, lies in this area. The head streams of the Irrawaddy, the Nmai Hka and Mali Hka, tumble down the southern ridges and valleys of these magnificent ranges in the Myitkyina District.

The Kumon Range south of the Chaukan Pass stretches south to the vicinity of Mogaung. The Mingin Loipyet, Gangen and Kankkwe Ranges run to the south like the fingers of an open hand. Southward, the Sagaing Hills cover the Shwebo and Katha Districts. In the Katha District, west of Wuntho, large areas are covered with volcanic and other igneous rocks The Mingin Range, lying mainly on the borders of the Shwebo and upper Chindwin Districts, has the highest volcanic mountain in Burma, Taungthonlon, rising to 5,600 feet above sea level. West of the Mingin Range is the comparatively lower Zibyun Range. East of the Irrawaddy, in the districts of Myitkyina and Bhamo, there

[4]Chhibber: Physiography of Burma, p. 2.

is a maze of hills with elevations ranging from 3,000 to 11,000 feet above sea level. Southward, these hills merge into the Shan Plateau.

The Arakan Yoma form an arc with the convex side facing the Bay of Bengal. The system narrows to the south, until the range almost disappears, leaving reefs and detached rocks stretching out to sea. All parts of the range were not fully known till the time of World War II, and the surveys in many parts were imperfect. Though knowledge of these highlands has grown, in the years since independence, some gaps in information still exist.

The Arakan Yoma have a maximum breadth of about 150 miles in the north, and the total length of the system is approximately 700 miles. The highest point is said to be the Saramati Peak which rises to 12,663 feet above sea level, close to the Burma-Assam border in the Naga Hills complex. This majestic peak is called Nwemauk (Snow Mountain) by the Burmans, and rises perceptibly over the dark outlines of the dense forests of the nearby ranges. A little further to the south is the somewhat lower peak, Mount Victoria (10,400 feet), which is better known since it can be sighted from various points in the Central Plain of Burma.

The major rocks forming the Arakan Yoma belong to Triassic, late Cretaceous and Eocene formations, the former occurring towards the center, and the latter on the flanks. On the eastern side, particularly, the chain appears to have been intruded by masses of serpentine with which chromites and pyrites seem to be associated in several areas.

Due to the traditional role of the western complex of highlands as a physical barrier between East Pakistan India and Burma, it is interesting to note the significant gaps and passes in these hills and mountains, including the Arakan Yoma. There are four principal passes.

In the north is the outstanding route of the Hukawng Valley, which played an important role as a backdoor into Burma for the American and British forces during World War II when they entered Japanese-occupied Burma. The route provides an access from north-eastern Assam to the Upper Chindwin Valley in North Burma. The famous Stillwell Road, also known as the Ledo Road, was built during the war to carry supplies and men into Myitkyina and thence into China. The route runs over the Patkai Hills from Ledo to Lungpang Bum over the Pangsau Pass (4,124 feet) on the Burma border to Langhpiga. Then it reaches Tagap Ga (Langshing) and goes on to cross the Tarung Hka, the first stream of some size at the village of Gahtawng, now deserted. After crossing the Tawang Hka and Tanai Hka streams, it reaches Tinghawk. From this point it is comparatively easy going to Myitkyina about 100 miles away.

The Manipur route into Burma commences at Imphal in Manipur and proceeds as two routes to Tamu and Tiddim inside the Burmese border. From Tiddim, the route follows the somewhat easy Kale Valley, and passing the nearby air strip at Tanngabin, it reaches Kalemyo. One section penetrates further south to Falam about 60 miles away. But the major route follows the narrow valley of the Myttha River up to Kalewa at its junction with the south-flowing Chindwin River. The passage is marked by gorges and rapids. This section is also known as the Myttha Gap. After crossing the Chindwin, the important settlement of Pyingaing Mauk is reached and eventually the route links with the rail-head at Ye-u about 40 miles away. In Burma this important route is called the North Western Road. The other route from Imphal via Tamu, goes directly southwest of Chindwin River to join with the Tiddim route near Kalewa.

The An Pass is the main gap in the Arakan Yoma Range. It affords a link between Akyab (Sitwe) and the oilfield area of Yenangyaung, Minbu, and Magwe in the Irrawaddy Valley. From the Arakan, the route follows the An River and then winding its way through the maze of hills descends to the west of Minbu.

The Taungup Pass affords the southernmost route across the Arakan Yoma and links the important town of Prome on the Irrawaddy with the Arakan coastal area around the mouth of the Taungup Chaung north of Sandoway.

There are a number of secondary gaps giving access to the Irrawaddy Valley from across the mass of hills in the west, i.e., Yaw Chaung Gap from Pakokku via Pauk to Gangaw, the nearby route from Seikpu to Kampetlet, and further north the fairly well-known Tuzu Gap which leads across the Patkai Hills. But all these passages are little used for any continuous traffic and have, at any rate, no all-weather roads going through them. So far, the function of these routes has been either for purposes of emergency or local contact and infiltration.

The Coastal Strips The Arakan coastal strip is narrow, and in places the hills come so close to the sea that the plain disappears and the cliffs jut forth into the Bay of Bengal. The largest flat-land areas are around Akyab. But generally, these flat stretches, wherever they may be, were formed by deltaic deposits of rivers flowing from the north The coast as such is rocky, full of inlets, and studded with a large number of islands, of which the Boronga, Ramree, and Cheduba are the largest. Similarly, the Tenasserim Coast, particularly in the south, has narrow flatlands and many islands clinging to the coast under the names of archipelagoes like Mergui and other groups.

The Tenasserim Yoma highlands consist of a number of parallel ranges with a north-south direction, and are dominated by granite masses. Deep valleys separate the ranges, and the hill and valley alignment is nearly parallel to the coast. Several individual ridges rise to 5,000 feet. The highest point is the Myinmolekhat Peak rising to 6,800 feet above sea level on the borders of the Tavoy and the Mergui districts. Further south their elevation is lowered to about 2,000 feet. Tin and tungsten, for which lower Burma is famous, are found in these hills deposited around the granite masses.

The Main Drainage System

The north-south direction of the mountain ranges of Burma is reflected in the direction of the flow of the rivers of the country. The most important river of Burma is the Irrawaddy, or the "Elephant River" of the Hindus as suggested by Chhibber.[5] The Irrawaddy is a wholly Burmese river rising just south of the Burma-Tibet border in an area of about 19,000 feet above sea level. The river is said to have a total drainage basin of 160,500 square miles. It carries an exceptionally large amount of water, having its sources and headwaters in an area of heavy rains, amounting to over 150 inches a year. In 1880, the discharge at Bhamo was estimated to be one million cubic feet per second; the width of the river here was six miles.

Of its two headstreams, it is more or less agreed that the eastern one, namely the Nmai Hka, is the main stream. From the confluence with the Mali Hka to its junction with the Chindwin River in the Pakokku district, the Irrawaddy flows through certain well-marked alluvium covered basins, separated by belts of hilly country. These narrow channels across the hills have become prominent defiles, but the steamers from Rangoon to Mandalay reach Bhamo throughout the year despite these defiles.

The Irrawaddy leaves the third defile at Kyaukmyaung in the Shwebo district and then flows southward in a broad open course through dry flats. Opposite Mandalay it swings round to follow an east-west course north of Myingyan. In the Pokokku District it is joined by its great tributary, the Chindwin. Between Minbu and Prome the outliers of the Arakan Yoma and Pegu Yoma come close to the river and leave only a narrow stretch of land for cultivation. Reserved forest areas cover either side of the hill slopes.

South of Prome the Irrawaddy begins to widen its course and the flat delta lands begin south of the town of Myanaung. Above Henzada, two large distributaries take off from the Irrawaddy, the Bassein River (Ngaween) and the Myitmake-Hlaing River on its west and east, respectively. Where the distributaries take off from the main stream, the Pegu Yoma and Arakan Yoma are only about 80 miles apart. Lower

[5]Chhibber: Geology of Burma, p. 10

downstream, the river divides into many off-shoots and enters the sea through several channels on a broad front about 160 miles wide from the mouth of the Bassein River to the Rangoon River. The north-south extension of the Delta is about 180 miles. There are at least nine major mouths to the sea.

The river divides and redivides, converting the lower part of its basin into a mesh of tidal creeks All the major streams entering the sea are navigable and tidal, namely, Bassein, Thetkethaung, Ywe, Pyamalaw, Pyinzalu, Thaungdu, Irrawaddy, Kadonkami, Bogale, or Dala on the Rangoon River. Rangoon on the Hlaing River has an excellent deep-water location, but since all the streams are heavy silt-carriers, river dredging operations have to be undertaken continuously at the port of Rangoon to keep the Channel deep and navigable.

The sea face of the Irrawaddy delta is built up by deposition of silt brought down by the rivers. It is probably extending into the sea at a rate of about 3 miles in a hundred years.[6] It is composed of muddy flat surfaces criss-crossed by creeks and channels and in the central southern part it has a mangrove vegetation cover. The seaward margin of the alluvial flats of the delta is formed by a sandy beach with numerous shoals and shallow water, interspersed with mangrove swamps. On account of this shallowness, large vessels cannot approach within several miles of the shore except along the submerged channels which form the main streams from the Irrawaddy. The maximum discharge at the time of the flood is about two million cubic feet per second [7] A spring tide at Diamond Island causes a rise of 7-1/2 feet, and at Elephant Point at the mouth of the Rangoon River, it is 19 feet.

The Irrawaddy is navigable throughout the year to Bhamo. This is a distance of over 800 miles and the river constitutes the great waterway of Burma. It carries an immense amount of water in the upper reaches. Rangoon is situated about 20 miles from the sea on the Hlaing River which rises in the Pegu Yoma and flows south parallel to the eastern side of the delta. It is connected by tidal creeks with the delta, and some Irrawaddy water finds its way to the sea through the Hlaing. Close on the eastern side is the Pegu River, and the confluence of these two rivers is pivotal to Rangoon's nodality by water. The Pegu River has a canal connection with the Sittang, and the two delta creeks and the Twante Canal come into the Hlaing from the west at Rangoon. Thus a superb water system is created with Rangoon in the center

The Mu River is an important northern tributary of the Irrawaddy. Its economic importance has been greatly enhanced in recent years due

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[6] Chhibber: Geology of Burma, pp 15-16

[7] Pascoe: Manual of the Geology of India, p 28

to the new irrigation schemes based on its waters in a part of Burma generally dry. The river rises in the Katha district and flows due south in a meandering course to join the Irrawaddy near Myinma in Sagaing District. It is the chief river of the fertile Shwebo District.

The Chindwin River rises in the Kachin Hills, not far from the sources of the Irrawaddy. After flowing through the Hukawng Valley, it continues through a tortuous course southward, till it bursts out of the hills northwest of Monywa. It joins the Irrawaddy about ten miles northeast of Pakokku over a wide front, the extreme outlets being 22 miles apart, enclosing large low-lying fertile lands. The Chindwin is navigable by light steamers up to Pantha throughout the year, but in the rainy season power craft can proceed to Tamanthi about 450 miles up the river.

The Sittang is also a wholly Burmese river. It rises in the hills on the fringe of the Shan Plateau in the Yamethin District. Flowing mainly south for about 350 miles, it joins the Gulf of Martaban. The mouth of the river is charged by extremely high tides which move up the river in a 9-foot high wave at the rate of about 12 miles an hour. This makes navigation on the Lower Sittang very dangerous. In spite of tides, the Sittang's mouth has been silting up, which has hindered navigation. Thaton, which was a port of considerable size in the past, has ceased to be one now. Due to the shallowness of this river, floods have increased in the Toungoo and Thaton districts.

The Salween River, like the Mekong and the Yangtze-Kiang, rises in the eastern part of the Tibetan highlands. In their upper reaches, the gorges of these rivers lie close to each other within a distance of 42 miles. The Salween enters Burma and flows through the Shan States. It traverses the eastern side of the Shan Plateau in a succession of great gorges, which are often three to four thousand feet deep. Before reaching the sea, the Salween forms the boundary between Burma and Thailand for about 70 miles. It is said that perhaps there is no rift defile, or canyon to match its length in the world. The deep, rocky through-like valley reaches to within 50 miles of the sea. The river enters the sea by two mouths in the Gulf of Martaban, one west of Moulmein, the other and more important one 28 miles south of the town. In the Shan Plateau, the river has several tributaries which join the main stream by forming cataracts and cascades. This is mainly due to the rise of the level of the Salween by about 70 feet during the rainy season. Due to the formation of shoals, bars, and sandbanks, the incised valley and variations in water level, the Salween is only of limited use. Teak logs are floated down the river, and in the future the enormous hydroelectric power generation potential may be put to use. At present, the river is navigable for only about 55 miles from its mouth.

The Tenasserim Rivers

Lack of space, and the nature of the rocks and general topography determine the character of the rivers along this narrow territory. In order to reach the sea, the rivers have to cut through ridges of hard rocks and consequently they form narrow gorges, usually with an east-west direction, fairly close to their mouths. These streams are generally rapid, but they erode the softer rocks, and sedimentation is characteristic. Their mouths provided openings and anchorages to coastal shipping in the past, but at present, heavy sedimentation makes them unusable even to sailing craft.

The most important river is the Tavoy which has a north-south course for about 90 miles, and nearly 60 miles of it is tidal. Its lower valley is the most important cultivated region along this coast. In southern Tenasserim there are three important rivers flowing in a north-south direction. The direction is determined by the trend of the hill ranges. The largest river is the Great Tenasserim, and on its estuary is situated the town of Mergui. The other noteworthy rivers include the Lenya and Pakchan.

The Arakan Rivers

Most of the Arakan rivers flow from north to south, with their valleys separated by intervening ridges and elevated watersheds. Due to the structure of the folds, their courses have become trellis patterns in the hills. Near the coast these rivers come out of the structural alignments by making sharp bends and curves. Because of the lower zones of sedimentation and on-shore winds, these rivers are useless for navigation, except the Kaladan. The headwaters of these rivers lead to remote and difficult passes through the Arakan Yoma. But the existence of these longitudinal valleys makes the east-west communication extremely difficult. The principal rivers are the Kaladan, Lemyo, Mayu, and Naaf. The Kaladan is the largest and rises in the Chin Hills, cuts across the Lushai Hills and then enters the Arakan area as a directly south-flowing stream. In its middle course the Kaladan is navigable up to Paletwa about 100 miles from the Bay of Bengal. The Mayu is another navigable river near its mouth.

The Arakan Coast is broken up by rocky headlands and stretches of mangrove swamps. But there are several good natural harbors. The presence of numerous creeks, streams, swamps and criss-crossing channels has helped to foster a semi-amphibious life. The boats are the life lines.

Lakes

The number of lakes in Burma, is not very large yet in the origin of those that exist there is considerable variety. In the Shan Plateau area the surface was subjected to successive submergence under the sea; therefore, cut-off portions of the sea, barred either by elevation of land or by deposition of sediments, led to the formation of water bodies. There are no large lakes in the northern part of the Shan Plateau at present. But it is believed that formerly there were lakes which gradually silted up; their basin sites are marked by broad open plains, floored by young sedimentary deposits. Some of these basins are suitable areas for cultivation. In others, valuable minerals including iron ore and oil shales are found. The most significant lake in the Shan Plateau is Inle, which lies in the state of Yawnghwe at a height of 3,000 feet above sea level. It is not entirely an area of inland drainage, since some streams drain out of it. It is about 14 miles long and 4 miles wide. The depth varies with the seasons, but at the end of the rainy season the greatest depth may be about 20 feet. The water is extremely clear. The average surface temperature is about 71°F and the bottom temperature is only 1F° lower. Evidence shows that the lake was much larger in the past.

The largest lake of Burma is the Indawgyi Lake in the far north, in the Myitkyina district. It is 16 miles long and 7 miles wide and it offers exquisitely beautiful scenery since it occupies a depression hemmed in by two ranges of thickly wooded hills.

In lower Burma, along the courses of the rivers, there are many small cut-off lakes. In many cases they represent changes in the rivers' course and deserted river channels often form the usual ox-bow lakes. Many lakes also form in the depressions beyond the levees. The largest lakes in Lower Burma are the Engma, or Imma, in the Prome District, the Htoo and the Doora in the Henzada District. The Engma Lake is south of Prome and is about 10 miles long, with a maximum breadth of 4 miles. During the rains it has a depth of 12 to 15 feet, but in the dry season it is a flat shrunken marsh. Doora Lake is within the township of Henzada and is about two square miles in area. Daga Lake in the Bassein District, is connected with the Daga River and receives the overflow of the Irrawaddy floods during the monsoons. It is a lake of clear water and has a circumference of about 5 miles and a depth of 20 to 45 feet in the center.

The salt lakes up Upper or Central Burma are a special feature of the landscape in the Dry Zone, and their saline water is the result of rapid evaporation due to an extremely hot and dry season. These lakes are found in the Shwebo and Sagaing Districts, e.g., Kadu, Halin, Mohanand, and Tamantha in the former district and Yemyet in the latter. The comparatively small Yegom Lake in Sagaing District is interesting since it yields brine for the manufacture of salt.

There are other smaller salt lakes in other parts of the Dry Zone, and there are also some shallow depressions which are subject to reduction of water level during the dry season. All these can yield salt.

In the Lower Chindwin district there are a number of crater lakes. Though small in size, they are of considerable depth. The location of villages on their slopes is determined by the occurrence of a permanent water supply. These crater lakes were formed by explosive eruptions. The presence of a lake is due to the consolidation of the lake floor, by which it is rendered impermeable and thus is able to retain water. Most of these lakes are found in the area of Shewezaye close to both banks of the Chindwin River before it flows to Monywa.

Man-made lakes not only become a part of the local landscape, but often serve important economic needs including storage of water for domestic consumption and irrigation. The famous lake near Meiktila was constructed by King Bawdapaya to improve agriculture by facilitating the requirements of irrigation. The well-known Victoria and Royal Lakes of Rangoon, a symbol of the British connection with Burma, are used largely for recreational purposes by the inhabitants of the metropolis. The major portion of Rangoon's water supply now comes from the lake reservoir of Hlawaga or Moyingyi northeast of Pegu.

Landform Characteristics

In carving out the landform features in Burma, both climate and running water have played an important part. The heavy monsoon rains are concentrated in the months between May and October. Rivers rapidly rise into floods, and water running down the slopes brings about considerable erosion during the rainy season. In the hill and mountain regions of Burma there are numerous torrential streams which carry a large amount of sediment, deepen the valleys and gorges and erode their banks.

As soon as the vegetation cover is removed from hillside clearings, the top soils are exposed to active denudation. Such exposed profiles have often resulted from the practice of "taungya" (slash-and-burn, shifting cultivation) by the hillmen; as well as by careless exploitation of certain forest areas. For example, in many parts of the Arakan the removal of vegetation has resulted in badly eroded areas. The construction of roads, railways and airfields, as well as new settlements heightens these problems of exposed surfaces and consequent rapid erosion.

In Burma, limestone formations extend on a large scale from the Shan Plateau to the southernmost parts of the Tenasserim Coast. In the course of time much of these limestone formations have been either dissolved or eroded, so that in many parts only isolated hills remain. Sinkholes, caves, caverns, and deeply incised valleys are some of the characteristic landforms from Mergui to the Shan Plateau.

Here and there the Tenasserim Coast is lined with extensions of mangrove swamps, which are exposed at low tide. It is possible to cruise for days in the shallow calm water within the outer protective fringe of islands. Dense forest comes to within 25 feet of high-water level and after this there is a bare slope of granite to half-tide level and below that there is usually a pile of boulders exposed only at low tide.

The coastal strip of Arakan is narrow, giving way to vegetation-covered cliffs and, occasionally, mangrove development in the flat Sandoway area. Where the ridges come near the coast and submergence has taken place, the ridges separate long, narrow and deep channels. This is the characteristic form of coastal landforms between Akyab and Sandoway. There are also low coastal islands. Southward, there are fewer islands and the coastline has a rugged and rocky face towards the sea.

The Dry Zone of Burma has certain features peculiar to its landforms. Though it is a dry area (in fact, the driest in Burma) with a rainfall average of 25 to 40 inches, rain is an important agent of landform sculpture. In the typical districts of the zone, namely, Mandalay, Sagaing, Shwebo, Pakokku, Myingyan, Meiktila, and Magwe, these processes can be well recognized. The rainfall, though meager, comes down in torrential showers. The surfaces are not well covered by vegetation and, therefore, receive the full impact of the rain. A badland topography is often developed, making movement and communications, as well as cultivation of the land, extremely difficult. There are sandstone earth pillars, ferruginous concretions and cones of sand. Along the cliffs the sand-rock is easily subject to landslides. Also, as a result of the strong sun and consequent repeated unequal expansions and contractions, the rocks crumble to form sand. Much of this is carried away by running water and wind.

The action of frost is characteristic of landforms in the Shan Plateau and the northern hilly and mountainous regions. The young folded mountains are subject to more rapid erosion, though wet conditions and the vegetation cover slow down the denudation process. In the coastal areas several processes are taking place in conjunction, namely, silt deposition by rivers, erosion and piling up of material by tides, volcanic action, and earth movements.

There is a need, therefore, to study and distinguish local landforms, particularly in relation to both economic and strategic needs. Qualitative methods of investigation should be combined with quantitative techniques[8] and attention should be paid to understanding characteristics of typical[9] landforms.

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[8] Wood: A Quantitative System for Classifying Landforms, Tech. Rep. EP-124, Natick, p. 20.

[9] Anstey: Physical Characteristics of Alluvial Fans, Tech. Rep. ES-20, Natick, p. 109. Also see: Analysis of Geographic and Climatic Factors in Coastal Southeast Asia (Final Report), Ann Arbor,1962, p. 182.

IV. CLIMATE

Burma is almost wholly situated within the tropics, but the influence of its mountain borders is profound in moderating the heat and in influencing the distribution of rainfall (See Map 3). Burma's climate can be described as a tropical monsoon type. The occurrence of the rains in summer is the outstanding feature of the climate. Though some areas are heavily drenched with rain, others experience only a moderate rainfall and a large area in the heart of the country receives inadequate precipitation and merits the designation, "Dry Zone."

The organization of meteorological information and its transmission depends upon secure and systematic observation stations. War and disorder preceding the independence and the continuously disturbed conditions thereafter have been impediments in this regard. It is a credit to the Burmese government that its meteorological department has been able to collect a fair amount of data and information upon which some climatic analysis can be based.

The earliest records go back to 1848-49 when rainfall measurements were started under the British rule in Akyab and Mergui.

In 1961 the Burma Meteorological Department had 28 full-time meteorological stations and 17 part-time stations. There were also 314 places with rain gauges.

The Hydrological Division of the Meteorological Department maintains seven stations with rain gauges along the rivers, for providing data for river control, hydro-electric and irrigation projects. In 1961-62, there were also thirteen evaporation-measurement stations in Burma.

The collection of rainfall data from more than three hundred stations with the help of the departments of Agriculture, Irrigation, and Meteorology is extremely useful. But a better geographic distribution of rain-gauges as well as an increase in the number of installations will lead to more meaningful collection of data. At present, most of the rain gauges are in the Irrawaddy Delta and the Dry Zone. Few are in the Arakan, Tenasserim, Shan States and North Burma areas. There are hardly any facilities for micro-studies, and little data can be obtained from prominent elevations or across the important mountain ranges. The more sophisticated type of installations are found only at Mingaladon (Rangoon Airport) or at Air Force Bases. A good deal of the meteorological data on Burma available in the United States are through the World War II contacts of the military

forces. Due to war, insurgency and lack of organization, the data pertaining to the period 1941-1950 is patchy. The U.S. Air Force Project Rand has been a source of climatic data on Southeast Asia including Burma.[1]

To give a general picture of the climate of Burma, precipitation, humidity, temperature, altitudinal and seasonal variations will be discussed. The monsoon tropical climate differs from the rainy tropics in that it has a distinct dry season. The storage of moisture in the soil is sufficient to maintain a forest cover through the more or less rainless period.

Temperature

Exceptionally high temperatures are not common over large parts of Burma. Only in the Dry Zone do temperatures rise above 100°F. This is characteristic of several places from February through June or July. The Tenasserim Coast is warmer than the Arakan Coast and Western Highlands; North Burma and the Shan Plateau are cooler than the valley plains and the delta. Appropriate data are given in Table X.

December, January and most of February are the coolest months all over Burma. The lowest maximum and minimum temperatures are recorded in the highland areas of North Burma, Arakan Yoma and the Shan Plateau. The lowest mean daily minimum temperatures range between 40° and 60°F, while in the same cool period in the Dry Zone, delta and coastal areas, the minimum temperatures range between 55° and 75°F. The Dry Zone and delta areas are cooler than the coasts. (See Table XI).

From March the temperatures begin to rise rapidly everywhere. This rise continues until April and May, the warmest months all over Burma. The maximum temperatures are usually recorded in April. Even after the commencement of the monsoon rains in the middle or end of May, the uniformly high temperatures combined with high humidity remain the dominant feature of the weather. Exceptionally high absolute maximum temperatures are experienced in the delta and Dry Zone areas from March through July. During April temperatures above 110°F have been experienced at most stations at one time or another in the Irrawaddy Valley, which has sometimes been called the "hot spot" of Southeast Asia. It is said that the highest temperature ever recorded anywhere in Southeast Asia is 114° F reached during April at Mandalay.[2] From July to November high temperatures are recorded everywhere except at the high elevations in the hilly

[1]Schutz, C. Monsoonal Influences on Wind, Rain, and Clouds throughout Southeast Asia. Santa Monica, Cal., Rand Corp. Oct 1967 (RM-5418-PR)

[2]Ohman,H:Climatic Atlas of Southeast Asia, Tech Rpt. ES-19, US Army Natick Labs, Natick, Mass., 1965, p.3

TABLE X

BURMA: MEAN ANNUAL MINIMUM AND MAXIMUM AND ANNUAL ABSOLUTE MAXIMUM TEMPERATURES, RAINFALL AND RELATIVE HUMIDITY

Stations	Min Temp. (°F)	Max Temp. (°F)	Abs Max Temp. (°F)	Mean Precip. (inc.)	Mean Rel Humdty (% spec hrs.) morning/ evening
Mergui	72	87	99	162	88/79
Moulmein	73	88	102	190	87 Av.
Tavoy	72	88	101	208	97/79
Bassein	73	88	103	109	78 Av.
Rangoon	73	89	107	103	84/71
Diamond Island	76	85	98	122	81/79
Toungoo	70	80	108	83	74 Av.
Mandalay	71	93	114	34	74/na
Minbu	71	91	111	35	75/na
Monywa	71	91	104	31	66 Av.
Thyetmyo	70	92	111	40	77 Av.
Yamethin	70	91	113	38	70 Av.
Bhamo	65	86	105	72	79 Av.
Myitkyina	66	84	105	84	86/na
Lashio	66	81	108	62	84/69
Maymyo	56	77	95	61	88/73
Taunggyi	56	77	101	66	77 Av.
Akyab	72	86	100	202	84/77
Sandoway	69	88	na	214	80 Av.
Haka	53	68	86	89	72 Av.
Kanpetlet	54	68	86	105	69 Av.

SOURCE: Burma, Climatic Data Tabulations Prepared by the Climatology Division S&CS, Weather Wing APO 925, May 1962, (Rearranged and adjusted).

TABLE XI

BURMA. MEAN DAILY MINIMUM* TEMPERATURE (°F)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Years Record
Mergui	68	70	73	74	74	74	73	73	73	73	71	68	72	43
Moulmein	65	68	73	77	76	75	74	74	75	75	72	67	73	43
Tavoy	65	68	71	75	75	75	74	74	74	74	70	65	72	41
Victoria Point	73	74	76	77	76	75	75	75	74	74	75	74	75	20
Bassein	63	66	71	76	77	76	76	76	76	76	72	66	73	43
Diamond Island	71	73	75	79	79	77	76	76	77	77	76	73	76	42
Rangoon	65	67	71	76	77	76	76	76	76	76	73	67	73	43
Tharrawaddy	59	60	67	75	76	76	76	76	76	75	72	62	71	23
Toungoo	58	61	68	76	77	75	75	75	75	74	69	61	70	43
Mandalay	57	61	68	77	79	79	79	78	77	75	68	54	71	32
Minbu	58	61	69	77	79	78	77	77	77	75	69	61	71	28
Monywa	57	60	67	75	79	79	79	79	78	75	68	59	71	18
Thayetmo	54	57	66	76	78	77	76	76	76	74	67	58	70	33
Yamethin	56	60	68	76	77	75	75	75	75	74	68	58	70	27
Bhamo	50	53	60	67	72	74	75	75	74	70	60	51	65	32
Kindat	52	54	60	67	74	76	77	76	75	72	64	56	67	13
Myitkyina	50	54	61	67	72	75	76	75	75	70	61	52	66	17
Lashio	46	49	56	63	67	70	70	70	68	64	56	48	60	36
Maymyo	40	43	51	59	66	66	66	66	65	61	53	43	56	22
Taunggyi	42	46	53	60	63	64	64	64	63	59	51	46	56	25
Akyab	59	61	69	75	78	77	77	77	77	76	71	63	72	43
Haka	42	44	52	57	59	60	60	60	59	56	48	42	53	9
Kanpetlet	44	46	53	59	60	60	60	60	58	55	50	44	54	9
Kyaukpyu	64	65	70	76	78	77	76	76	77	76	73	67	73	12
Sandoway	55	56	64	74	75	76	75	75	75	73	70	60	69	3

*Average of the minimum temperatures for each day within a given period, usually a month, for a period of years.

SOURCE: Burma, Climatic Data Tabulation, Prepared by Climatology Division, S&CS, Weather Wing APO, 925, May 1962

areas. (See Tables XII and XIII.) High temperatures are found in association with high mean relative humidities. (See Table XIV.)

The maps of Southeast Asia depicting the daily maximum temperatures, which are attained about 1400 hours LST, show that the heat center for the whole of Southeast Asia is located in the central and southern parts of the Irrawaddy Valley.[3]

Comparative data with regard to the mean annual minimum and maximum and the annual absolute maximum temperatures at different stations representing a cross-section from different parts of the country are shown in Table X. The mean daily maximum temperatures for April and May show that Burma (except its highlands) is the warmest area[4] in the region of Southeast Asia. Similarly, the mean daily minimum temperature and its mapping in December, January and February show that most of Burma is the coolest area in Southeast Asia.[5]

Precipitation

The causes of the monsoon and its intricate mechanism continue to be a subject of some controversy. The commencement of the monsoon, or the beginning of a steady period of rainfall of the summer season, is described in terms ranging from "bursting[6]", to a quiet and gradual increase of the rains. The change is ushered in by increasing breezes, showers, increased humidity and moderation of the dry heat The heavens do not fall and the first rain does not necessarily pour down in torrents, but the first rain nevertheless usually falls in fair amount. The beginning of the monsoon is often accompanied by squally weather and rough seas, in a sudden and spectacular manner so that some call it the "bursting of the monsoon[7]".

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[3]Ibid., See maps Nos. 15-26

[4]Ibid., See maps Nos. 18-19, for mean daily max. temp. in April and May.

[5]Ibid., See maps Nos. 27 and 28 and 38 for mean daily min. temp. in January and February. For a general depiction of temperature and rainfall conditions see Hall: Atlas of Southeast Asia, 1964, pp. 54-55.

[6]Huke: Rainfall in Burma, 1966, p. 51.

[7]Jen Hu Chang: The Indian Summer Monsoon, Geog. Rev., Vol. LVII, No. 3, 1967 p. 377.

TABLE XII

BURMA: MEAN DAILY MAXIMUM* TEMPERATURES (°F)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Years Record
Mergui	88	89	91	92	89	85	84	84	84	87	87	87	87	43
Moulmein	89	92	94	95	89	85	83	83	85	88	89	87	88	43
Tavoy	90	92	93	94	89	84	83	83	84	88	89	88	88	41.
Victoria Point	87	88	90	90	86	84	83	83	83	84	85	85	86	20
Bassein	86	90	94	96	92	86	85	85	86	87	86	84	88	43
Diamond Island	84	84	85	88	89	86	85	84	85	86	85	84	85	42
Rangoon	89	92	96	98	92	86	85	85	86	88	87	87	89	43
Tharrawaddy	87	93	97	101	93	88	86	86	88	89	88	87	90	23
Toungoo	84	90	97	100	96	89	87	87	89	90	87	83	90	43
Mandalay	84	90	98	102	100	95	95	93	93	92	88	84	93	32
Minbu	84	90	98	103	99	92	91	90	90	90	87	82	91	28
Monywa	82	88	96	101	100	94	94	93	92	90	86	81	91	18
Thayetmo	86	92	99	103	99	91	89	89	90	90	88	84	92	33
Yamethin	85	91	98	101	97	91	90	89	91	91	87	83	91	28
Bhamo	76	81	88	92	93	90	88	88	90	88	81	76	86	32
Kindat	76	82	90	97	95	90	89	88	88	87	81	76	86	13
Myitkyina	74	78	85	88	91	88	87	87	89	86	80	75	84	17
Lashio	74	78	85	89	87	84	82	82	83	82	77	73	81	36
Maymyo	70	74	81	84	82	78	77	76	77	77	73	70	77	22
Taunggi	73	76	83	86	80	77	76	76	77	78	74	71	77	25
Akyab	81	84	89	91	91	86	85	85	86	87	85	81	86	43
Haka	63	64	70	75	75	71	70	69	69	68	64	61	68	9
Kanpetlet	63	66	73	77	74	70	69	69	69	67	64	61	68	9
Kyaukpyu	79	81	85	89	89	86	85	84	86	86	84	80	84	12
Sandoway	87	89	91	94	91	87	85	84	87	90	90	87	88	3

*Average of the maximum temperatures of each day within a given period, usually a month, for a period of years.

SOURCE: Burma, Climatic Data Tabulation, Prepared by Climatology Division S&CS, Weather Wing APO, 925, May 1962.

TABLE XIII

BURMA: ABSOLUTE MAXIMUM TEMPERATURES (°F)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Years Record
Mergui	95	97	99	98	99	98	97	92	92	93	94	94	99	51
Moulmein	96	99	102	101	102	96	93	91	93	97	99	97	102	43
Tavoy	98	98	99	101	99	93	91	93	91	99	100	97	101	39
Victoria Point	93	97	97	99	105	90	89	88	89	90	95	91	105	10
Bassein	93	97	103	103	103	99	96	91	92	91	91	91	103	26
Diamond Island	92	92	93	98	97	91	91	92	90	94	93	92	98	42
Rangoon	100	100	104	106	107	98	93	96	94	94	95	98	107	51
Toungoo	94	100	105	108	108	102	95	95	98	99	95	94	108	26
Mandalay	96	100	108	114	114	106	106	103	103	102	97	92	114	40
Minbu	94	101	107	111	110	109	102	98	98	100	96	93	111	13
Monywa	85	90	100	104	104	101	100	98	97	95	98	93	104	8
Thayetmo	94	103	109	111	111	106	98	96	97	100	95	97	111	25
Yamethin	100	100	107	113	110	102	99	98	101	102	98	94	113	13
Bhamo	85	90	100	105	105	102	100	98	98	96	88	83	105	16
Kindat	85	96	101	107	106	103	97	95	100	94	90	85	107	16
Myitkyina	82	89	95	102	105	100	98	96	97	97	90	82	105	N/A
Lashio	88	90	108	104	100	96	92	93	92	94	86	81	108	47
Maymyo	80	83	94	95	95	88	86	85	87	85	85	83	95	30
Taunggyi	80	90	88	101	89	84	83	90	82	89	79	77	101	28
Akyab	91	95	100	99	99	98	93	91	94	99	92	90	100	43
Haka	73	74	80	85	86	80	78	77	76	75	74	72	86	9
Kanpetlet	75	76	82	86	85	80	79	73	74	74	74	78	86	9

SOURCE: Burma: Climatic Data Tabulation, Prepared by Climatology Division S&CS. Weather Wing APO, 25, May 1962, p. 3.

TABLE XIV

BURMA: MEAN RELATIVE HUMIDITY (%) AT SPECIFIED HOURS*

Station	Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Years Record
Mergui	0800	83	86	86	84	87	92	94	94	95	88	83	82	88	5
	1800	69	70	70	75	82	87	89	88	89	83	75	76	79	6
Tavoy	0800	84	86	83	80	86	94	95	95	93	87	80	79	87	19
	1800	67	68	68	72	83	90	91	90	90	85	79	68	79	7
Victoria Point	0800	76	77	79	81	85	87	88	88	88	87	82	78	83	10
	1800	69	65	68	75	85	84	87	86	88	85	81	74	79	5
Diamond Island	0800	74	77	79	76	79	86	[illegible]	88	83	84	80	74	81	5
	1800	70	71	76	78	80	85	87	87	87	82	78	72	79	6
Rangoon	0800	77	83	84	81	82	89	92	90	90	85	82	78	84	5
	1800	51	50	54	64	75	86	88	88	86	77	71	61	71	6
Mandalay	0800	79	66	53	55	68	78	78	83	84	83	83	82	74	32
	1800	DATA NOT AVAILABLE													
Minbu	0800	74	61	55	58	71	81	82	85	84	84	82	78	75	14
	1800	DATA NOT AVAILABLE													
Myitkyina	0800	90	85	78	73	81	91	93	91	91	88	[illegible]	89	86	14
	1800	DATA NOT AVAILABLE													
Lashio	0800	87	78	65	69	78	85	88	89	90	91	93	93	84	19
	1800	63	51	37	43	61	79	82	84	83	83	83	79	69	7
Maymyo	0800	95	86	73	71	82	89	91	92	92	93	93	95	88	14
	1800	70	51	43	44	73	84	85	90	86	87	87	81	73	3
Akyab	0800	81	77	77	75	77	91	92	91	90	87	86	86	84	5
	1800	65	66	69	71	75	87	89	88	86	82	78	72	77	5

*0800 observations are in Local Mean Time. 1800 observations are in Burma Standard Time. The difference between Local Mean Time and Burma Standard Time is less than one-half hour at any station.

SOURCE: Burma, Climatic Data Tabulation; Prepared by Climatology Division, S&CS Weather Wing APO 925, May 1962.

After the onset of the monsoon rains are caused during the following weeks or months by the movement of the cyclonic depressions some weak, some active, in the air drift from the sea, which produce precipitation by orographic as well as convectional activity. As these "lows" move further away from the sea, the amount of rainfall gradually diminishes. There are periods of moderate-to-heavy rainfall, followed by breaks. The typical pattern consists of a number of long periods of rainy days, each followed by a short period of dry weather.[8] Breaks are more frequent in August and September, but they are short-lived in July. According to Huke, an analysis of daily rainfall records covering 134 station years shows that the median date for the year's highest 24 hour rainfall total is around July 5. But this date is variable from year to year and region to region.

Temperatures are actually lower in June, July and August than in April and May; it is the higher humidity, generally from 80 to 85 percent, which is the cause of human discomfort.

The commencement of the monsoon varies both in terms of time and space.[9] Some years the phenomenon takes place at the expected time (so-called "normal" date of the arrival of the monsoon), while in other years there is a marked departure from this "normal." Both the scope and the extent of the rains are extremely variable from year to year, defeating fond hopes and intelligent expectations. It is recognized that these phenomena require more study and documentation.[10] They say that you fight the monsoon, but cannot predict it.

As far as the normal dates of the commencement of the monsoon in Burma are concerned, an approximate time table is given in Table XV.

The heaviest rain of the year is most likely to occur sometime during the months of July, August or September during the monsoon period, and it results from violent convectional activity.

The mean number of days with thunderstorms is shown in Table XVI. The maximum number are experienced along the Tenasserim coast, followed by North Burma. The number of tropical cyclones crossing sections of the Bay of Bengal into Burma during the last

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[8] Huke: Rainfall in Burma, 1966, pp. 50-51.

[9] Jen-Hu Chang· The Indian Summer Monsoon, Geog. Rev., Vol LVII, No. 3, 1967, p. 373.

[10] Schutz, C. op. cit. p. 2 et seq.

TABLE XV

BURMA· SOME DATES[11] FOR COMMENCEMENT OF THE MONSOON

Places or Areas	Approximate Date
Mergui	Around April 24 (or last week)
Rangoon	May 6 (or middle of May)
Papun	May 12 (or middle of May)
Prome	May 18 (or 3rd week of May)
Akyab	May 9 (or middle of May)
Mandalay·	First week of June
Pakokku	June 21 (or middle of June)
Shan States	Middle of May
North Burma (Myitkyina area)	Second or third week of May
Falam and Chin Hill Area	Middle of May

SOURCE: Huke· Rainfall in Burma, 1966 (based on text)

50 years shows that their greatest frequency was in June-September followed by October-December and there are hardly any during January through March (see Table XVII).

During the monsoon period showers generally come in the afternoon and extend to early evening. Weather in the morning is usually clear. Afternoon showers result in stoppage of work. People eat lazily, enjoy the siesta, and generally glory in a "take it easy" attitude. This is the traditional and typical Burmese way of life. Weather conditions occuring from noon to early evening hours are not conducive to physical activity during a major part of the year. The least rainfall occurs between the hours of 10 p.m. and 5 a.m.

Between June and September at Mandalay, about 85 percent of the annual rainfall occurs, and there is a pronounced maximum between noon and 8 p.m. During these hours, about 53 percent of the rain falls, while from midnight to 8 a.m. only 21 percent falls. The wettest single hour is from 2 to 3 p m., while 4 to 5 p.m. is a close second. The driest hours are from midnight to 2 a.m.

Details of mean monthly precipitation are given in Table XVIII and distribution of rainfall is shown in Maps 6,7 and 8. Along the Tenasserim Coast, Thaton Tavoy and Mergui receive 217, 208,

[11] According to Chang, op. cit. Map Fig 2, p. 376, the average dates of the onset of monsoon are: Tavoy May 20, Rangoon,May 25, Akyab end of May, Shan States, North and Central Burma, June 1.

TABLE XVI

BURMA: MEAN NUMBER OF DAYS WITH THUNDERSTORMS

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Years Record
Mergui	2	5	14	15	23	18	10	8	10	17	13	4	139	10
Tavoy	2	1	9	9	11	3	2	1	5	11	5	1	60	10
Victoria Point	3	6	17	26	22	12	13	7	9	14	15	9	154	10
Diamond Island	*	0	1	1	11	6	2	2	3	11	4	1	44	10
Rangoon	0	1	1	5	11	8	7	7	7	5	2	*	51	10
Toungoo	0	0	1	5	11	8	4	6	7	8	2	0	52	8
Mandalay	*	*	1	5	12	7	4	7	12	7	*	0	55	8
Bhamo	0	2	2	6	10	10	6	6	11	3	1	0	57	4
Myitkyina	0	3	3	4	5	4	3	3	5	3	0	0	33	4
Lashio	0	1	2	9	13	14	9	10	11	5	1	0	75	4
Akyab	0	*	1	3	17	12	3	4	9	10	2	0	61	8
Sandoway	*	*	0	4	16	12	5	5	8	13	5	0	68	8

* < 0.5 Day.

TABLE XVII

BURMA: NUMBER OF TROPICAL CYCLONES CROSSING SECTIONS OF THE BAY OF BENGAL IN 50 YEARS

Area	Jan - Mar	Apr - May	Jun - Sept	Oct - Dec
Calcutta, India to Akyab	0	11	23	19
Akyab to Diamond Island	0	9	1	11
Diamond Island to Moulmein	0	6	0	0
Moulmein to Victoria Point	0	0	0	0

SOURCE: Burma, Climatic Data Tabulation: Prepared by Climatology Division, S&CS Weather Wing APO, 925, May 1962

TABLE XVIII

BURMA: MEAN PRECIPITATION (INCHES)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Years Record
Kawkarei	0.2	0.4	1.0	2.5	16.5	33.5	48.0	49.6	27.7	10.7	2.0	0.4	192.4	39
Mergui	1.0	2.1	3.1	5.0	16.7	30.0	32.9	30.0	24.9	12.1	3.8	0.8	162.3	60
Moulmein	0.2	0.2	0.5	3.0	19.9	37.1	47.5	44.2	27.1	8.5	1.7	0.3	190.1	60
Tavoy	0.2	0.5	1.3	3.4	19.8	43.5	48.9	45.0	32.6	10.4	2.4	0.3	208.3	81
Thaton	0.1	0.3	0.7	3.3	22.8	42.5	53.4	50.2	31.3	10.1	2.0	0.4	217.0	50
Victoria Point	0.4	0.7	2.2	5.1	19.8	28.3	28.8	26.1	28.0	17.6	6.3	2.3	165.6	30
Bassein	0.1	0.2	0.2	1.1	9.6	23.0	25.1	23.7	14.7	7.6	3.1	0.5	109.0	60
Diamond Island	0.1	0.2	0.2	1.3	11.2	25.2	27.6	25.5	17.3	8.4	5.0	0.8	122.7	60
Kyangin	*	0.1	0.1	0.7	7.4	11.9	12.7	12.1	9.9	5.5	2.2	0.5	62.8	50
Minhla	0.1	*	0.2	0.4	8.6	15.9	17.7	15.2	12.2	5.8	2.4	0.4	79.0	38
Papun	0.1	0.2	0.5	1.9	12.9	24 0	26.9	23.6	14.9	6.6	1.9	0.5	114.0	50
Pyapon	0.1	0.2	0.3	1.4	11.1	19.9	21.8	20.6	13.6	7.7	3.2	0.9	100.7	50
Rangoon	0.1	0.2	0.3	2.0	12.1	19.0	22.9	20.8	15.5	7.1	2.7	0.4	103.1	60
Shwegyin	0.1	0.3	0.3	1.8	11.6	27.3	36.5	33.7	19.3	9.0	1.8	0.3	141.8	72
Toungoo	0.2	0.2	0.3	2.1	8.0	14.5	17.9	18.9	11.7	7.2	1.9	0.4	83.2	60
Gangaw	*	0.1	0.3	1.0	5.4	8.0	7.5	8.8	8.1	6.3	1.4	0.3	47.1	51
Kama	0.0	0.1	*	0.9	5.7	8.8	8.5	8.3	7.1	4.2	1.5	0.3	45.3	50
Mandalay	*	0.2	0.2	1.4	5.9	5.9	2.8	4.0	5.8	5.0	2.5	0.4	34.3	50
Monywa	0.1	0.1	0.1	0.9	4.8	4.6	3.0	4.7	6.0	5.2	1.6	0.3	31.3	35
Myingyan	*	0.1	0.1	0.5	3.9	3.5	3.0	4.2	6.0	4.2	1.4	0.4	27.4	54
Nagpe	*	0.1	0.2	0.9	5.0	7.8	6.2	5.9	7.5	6.2	3.3	0.6	43.7	42
Sale	*	0.1	0.1	0.5	3.3	3.6	1.8	2.3	4.4	4.0	1.5	0.3	21.8	46
Saw	*	0.1	0.1	0.7	5.6	8.5	6.5	9.0	10.8	8.4	2.3	0.6	52.4	45
Tagaung	*	0.3	0.3	1.8	8.6	7.2	5.2	6.0	7.8	6.8	2.2	0.6	46.8	26
Taungdwingyi	*	0.1	0.1	0.9	5.3	6.6	6.2	7 4	7.7	4.8	1.8	0.3	41.3	53
Thabeikkyin	0.1	0.2	0.2	1.3	7.4	7.3	5.0	7.5	7.7	5.8	2.1	0.4	45.0	36
Yamethin	0.1	0.2	0.4	1.9	5.4	4.8	4.0	5.9	7.1	5.9	2.2	0.4	38.2	45
Yenangyaung	*	0.1	0.1	0.6	3.6	4.2	2.8	3.2	4.2	4.3	1.9	0.4	25.4	47
Ye-U	0.1	0.2	0.2	0.9	5.3	5.9	4.3	5.7	6.8	4.7	1.2	0.3	35.5	55
Bhamo	0.4	0.6	0.7	1.8	6.1	14.1	16.7	16.1	9.8	4.6	1.7	0.5	73.1	55
Homalin	0.2	0.8	0.8	1.6	7.2	19.9	20.1	19.1	15.5	7.5	1.4	0.3	94.3	46
Htawgaw	1.3	4.0	3.8	6.3	9.2	16.0	13.5	10.5	7.7	6.7	3.1	1.0	83.0	27
Kalewa	0.1	0.3	0.2	1.5	6.7	11.2	11.0	13.6	10.9	9.5	1.6	0.4	67.0	30
Mogaung	0.4	0.8	1.2	1.9	7.1	17.7	18.9	18.1	10.2	6.2	1.4	0.5	84.5	49
Mohnyin	0.4	0.9	1 0	2.1	8.7	15.7	13.1	13.4	10.5	8.0	2.2	0.6	76.5	36
Myitkyin	0.4	0.9	0.9	1.8	6.3	18.9	18.8	17.1	10.1	7.2	1.5	0.5	84.4	45

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and 162 inches of rain per year, respectively. Of this, over 95 percent occurs during the s.w. monsoon period (May to October). The village of Laungion, about 10 miles south of Tavoy, receives the highest annual rainfall recorded normally for the Tenasserim station, i.e., an average of 226 inches. No recording of rainfall is done in the hills east of Tavoy which rise to about 5,000 feet above sea level and may be receiving still heavier amounts.

On the Arakan Coast, Akyab's normal annual rainfall is about 200 inches, but in several years since the regular recordings began in 1861, the total has exceeded 220 inches. In 1918 over 323 inches of rain were recorded. Further south, Sandoway's normal annual rainfall is 214 inches in a record of 74 years. There is no systematic rainfall recording on the monsoon-facing slopes of the hills.

In the Delta area south of Bassein, precipitation averages 125 inches. At the eastern end of the Delta at Shwegyin in the Sittang Valley near Papun, at an elevation of 6,000 ft., the annual average is 140 inches. At the seaward edge of the middle of the Irrawaddy Delta, rainfall averages from 100 to 120 inches. It decreases rapidly over the delta northward. There is a marked decrease in rainfall northward from Prome toward the heart of Burma until Dry Zone conditions are established in the rain shadow of the Arakan Yoma. North of the dry belt the rainfall increases once again into Upper Burma and the Northern Highlands.

January is the driest month for the whole of Burma. No station reports more than 0.25 inches of rainfall in January. However, the long-term averages in the Naga Hills, Hukawag Valley and Kachin State may rise to 0.75 inches (see Map 7).

In February the rainfall pattern is much the same as in January, though somewhat higher amounts are received in the Naga Hills, Kachin State, eastern Shan Plateau and Mergui area. There are also some showers in the Irrawaddy Delta. Storms of Atlantic origin (the Western disturbances familiar at this time of the year in the Middle East and Iran, Afhanistan and the Northern Plains of the Indian Subcontinent) penetrate as far as Northern and Central Burma and the Shan Plateau and are responsible for the sporadic precipitation in January and February. This rainfall is important to the practice of slash-and-burn type of shifting cultivation (taungya). The rain helps to keep fires under control in the newly cut areas. It also promotes the growth of planted crops laid out in the taungya.

By the middle of March the inter-tropical front normally moves north of the equator and extends from Ceylon across the southern Bay of Bengal to the Irrawaddy Delta. During this period small amounts of precipitation occur all over Burma except the Central Dry Zone. But on the whole March can be said to be a dry month: the Mergui area including the archipelego is an exception. In April, the amounts of

rainfall increase everywhere, but high temperatures ranging from 90° to 100°F or more, make ground water from this rainfall disappear quickly. In May, things begin to change. The excessive heating of land areas continues. Monsoon winds begin to make their appearance along the Tenasserim Coast. The Dry Belt becomes quite pronounced and it draws winds from the sea, due to the thermally induced low pressure. Afternoon and evening thunderstorms are common over the region. The Arakan Coast receives more than 10 inches of rain during this month.

The Dry Belt has the least number of rainy days, while the Tenasserim Coast and the Kachin area in the north have the most. The Arakan Coast and the delta region have an intermediate position. At Pakokku the number of rainy days per year is only 38, while the total rainfall is 25 inches. At Victoria Point in the extreme south of the Tenasserim Coast the number of rainy days is 157 and the total rainfall is 166 inches But the highest average rainfall per rainy day is at Akyab on the Arakan Coast, where the number of rainy days is 125 and the annual rainfall is 203 inches.

For the country as a whole, the largest number of rainy days is spread over the period from May to October and mostly during the height of the monsoon season from June to September. January is usually the month showing the least number of days of rainy weather. Only the Kachin State north of Bhamo, and particularly the mountain area along the Chinese border, records wet periods about 1 day out of 10. Table XIX gives the mean number of days with precipitation for selected stations on the basis of overall climatic differences and rainfall during different parts of the year.

The simple reference to the climate of Burma as wet or humid tropical with monsoonal activity does not seem to bring out the significant variations which influence both plant growth and human comfort; but the foregoing general appraisal of the main climatic elements may provide a basis for suggesting broad climatic divisions. There is a paucity of data and it is not possible to obtain a complete picture of the climatic elements in some parts of the country, especially the mountainous areas. But it can be said that the winter months are certainly cold and in the highland areas above 3,500 or 4,000 ft. freezing temperatures may be experienced from December through February. Considering all the relevant factors, the following 12 climatic divisions may be suggest. (See Map 5).

TABLE XIX

BURMA: MEAN NUMBER OF DAYS WITH PRECIPITATION (SELECTED STATIONS)

Stations	Dec Jan Feb	Mar Apr May	Jun Jul Aug	Sep Oct Nov
Tavoy	7	8	27	13
Thaton	1	8	28	12
Mergui	2	10	25	15
Akyab	1	5	26	11
Sandoway	1	4	27	11
Gwa	1	4	26	10
Fort White	1	7	24	12
Kanpetlet	1	6	22	14
Ngape	1	2	12	7
An	1	5	27	11
Myingyan	1	2	6	6
Monywa	1	3	6	6
Mandalay	1	4	7	6
Yamethin	1	3	10	7
Minhala	1	3	21	10
Toungoo	1	5	23	10
Papun	1	6	27	11
Bassein	1	4	25	12
Rangoon	1	5	24	11
Wuntho	1	5	14	9
Bhamo	1	6	19	8
Myitkyina	2	6	20	8
Sumprabum	3	11	25	11
Htawgan	4	11	21	9
Putao	3	10	26	12
Tangyan	1	6	21	10
Loi-Lem	1	6	20	12
Taunggyi	1	6	19	12
Keng Tung	1	6	16	7

SOURCE: Schutz, C. Monsoonal Influences on Wind, Rain and Clouds throughout Southeast Asia. Santa Monica, Cal., Rand Corp, Oct. 1967. (RM-5418-PR) App C, pp. 103-107.

The Arakan Coastal Area·

The coastal area and the lower western slopes of the Arakan Yoma have very heavy monsoon rains, averaging 160 inches or over. It is generally warm, with mean annual minimum temperature around 72° F, a mean annual maximum temperature of 86° F and an absolute maximum of 100° F. The absolute minimum temperature at Sandoway has been recorded as low as 45° F and 43° F in December and January, respectively. The area is thickly forested except the clearings for cultivation.

The Arakan Yoma and Western Highlands (including Chin and Lushai Hills):

There are very heavy monsoon rains because of the increased elevation, and the area is cooler than the coast. Mean annual minimum temperature is 54° F, mean annual maximum temperature is 68° F, and absolute maximum is 86° F. Absolute minimum temperatures at Kanpetlet and Haka in the Chin Hills may drop as low as 33° F and 35° F in December and January. The hills and valleys are thickly forested.

The Delta Region:

The delta of the Irrawaddy and Sittang Rivers receives heavy monsoon rains, and there is prounounced seasonality. It is moderately warm. Mean annual minimum temperature is 73° F, mean annual maximum temperature is 89° F, and absolute maximum temperature is 105° F. The absolute minimum temperature at Rangoon may drop as low as 55° F in December and January. Paddy cultivation has largely replaced natural vegetation.

The Highlands of Pegu Yoma:

This area is rainier than the Delta during the monsoon months. Heat is modified by elevation. The highlands are densely forested.

The Sittang Valley:

Heavy monsoon rains, i.e., an average annual amount of 75 to 90 inches occur in this area. It has lower mean annual minimum temperatures than the delta, and mean annual maximums are slightly higher. The absolute maximum is 108° F. The absolute minimum temperature at Toungoo may drop as low as 47° F. The area is partly forested and partly cultivated.

The Tenasserim Coast:

Very heavy monsoon rain averages between 120 and 200 inches annually, and the area is more humid throughout the year than the rest of Burma. Mean annual minimum and maximum temperatures are 72° F and 88° F respectively. The absolute maximum temperature is

100° F. An absolute minimum temperature of 55° F has been recorded in Moulmein. But on the whole, there is little seasonality in the climate. This area is largely forested, but there are several rubber plantations.

The Tenasserim Highlands:

These highlands extend with considerable elevation (2,500 to 5,000 ft.) from northeast of Moulmein to Victoria Point. There is very heavy rainfall, above 200 inches annually, but little seasonality. Temperatures are modified by elevation and are generally lower than in coastal situations. It is a densely forested region.

Dry Region of Central Burma:

This area lies mostly in the middle Irrawaddy Valley extending in the north from Shwebo to Thayetmyo in the south. The east-west dimension is roughly determined by the lines of hills on either side. The inner core area from Myingyan to Minbu is very dry. Low annual rainfall ranges between 20 and 40 inches. December, January and February are very dry months. The mean annual minimum temperature is 70° F and the mean annual maximum temperature is 90° F. At various stations in the area the absolute maximums range from 110° F to 114° F. Low absolute minimum temperatures have been registered at Mandalay (44°F), Monywa (46°F), and Minbu (45°F). The area experiences pronounced seasonality. Irrigation is essential for farming.

Shan Plateau (Eastern and Southeastern Areas):

Moderate rainfall (from 40 to 60 inches) occurs in this area. It is somewhat dry and cool and many areas are forested. Data on temperature are lacking.

Shan Plateau (Northern, Western and Southern Areas):

These areas have considerable elevation, varying from 3,000 to 6,000 ft. Rainfall ranges from 60 to 80 inches and most of it comes during the summer months. Mean annual minimum temperatures remain around 55° F to 60° F and mean annual maximums rise from 75° to 80°. Absolute maximums of 100° F and absolute minimums of 31° F have been recorded at Lashio and Maymyo. Data are scanty, especially for the remote areas. Many parts of the plateau are forested, while some areas have meadowlands. Some "taungya" is also practices, especially in the northern parts. These areas are generally among the pleasantest in Burma.

Upper Burma:

This is a vast area, partly hilly and partly undulating, and extends from Wuntho on the south to north of Myitkyina between the Irrawaddy and Chindwin River Valleys. It is moderately wet, with rainfall ranging from about 60 to 80 inches. There are some moderate winter showers. Mean annual minimum temperature is 65° F and the mean annual maximum is 80° F. The absolute maximum temperature is 105° F at Myitkyina and the absolute minimum temperature at Bhamo is 37° F. There is distinct seasonality, but the climate is generally pleasant. Many areas are forested, but considerable areas await cultivation and settlement.

Northern Burma:

This is the remote northernmost mountainous area of Burma. The headwaters of the Irrawaddy and Chindwin Rivers are located in this area. The average elevation is above 6,000 ft. and several peaks rise beyond 11,000 ft. The southwestern part of the area contains the Patkoi and Naga Hills. There are high passes into both Assam and China. Monsoon rains reach this region in full force and the annual rainfall averages more than 150 inches. Putao, the only prominent station supplying meteorological records, registers an annual rainfall of 156 inches. The area also receives winter rain in December, January February and March, a total of over 10 inches for these months. (For Climatic Divisions See Map 5).

V. VEGETATION, FORESTS AND SOILS

Forests and forest products constitute a great national asset for Burma. Use of forest resources is of growing significance. Utilization is concerned with extraction, milling and commercial use of leading woods and timbers. The most significant use is for construction and timbers and woods are important exports. Apart from valuable timbers and woods, the forests yield turpentine and resin, lac, tannin extractions, firewood and charcoal.

The forests of Burma cover some 57 percent of the country's total land area. About 90 percent of the reserved government forests are in Burma proper and the other 10 percent are in the Shan States. North Burma, Northwestern Hill Region, Arakan, Shan States and central and southern Tenasserim have extensive non-reserved forests. Large pasture and natural grass areas exist only in Northeastern and Southwestern Shan States. Tidal and mangrove forests are found in the southernmost part of the Irrawaddy Delta and scattered along the Arakan and Tenasserim coasts.

Burma is the largest producer of teak and its forests contain about 75 percent of the world's supply. Teak is the next most valuable commodity going out of the country after rice and other agricultural products.

Frost does not occur in the lowlands, but above 3,000 feet it brings about significant changes in vegetation. Above this level, which may be called the frost line, evergreen oak forests, sporadic pine forests and wide areas of open land with bracken and grass are common. Rhododendron forests occur at high levels. Below the frost line the natural vegetation depends mainly upon the rainfall.

Forest Types

Several well-marked types of forests may be recognized. Generally speaking, where the rainfall exceed 120 inches, the forests are mainly of the tropical evergreen type; with a rainfall 40 to 120 inches the dominant type is mixed deciduous or monsoon forest merging into tropical evergreen in moist localities and other evergreen types on the hills. The deciduous forests are the home of teak and other valuable species and are economically the most important in Burma. In the Dry Zone, where the rainfall is less than 40 inches, the forests are mainly of a dry open type, producing small-size timber only.

The tropical evergreen forests are those that come nearest to fulfilling the popular idea of a tropical forest, rarely penetrated by the full light of the day. The mixed deciduous forests are of a more open type and the most pleasant places to move, live and work, except

during the rains when insect pests are much in evidence.

Tropical evergreen forests may exist even with precipitation from 60 to 100 inches in shady valleys and cool and moist conditions of climate. Bamboo predominates in this type of forest. The dense forests contain a variety of species growing in tiers of which the uppermost attain a height of 150 feet or more, and may include deciduous trees. Nearer the ground, there is a great profusion of evergreen species over a dense undergrowth of shade-bearing palms, climbers and canes. These often constitute an almost impenetrable mass of vegetation. Movement is not easy in these forest areas. These forests are a source of valuable woods and timbers of commercial importance. Leading items are kanyan, thingan, thingadu and pyinma, all of which are fine structural timbers. The thitka is suitable for panelling and furniture. The Tenasserim forests are the main source of supply of these varieties.[1]

The tropical evergreen forests consist of many species of trees, but more than half belong to Dipterocarpaceae. The timbers are hard and little used Tropical rain forests cover the whole length of the western Arakan Yoma, the southern part of Pegu Yoma, the western edge of the Shan Highlands, a narrow belt astride the Salween River up to 25°N Lat., and the whole of Tenasserim.

Monsoon forests thrive where rainfall ranges between 40 and 80 inches The trees lose their leaves at the commencement of the hot season. The forests abound with teak trees, providing one of the world s most useful hardwoods. In shrinkage, strength and heaviness, teak surpasses European and American timbers. Teak trees when fully mature attain heights of 100 to 125 feet. The girth at breast height is from 6 to 12 feet The tree grows best at elevations from 2,000 to 3,000 feet above sea level, but lower elevations may also carry good teak.

Two types of teak forest may be distinguished: the drier ones with thickets of bamboo: and a wetter type, which is the source of most of the commercial teak in North Tenasserim, Pegu Yoma and near Bhamo and Katha in Upper Burma Above 3,000 feet elevation this forest merges into oaks Conifers appear on higher parts of the Arakan Yoma and over the Patkoi Ranges in the Northwest.

The Pegu Yoma contain the largest and the most valuable blocks of reserved forests (See Map No.10) in Burma. The forests in the Pegu Yoma extend northward uninterruptedly for about 300 miles, starting 25 miles north of Rangoon. Pyinmana and Toungoo are the main points for forestry operations and the eastern side of the Yoma and Prome and Tharawaddy serve the same purposes on the western side of the hills. Besides teak, these forests also contain other notable hardwoods such as Pyinkado which is very suitable for making railway sleepers.

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[1] Morehead: Forests of Burma, Pamphlet No. 5, 1941, p. 8.

Mixed deciduous forests are found in areas where rainfall ranges between 50 and 60 inches. They may extend to regions beyond these climatic limits Most trees lose their leaves at the commencement of the hot season. Foliage comes up quickly in summer before the rains. These forests are open and do not bar movement. More moist areas contain the bamboo and pyinkado, and teak is the outstanding tree. Both in the dry upper mixed deciduous forests and the lower mixed deciduous forests there are different varieties of hardwoods, but teak is found in abundance.

Dry Zone forests are found in areas with less than 40 inches of rain annually. The forest becomes poor and with increasing dryness passes into scrubland. There is little or no true grassland. The Dry Zone of Burma extends roughly from Shwebo in the north to Thayetmyo in the south and contains these forests.

Tidal and mangrove forests cover the southwestern face of the Irrawaddy Delta which has a rainfall of over 90 inches; here there is a thick deposit of deltaic sediments. Tidal mangrove forests are also found scattered along the Arakan and Tenasserim coasts and adjoining islands. In these coastal areas and islands of Tenasserim, they do not occur on sandy beaches and rocky shores and on positions exposed to wind and wave. But they grow favorably in the shelter of river estuaries, tidal creeks, lagoons and low islands heavily impregnated with silt. The outer belt of the forest consists of mangroves. The trees grow near the sea margin in deep mud and are under sea water at high tide. There are masses of stilt-like roots protruding from the ground and aerial roots which come down form the branches to find anchorage in the mud The profusion of vegetation along with the soft slimy mud makes movement inland very difficult. No mechanical craft or vehicle can move in this vegetation; only nimble-footed individuals can inch their way cautiously. Visibility is poor and firm ground is hard to find. Therefore, all movement is confined to water channels. Commercially, the tidal forest is useful for the supply of firewood and tanning material. Some species are being used for rifle stocks, furniture, boat building, and as in the Bengal Sundarban, new possibilities may open with such industrial uses as pencil making, matches and sortwood for the newsprint industry.

The beach and dune forests form a narrow belt along the Arakan and Tenasserim coasts. They are above high-tide limit and are partly evergreen and partly deciduous. They yield some timber and fuel. The swamp and lowland forests by river or lake sides also provide timber for local uses.

Natural grass or pasture areas are scattered over the transition zones from the wet to the dry areas.

Economic Aspects of Forests

Teak occurs naturally in the mixed deciduous forests of the plains and the foothills of Burma, except in the Arakan, South Tenasserim, the extreme north, or at elevations generally over 3,000 feet above sea level. Teak forests of Burma are capable of a sustained annual yield of 400,000 tons or more. Teak usually occurs by itself or in groups of trees scattered throughout the forest among the other species. It is estimated that it forms about 12 percent of the whole stock of the forests in which it occurs. The virtue of the teak timber lies in its strength, durability, and immunity to white ants and fungus. It needs no artificial preservative treatment to prolong its life.

Teak trees in Burma attain girths of 10 to 15 feet and the first branches start at a height of about 100 feet. Logs weighing up to 10 tons have been cut in Burma.

The selected trees are "girdled" by cutting a ring all round the bark close to the ground. The dead trees are left standing for three years before felling, by which time the sap has dried out and the logs are light enough to float. Some of the best teak grows on steep slopes, beyond the reach of tractors and machinery. Therefore elephants are used to move the felled logs to the nearest stream capable of floating them to one of the main rivers, during the flood season In the main river, the logs are tied into rafts, which are floated down to sawmills. The biggest sawmills are in Rangoon. The journey to Rangoon may take about a year.

When the green teak tree is girdled, the sapwood is light yellow and the heartwood chocolate brown color. When dry, the heartwood is golden brown and sometimes shows dark streaks. With age and exposure to the air, the wood turns dark brown. It is usually straight and even grained. Teak is used extensively in furniture making, boat and ship-building, railway cars and pullmans, panellings and fittings in buildings and homes.

In 1942 the average annual production of teak on a 15-year basis was 446,113 tons. All timbers other than teak made up an output of 482 363 tons. These timbers were Pyinkado, Padauk, Thitya-Ingyin (Burma Sal) Pyinma and In-Kanyin. The minor forest products included firewood, charcoal, bamboos, canes, tanning barks, lac, cutch, thitsi, etc. Royalty value of minor forest products in 1939-40 was Rs 522,449.[2] Apart from teak, nearly fifty forest species are now commercially utilized, and it is said that there are almost 250 additional species which may be of potential commercial value.[3]

[2]Andrus: Burmese Economic Life, 1947, p. 108. One rupee is equal to 21 cents (U.S.) approximately.

[3]Horehead: op cit p. 13 See also ECAFE: Survey of Housing and Building Materials in Asia and Far East, Bangkok, Nov 1956, pp. 19-23.

The Burmese forests are rich with an immense variety of fauna. Of outstanding importance is the elephant who figures prominently in the economic exploitation of the forest. Only the males bear tusks, and the Burmese elephant is generally smaller than the African counterpart. The elephant can do heavy forest work on all kinds of terrain from mud, sand, water, and rocks and boulders to hill slopes. Mechanical equipment such as tractors are of only limited use, and under the prevailing conditions are less economical than the elephant for timber work in most of the teak forests. At the time of the Japanese invasion in 1942, there were about 6,500 tame elephants in Burma and the estimated number of wild elephants was nearly 5000.[4]

Wild elephants are caught, tamed, and trained in forest work and other tasks Training the young elephant to obey the commands of his "oozie" or rider is a long process. The average number of elephants caught is about 200 per year; this is permitted only under license and supervised by the Forest Department, to ensure proper and humane treatment of captured animals. They are captured in two ways. In North Burma, in the Myitkyina and Hukawng Valley regions, elephants are caught by chase with the help of tame animals under the system called "Mela Shikar." But, in other forest areas the operations involve the building of a stockade into which the unsuspecting wild elephants are led by the tame ones. It takes about two years to properly train elephants for forest work The calves born to tame animals can be trained into regular disciplined work in about seven to eight years. It is said that the life history of an elephant approximates closely to that of humans.

Elephants become mature at twenty and are at their best working years between 25 and 45. They may be retired when 60 or 70 years old. Some reach the ripe old age of 100 years. Male elephants grow to be about 10 feet tall at the shoulders and females may be two feet shorter. The males sometimes have tusks six to eight feet long. A fully grown elephant may weigh up to three or four tons and may consume over 1,000 pounds of green fodder in 24 hours. A good male elephant under average conditions can drag up to 200 tons of teak logs from the stump to the floating stream in a season. Maximum load carried by a good baggage elephant is about 1,200 lbs., including the pack gear. Many female elephants are used for this purpose. At present about 300 elephants work in the forests of Burma.

Forest Exploitation

A century ago most of Lower Burma was covered with forests. Teak was a valuable product even at that time, though it had not entered international commerce. The famous convict ship "Success" was built of Burmese teak in 1790 and crossed the Atlantic under its own sail

[4] Ibid., p. 13.

in 1812. In 1855, Lord Dalhousie, then Governor General of India, made teak trees State property in Lower Burma and the Forest Department was set up in 1856.

Timber and associated products constituted about 7 percent of Burma's total output in 1938-39 and they also made up about 7 percent of the value of all exports. In fact, the value of timber exports on the eve of World War II matched that of all materials under the category of agricultural produce other than rice. Of the minor forest products, lac and cutch were exported.

After World War II the forests in Burma became entirely State owned and all organized forestry became the responsibility of the Forest Department. A State Timber Board was set up to look after economic exploitation, commercial transactions and exports concerned with the resources of the entire reserve forests. Around 1955-56, the Board employed over 4,200 permanent workers in its saw mills and over 15,000 seasonal workers in logging camps. In October 1963, the State Timber Board assumed sole responsibility for extracting, converting and distributing all kinds of timber. All shops in the country dealing in timber have been nationalized and reorganized into 250 People's Timber Shops.[5]

Burma's production of timber as well as export trade in timber declined after World War II. But in recent years, slow yet steady recovery has been maintained. (See Table XX).

In 1952-53, the foreign consultants of the KTA[6] did not go fully into the question of the forest resources of Burma, but made a number of useful general suggestions for improvement. These included the stepping up of teak girdling in the forest, emphasis on mechanized traction, and the gradual replacement of elephant power. KTA also recommended a greater utilization of Burma's forest resources by the establishment of six factories at a total cost of K 77 million. Of these, the largest was to be a bamboo pulp and paper mill, estimated to cost K 66 million. Other plants recommended were a saw mill, a wallboard plant, a plywood plant, a joinery plant and a furniture factory.[7]

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[5]Economic Survey Burma, 1964, p. 24.

[6]KTA; Knappen Tippetts Abbett Engineering Company, New York, were invited by the Burmese Govt. in 1951 to prepare a report on planning economic development of Burma. They made recommendations in a Preliminary Report and 2 Vols. of detailed reports. See Bibliography and Chapter on Resources Planning and Development, infra.

[7]KTA, Vol. II, p. 815.

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TABLE XX

BURMA: PRODUCTION OF TIMBER*
(In cubic tons of round logs)

Type of Wood	1936-37 to 1939-40 Average	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64 Revised Estimates
Teak	453,481	237,183	249,834	292,724	282,886	313,829	340,317
State Timber Board	...	199,905	220,299	260,053	237,824	285,169	340,317
Private and others +	453,481	37,283	29,535	32,671	45,062	28,660	...
Non-teak	501,866	597,711	574,751	671,480	693,737	779,471	660,726
Pyinkado	117,823	133,701	133,630	135,700	151,761	212,054	n.a.
Padauk	6,714	9,008	9,767	11,370	9,893	9,766	n.a.
Thitya-Ingyin	24,574	37,945	36,744	63,292	48,765	34,376	n.a.
In-Kanyin	176,712	246,395	275,411	291,712	305,604	350,108	n.a.
Pyinma	7,437	4,922	3,779	3,472	3,214	5,705	n.a.
Matchwood	168,606	9,600	10,221	15,873	11,615	17,456	n.a.
Other Timber	...	156,140	125,199	150,061	162,935	149,966	n.a.
TOTAL	955,347	834,899	824,585	964,204	976,673	1,093,330	1,001,043

*Measured at royalty collecting stations (F.D.) for years up to 1962-63 and arrivals at Main River Depots (STB) for 1963-64.

+Includes small amounts extracted by the Forest Department.

n.a. -- not available

SOURCE: (1) Office of the Chief Conservator of Forests.
(2) State Timber Board. See Econ, Surv. Burma, Rangoon, 1964, Table 13, p. 21.

The newly constituted State Timber Board made some interim recommendations to the Implementation Conference of the Pyidawtha[8]; these were implemented by the government. Designs were prepared for the proposed Forest Research Institute in 1958; but the major forest-industries recommendations of the KTA consultants were not carried out. One of the chief deterrents in extending extraction and expanding production and processing was the insecurity experienced by the Forest Department due to the continued insurgency. However, during 1955-57, the rate of girdling teak trees was raised and in 1963-64 it stood at 24,000, six to seven times that of 1954.[9] The loss of elephants was partly met by the employment of buffaloes.[10] In 1957-58, the three mechanical timber extraction units added about 20,000 tons each to the volume of extraction. The work of the State Timber Board was made more difficult by the obsolescence and limited capacity of the six existing mills. Thus, improved quality exports required for the United Kingdom and other European markets were not easy to achieve.

By 1960, the sawmill output of teak was only 75,000 cubic tons and exports were also not much above that level (93,000). In 1959-60, forestry contributed K 376 million to the gross domestic product (in 1947-48 prices) The extraction and production of non-teak timbers, handled by the private sector, had expanded to exceed even the pre-war levels. The critics[11] of nationalization programs have praised this situation. But in fairness to the state enterprise in teak, it must be realized that the main teak areas were located in more active insurgent areas thus the same circumstances did not prevail as regards extraction of non-teak woods; moreover, graft and tribute paid by private operations to insurgent groups in control of some of the forests, could not be followed by the state agencies. Therefore, the rate of recovery in teak extraction and handling was slower than in other woods and timbers.

The export of timber before the war as compared with the years since independence is given below:

EXPORT OF TIMBER
(in tons)

	1936-37 to 1939-40 (average)	1959-60	1960-61	1961-62	1962-63	1963-64
Teak	227,283	90,591	92,035	119,019	145,889	150,000
Hardwood	43,982	10.264	9,700	18,657	22,313	5,150

SOURCE: Economic Survey Burma, 1964, p. 25.

[8]Conference held in 1952 to formulate ideas concerning establishment of a welfare state in Burma.

[9]Economic Survey Burma, 1964, Table 16 p. 24.

[10]In timber extraction work in 1965-66, the following were employed: elephants (3,253)· buffaloes (19,102); tractors (45); and trucks (1,626)

[11]Walinsky· Economic Development in Burma 1951-60, p. 340.

Teak production, in 1934-40, averaged 466,000 tons and the exports were approximately 216,000 tons. In 1957-58 the annual teak production was 188,000 tons and the exports were 150,000 tons.[12] In 1960, teak production had risen to 312,000 tons, but exports registered only 92,035 tons. Exports rose to 150,000 tons in 1963-64. During these years the basic reasons for low production remained the same, disturbed security, shortage of trained workers, scarcity of trained elephants (the number of working elephants was only about 900 in 1960), and lack of tractors. The Timber Board began to lay more emphasis on mechanical cutting equipment and more tractor haulage, and forest and link roads received repairs. But of the seven sawmills in 1961, of which five were in Rangoon, only one had modern equipment. In 1961, the Board[13] also made a new plan which included new sawmills with a yearly capacity of 75,000 tons and the establishment of a veneer and plywood factory.

In pre-war years, the export of teak was exclusively sawn timber and at present, attempts are being made to increase the export by increasing the milling capacity. In recent years, increasing quantities of dry round logs and green and semi-green teak round logs are being extracted. In addition to the export of teak, the State Timber Board (STB) also exports hardwoods on behalf of private timber traders. The sizeable increase in non-teak hardwood export is also due to the purchase of railway sleepers by the government of India.[14] The production of round wood as a whole, according to United Nations[15] statistics was as follows:

Million cubic meters (solid volume of round wood without bark) 1948 (2.3); 1960 (3.3); 1962 (3.5)

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[12] Mission, Labour Office, Geneva, 1960, p. 17.

[13] Quat. Econ Rev. (EIU), London, No. 35, Sept. 1961, pp. 1-2.

[14] Econ. Surv. Burma, Rangoon, 1961, p. 21

[15] Statistical Yearbook, U N O. 1965, Table 48, p. 152

Soil Types

The three chief types of soils in Burma[16] are: hill and mountain soils; residual; and alluvial soils (Map No. 11). The residual soils are older and thoroughly weathered i.e., oxidized and leached. If the original rock is granite it may give rise to loams and sandy loams, and if the granite is poor in quartz the resulting soil may be silt or clay. Soils developed from limestones are generally clays and loams with characteristic red or yellow colors, as, for example, over the Shan Plateau. In most of the highland areas red earths and laterites are common due to the limestone formations. Thus, much of the soils of the plateau are typical examples of residual soils. They have a stiff tenacious character. The soil contains nodules of iron oxide of varying sizes. In areas of steep slopes, soil cover becomes thin, while with food drainage and in basin formations, a thick dark loamy soil is formed, often with the accumulation of humus; such soils are very fertile. The largest proportion of the soils of the Shan Plateau have been formed on a matrix of limestone which has changed into a thick mantle of clay and red earths, showing no trace of the initial limestone.

In younger soils, the effect of the composition of the parent material is generally prominent, but as the soils reach maturity or fuller development under the prevailing climatic conditions, the influence of the source material is greatly reduced. Permo-carboniferous rocks yield blue-grey or yellow soils. The Negrais series are variable, loamy to a clayey soil. The Mergui series are heavy brownish red, clayey soils. The gneiss and micaschists give orange to bright red soils which are often micaceous and sandy. Heavy rain and dense vegetation play an important part in soil formation in the Arakan and Tenasserim areas. The soils derived from volcanic material e.g., those of Mount Papon the Lower Chindwin and Wuntho regions, are very fertile. The red soils of the Naga and the Arakan hills are derived from serpentine and are generally less fertile.

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16 In recent years a great deal has been added to the knowledge of soils of Burma by Soviet soil scientists. Former contributions were made by Chhibber (1934), Stamp (1950), Dobby (1954), Coggin-Brown and Dey (1955). Nuttonson also wrote about the Soils of Burma in 1963. But more systematic work was the result of soil surveys and mapping done by Soviet specialists Karmanov, Rozanov, and Rozanova, between 1957 and 1959 under the aegis of the Burmese Land Utilization Office, which proposed to produce a 1:253,000 Soil Map of Burma. By 1961, about 2/3 of the territory of the Union had been mapped. Between 1961 and 1966, contributions on Soils of Burma appeared in the Soviet Journals POCHVOVEDENIYE and DOKLADY, No. 13, Supplement, 1965, p. 1601. Kingdom-Ward has made useful contributions on Soils of North Burma (1956). See Bibliography.

The Pegu series consist generally of alternating shales and sandstones, and make up, on the whole, good loamy soils with local variations. These soils are common to the P egu Yoma where folding is complex and the detrital beds are much mixed. Soils vary from stiff clays to laterites in the south with wetter conditions.

The Irrawaddian series generally yield coarse sandy soils, sometimes ranging from sand to sandy loam and occasional patches of clay. They form hard pans and particularly in the Dry Zone areas they form stretches of barren and broken ground. These soils are often classified into: a) Clays and clayey loams; b) Loams; c) Sandy loams; d) Sands; e) Gravels and rocks.

In the delta areas of the Irrawaddy and the Sittang, there are deposited enormous quantities of alluvium, providing heavy loams. Tracts experiencing inundation by rivers are generally covered with rich silt deposits. Of course, local variations occur from district to district. The diversity of soils in the rice field area in the delta region is determined by microrelief.

The most common soils of the humid monsoon tropical zone may be called red-brown tropical evergreen forest soils or, according to Chhibber,[17] "red loams." It is suggested that the red-brown tropical soils are the first stage in the development of red earths. Red-brown forest soils are relatively rich in humus (3 to 4 percent in the upper horizon).

Two distinctive soil types have been evolved in the Dry Zone.[17] Black Cotton Soil known as "tane" has been formed to a depth of about 2 ft over the top of some Irrawaddy alluviums. These soils are noted for their black color, but when very dry they may turn yellow. Though the texture is clay-like, they contain only about 45 percent clay. It is argued that its stickiness and tenacity are due to a high calcium and magnesium content which is the result of prolonged evaporation. These soils are noted for cotton cultivation on either side of the Chindwin River near Monywa and around Shwebo, though there are small patches in several parts of the Dry Zone.[18] They are somewhat hard to work, but their moisture retention quality, even in abnormally dry conditions, makes them suitable for cotton cultivation as well as winter cropping.

Saline and Alkaline Soils have been developed under high evaporation where the clay content is low. C apillary action causes the accumulation of carbonates and sulphates of sodium, calcium and magnesium which are responsible for their yellow or brown color. They are found in areas southeast of Shwebo and in northern Sagaing and around the Selingyi volcanic uplands.

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[17]Dobby: Monsoon Lands of Asia, P. 166.

[18]Ibid

The central part of the Dry Zone may be said to be a savannah, probably of anthropogenic origin. Everywhere there is severe erosion. The surface horizon of these soils is always very sandy and often lighter colored than the underlying layer. There is an extremely low humus content. Erosion control and provision of irrigation are basic economic problems.[19]

Chhibber brings out the following relationship between his climatic zones and soil groups:[20]

1) Arakan Coastal Strip: red loams; immature alluvial soils.

2) Western Hills region: immature alluvial soils of mountainous areas.

3) Shan Plateau: red earths and yellow soils, vlei soils in valleys.

4) Tenasserim Coastal Strip: red loams, immature alluvial soils, laterites in places.

5) Northern Hills Region: red earths and red loams, vlei soils in valleys.

6) Dry Zone: black earths, alkali soils, saline soils and vlei soils.

7) Delta Region: immature alluvial soils, vlei soils, laterites in places.

8) Pegu Yoma: immature alluvial soils, red loams.

9) Sittang Valley: immature alluvial soils, red loams, vlei soils.

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[19] Rozonov and Rozanova: Soils of the Arid Monsoon Tropical Zone of Burma, Soviet Soil Science, No. 3, Mar 1962, p. 301.

[20] Chhibber: Mineral Resources of Burma, 1934, (Maps), p. 267. Also, Rozanov and Rozanova: Soils of the Humid Monsoon Tropical Zone of Burma, Soviet Soil Science, No. 12, Dec 1961, p. 1338.

It may be said that another way of drawing a distinction between different types of soils is based on their suitability for agricultural land use.[21] Soils and their crop adaptation are extremely important to the agricultural economy of Burma and are a subject worthy of investigation and analysis.

In general, the Irrawaddian silts and clays are excellent paddy lands, and alluvial deposits of inland as well as coastal areas bear a large portion of the paddy crop of Burma. The rice soils in Lower Burma are largely old alluviums with stiff subsoil. They are rich in potash, but generally deficient in phosphates and nitrates. During the dry season the soils become hard and stiff, and it is only after the monsoon rain begins that they can be plowed.

The salinization of the mangrove forest soils decreases gradually as the distance from shore increases. These soils, because of their striking content of humus and available nutrients, are highly suitable for paddy.

The Irrawaddian sands, particularly in the Dry Zone, carry good crops of groundnuts, sesamum, maize, millet and watermelons. The Pegu clays and river alluviums are suitable for paddy and cotton. The "Kaing" lands (inundated lands along streams) are excellent for the cultivation of tobacco, vegetables and watermelons. The hill soils under the "taungya" (shifting cultivation) produce a variety of crops before abandonment. The laterites are poor soils unless fertilized and manured.

Though soil erosion is not such an acute and widespread problem in Burma as in some of the neighboring countries, it does exist in some parts of the country. In all areas where "taungya" (shifting cultivation) is practiced, e.g., in Northern Burma, Arakan and Lower Burma, the recently abondoned slopes are liable to soil erosion somewhat rapidly, because in most of these areas precipitation is heavy and sudden downpours are common. The problem is there and people are aware of it, but so far no systematic investigations have been made.

The Shan Plateau has climatic and physiographic conditions favorable to erosion. There are long dry periods alternating with torrential rainfall. Many areas have thin soil cover composed of sandy or light friable clays which become aerated when dry, and the material is easily washed away. The topography is uneven and groundnuts are cultivated; these root crops need thorough weeding and later the plant is pulled out as a whole, making erosion possible. To check erosion, many devices are adopted and have proved effective, e.g., the increasing practice of terracing land under cultivation, also brushwood and stone reveting of incipient gullies.

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[21] Nuttonson: Physical Environment and Agriculture of Burma (and Supplement), Soils and Rice Culture of Burma, etc., 1963, p. 7.

PART III

VI AGRICULTURE

Agriculture today in many less developed parts of Asia, Africa and Latin America presents certain common features in terms of farming practices, technological level, and subsistence economics.

Burma is an overwhelmingly agricultural country. About 85 percent of the people live in the rural areas. The main farming areas are concentrated in the alluvial lands of the delta and in the valley lands of the prominent rivers, particularly the Irrawaddy, Chindwin and Sittang. Rice is by far the most important crop, with about 60 percent of the 12.5 million acres of cropped land devoted to it. Production was about 8.15 million metric tons in 1964-65. Sesame and groundnuts occupy about 15 percent of cultivated land, and legumes, millet, corn, tea, and rubber take up another 15 percent of the cropped area (See Map 12), More than 90 percent of the cultivated land yields only a single harvest and less than 10 percent of the cultivated area is irrigated.

The scars of the last war were deep in Burma and slowed down the processes of rehabilitating agriculture, but by 1959-60 the total output was estimated to have reached the prewar level and to have topped the 1951-52 line by nearly 40 percent. Of the major crops, with the exception of paddy, cotton, and tobacco, all had surpassed the prewar average in area and production by 1964-65. Two significant gains in recent years have been achieved in the production of paddy rice and groundnuts (one, a chief food item and the other, a provider of oil as a cooking medium). Especially important was the fact that there was a perceptible increase in yields per acre.[1] See Tables XXI and XXII for long-term figures pertaining to area and production.

Of the 12.8 million acres of paddy land before the War, about 2.2 million acres were left uncultivated by 1959-60 due to various causes, ranging from the physical to technological and political, which were responsible for preventing extension of cultivation. The total crop acreage in 1959-60 fell short of the prewar level by only about 1.6 million acres. It was expected that by 1965-66 the total exportable surplus of rice would be around 3 million tons. But these hopes have not been entirely fulfilled and the rice exports have registered only a figure of around a million tons.

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[1] Walinsky. Economic Development in Burma, 1951-60, p. 338. See also Binns. Agricultural Economy in Burma, 1948 (preface). Also FAO Production Yearbook, 1965. (Various Tables).

TABLE XXI

BURMA: AGRICULTURAL PRODUCTION* (major crops)

CROP	1937 to 1941 Average	1962	1963	1964	1965	1966**	1967**
			(In thousand tons)				
Paddy	7426	6799	7544	7720	8373	7928	7969
Groundnut	181	375	425	332	338	283	403
Sesamum	45	75	84	53	80	47	91
Cotton (Lint)	21	16	19	17	N	N	N
Pulses	250	271	320	327	275	283	403
Sugarcane	1000	1140	1272	1194	1067	1425	1964
Tobacco	44	41	47	54	57	52	71
Wheat	9	21	32	53	71	95	103
Millet	62	72	53	60	40	45	39
Potatoes			55	49	45	34	49
Jute			53	12	12	15	15
Rubber			14	13	13	12	12
Tea			17	28	34	36	36
			(As percentage of prewar average)				
Index of Agricultural Production+	100	101	112	109			
Paddy	100	92	102	104			
Groundnut	100	207	235	178			
Sesamum	100	167	187	118			
Cotton (Lint)	100	76	91	81			
Pulses	100	108	129	131			
Sugarcane	100	114	127	119			
Tobacco	100	93	107	86			
Wheat	100	133	356	433			
Millet	100	116	86	74			

* Adjusted for States.

** Figs. for 1966 are provisional and those for 1967 were targets.

\+ Weighted average of gross value of outturn of principal crops at 1948 prices

SOURCE: Ministry of Agriculture and Forest See Econ. Surv. Burma, Rangoon, 1964, Table 8, p. 15. Also Union of Burma Budget Estimates, 1966-67, Appendix 1A , and FAO Production Yearbook, 1965 (various tables)

TABLE XXII

BURMA: MAJOR CROPS: AREA, YIELD AND PRODUCTION
1948-49 to 1964-65

CROPS	AREA				YIELD				PRODUCTION			
	1949 1953	1963	1964	1965	1949 1953	1963	1964	1965	1949 1953	1963	1964	1965
	(in 1000 hectares)				(in 100 kg/hectares)				(in 1000 metric tons)			
Wheat	14	36	58	80	2.9	5.9	5.6	6.8	4	21	33	54
Maize	66	128	131	114	4.5	5.2	6.6	5.8	30	66	86	67
Millet and Sorghum	199	154	142	144	2.8	3.4	3.9	2.8	56	53	55	41
Sugarcane	21	47	39	49					944	1292	1114	1084
Rice (Paddy)	3757	4654	4877	4976	14.6	16.5	16.0	16.4	5481	7665	7783	8151
Potatoes		20	16	15		31	31	31		63	50	46
Onions		21	16	18		46	51	47	58	96	79	84
Groundnuts	227	606	558	529	5-6	7-6	6.0	6.5	154	459	337	345
Cottonseed	118	200	235	232	3.1	1.8	1.5	2.0	37	37	36	45
					1.3	0.9	0.8	1.0	19	18	18	23
Sesame Seed	371	465	383	703	1.2	1.8	1.4	1.4	43.7	84.9	53.8	100.4
Tobacco	48	40	49	53	9.2	10.4	9.6	8.1	45.2	41.7	47.2	43.3
Jute		18	19	17		6.1	6.4	5.6		11	12	10

SOURCE: FAO, Production Yearbooks, 1965
(Various Tables, adjusted).

There are approximately 25 million acres of land in the country which can ultimately be brought under cultivation by means of irrigation or drainage works. In 1959-60 nearly 17.4 million acres of land were under crops, but only about 750,000 acres were under irrigation. Steps are being taken to extend irrigation to cover about 2 million acres of land.

The data examined by the Soviet soil scientists between 1957 and 1960 convinced them of the enormous potential development of agriculture in Burma. At present only about a third of the land suitable for agriculture is farmed, and future expansion of agriculture on new lands may well be envisaged.

The leading crops in order of the area occupied are paddy, sesamum, pulses, groundnuts, millet, wheat, cotton, sugarcane and tobacco. (See Table XXII.) Of these, rice is in surplus and is the main export of the country. Its export value exceeds $168 million in 1962-63 out of a total export value of $264 million.[2] In 1964-65 and 1965-66, the share of rice exports among total exports was maintained at a level of 60 percent. The area yield and production of the principal crops between 1948-49 and 1964-65 are shown in Table XXII. There were decreases only in the case of cotton and tobacco.

A review of prewar agriculture is relevant to focus attention on certain vital problems of agriculture in Burma and its development in recent years. The significant phases were (1) Traditional agriculture, (2) British changes in land use and crop production, and (3) Postwar agriculture.

Traditional Agriculture.

To the Burmese, the cultivation of land was an enjoyable part of living. It was pleasurable out of doors, the climate had no rigors; its cycles were well predicted, and the weather pranks were understood sequences. The farm work had an easy timetable and produced no pressures, and there was no need for hurry. The cooperative effort of the family, and even neighbors, satisfied the labor requirements. In some years, if it was too dry for paddy, millet was substituted and yielded reasonably good food. In the monsoon-drenched and flooded areas of Lower Burma and coastal tracts, there was plenty of water and silt fertilized the soils for paddy cultivation. Surplus rice was for extra-regional sale and moderate surpluses could be easily stored at

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[2] Overseas Business Rpts. U.S Dept. Commerce, Dec 1963, Table 9, p. 6 and Table 4, p. 5. Also Monthly Economic Indicators, June 1967 (Ministry of Finance, Govt Burma, Table 9).

the farm. Farming was not market-oriented; its products brought satisfaction and well-being to the family and the local community. The farmers and villagers, for the most part, lived within their means and always had some spare cash. There was a division of labor in agriculture. The adult men cleared the land if it was necessary and they shared with young men and boys occasional plowing of the land with oxen. Women and children generally did the transplanting and weeding. Finally, men were called upon to do the reaping. All petty trading in the rural community was in the hands of women. In fact, women were responsible for most of the farming activities; men did the heavier work and the women and children did the rest. In spite of recent changes and shifts in cultivation, in most rural areas this division of work and responsibility remains characteristic of farming operations.

In the dry sections of the country, sesamum was grown as a cash crop to exchange for surplus paddy from the lowlands as a part of the subsistence pattern. There was hardly any interest in making money, getting rich or acquiring imported goods. Money was not a means to create wealth, and accumulation of interest was frowned upon by the rural society. No farms could be mortgaged, particularly in Upper Burma, where they were the property of the whole family. Furnivall[3] has rightly remarked that in spite of the production of cash crops, it was basically a subsistence economy, and in spite of money it was a barter economy.

The family was closely knit, with interdependence between young and old. Before the First Burmese War in 1824, the Burmese lived in a self- sufficient economy. Predominantly rural, they lived in villages almost autonomous, without interference. There was very little crime or litigation. Most of the men were literate and the women had a great degree of responsibility in agriculture and in domestic and money matters. On the whole, the land was rich and wants were simple. There was always enough time for relaxation, revelry and festivity. Work was done without compulsion and there was little anxiety. Few were exceptionally rich, most were happy with what they had. Individual achievement was encouraged and performance of good deeds was inculcated by religion. That was the traditional way of life.

British changes in land use and crop production.

Under contact with the West, particularly after the British conquest of the delta area, profound changes were initiated, such as

[3] Furnivall, Colonial Policy and Practice, 1948

immigration and commercially-oriented cultivation of land through a mono-culture based on extensive paddy production. Thus agricultural land use underwent radical changes, chiefly in Lower Burma. Teak began to be exported and cotton textiles were imported. As a result of this, the Burmese learned to place a higher value on material things, to spend their money on foreign goods and their labor in making money to purchase these commodities.

With enhanced commercial activity and expansion of agriculture, particularly in the new lands of Lower Burma, the need for a larger labor force began to be felt. The Burmese were unable to supply it. Thus large numbers of Indian and Chinese immigrants entered the country. This immigration was not only encouraged but was also aided by government. In 1942, there were about 2 million (13 percent) first generation immigrants in Burma, out of a population of nearly 17 million.

Nearly 70 percent of the prewar population of Burma lived and worked on farms, of which there were about 1.7 million with a total acreage of about 19 million.[4] On these farms 5 million oxen were used and nearly one million buffalo. The average was 2 draft animals on a 10-acre farm. The acreage under irrigation, mostly in the Dry Zone, amounted to 1.5 million acres or about 8 percent of the total. Of the total acreage under crops, about 60 percent was given to paddy. The paddy yield was said to be 1,300 pounds per acre, among the lowest in the rice-producing areas of the world. This was equivalent to some 27.5 bushels per acre compared with 49.7 bushels in the United States, 52.5 in China, 75.4 in Japan, 103 9 in Italy and 124.4 in Spain.

About 48 percent of the cultivated land in Lower Burma was farmed by tenants. Of this land 34 percent was owned by non-agriculturists and 14 percent by other farmers; the remaining 52 percent was farmed by owner-cultivators. In Upper Burma the position was different. There 68 percent of the land was farmed by owner cultivators and less than half of the 32 percent operated by tenants was owned by non-farmers. In Lower Burma, only two-fifths of the land was operated by non-cultivators; of the 59 percent operated by tenants, non-agriculturist absentee landlords owned the predominant share. Even today as a result of the changes in land tenure and the stress on cash crops, the most fertile parts of the delta are somewhat thinly populated, supporting about 450 persons per 1000 cultivated acres, while the far less productive parts of the Dry Zone of Central Burma have to support 600 to 700 people per 1000 cultivated acres.

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[4] Christian: Modern Burma, 1941, p. 158.

Postwar Agriculture.

In 1948, Sir Bernard Ottwell Binns published his report on the Agricultural Economy in Burma and made some significant observations concerning agricultural production in the country. Firstly, he said that he was convinced that the official estimates of production had been much too low (see Table XXIII.) He added that his belief was shared by several well-known officials of the Agriculture Department, that production was considerably in excess of estimates and that it had been constantly increasing due to extensions in cultivation, and he asserted that "new" land in the delta and maritime areas had improved consistently over a period of 40 years.

One of the factors of increased production in prewar years was the distribution of pure seed of improved varieties offering greater resistance to climatic conditions and disease. In five years before the Japanese invasion, about 50,000 tons of such seed were distributed. There were other factors also helping to increase yields, but settlement reports seemed to present lower estimates. According to Binns the "normal yield" per matured acre for the whole of Burma which was officially estimated at 1,500 lbs. could be much nearer 1,680 lbs., and the average yield for the quinquennium ending 1940-41 which was estimated at 7,030,900 long tons of paddy was really nearer 7,700,000 tons.

Binns also suggested that all repurchased land should be organized on the basis of large collective farms under the management of officers of the Agriculture Department until trained and educated men were available from the ranks of the farmers themselves, and that full-scale experiments in mechanization including contour embankments and the elimination of most other permanent "Kazins" (embankments) should commence at once. He advocated mechanized cultivation along with greater use of fertilizers. He made a bold assertion in saying that the ills of agriculture in Burma arose primarily from fundamental defects in her social economy, which must be removed to cure the defects in agriculture itself.

After the holocaust of war and destruction, the time seemed to be ripe for beneficial changes. The liberal, far-sighted and sincere British officials with good local knowledge, advocated a complete change in agricultural policy, linking it to economic development on a wider basis, since agriculture was the chief economic base of the country. Quite revolutionary remedies were suggested, from systems of land tenure to new farming techniques. Therefore, the oft-repeated view of outside observers that the Burmese government and people, after independence, practiced new

and untenable theories and advocated mere ideological concepts in tackling agricultural problems, seems ill-founded.

The increased production of agricultural commodities, particularly rice, in Burma is desirable from several points of view. The present yields are low, though small increases have taken place in recent years. (See Table XXIII.) It is essential to meet the food requirements of the growing population and dispense with the need of imports of the main agricultural commodities (including food, fibers, and edible oils). Burma should also maintain its increase in rice exports to above the prewar level to help remove the adverse balance in trade. This, of course, will be achieved only by increased yields in agriculture as a whole. Burma is deficient in wheat flour, spices, fruits and vegetables, some pulses, and tobacco. All of these can be produced in adequate quantities. Increased production needs to be achieved in rubber, cotton, sugarcane, jute and maize.

Climate is perhaps the most potent of the environmental conditions influencing agriculture, and is responsible for unexpected calamities. Precipitation and temperature are the chief elements in the climate influencing agricultural land use. These have been dealt with already in the discussion on climate. In spite of abundant rainfall, there are parts of the country, such as the Dry Zone, where irrigation is essential to agriculture

Dry Zone Irrigation

For generations the Dry Zone of Burma has been the principal area for the practice of irrigation. In fact, some of the irrigation systems date back to the 11th century or even earlier. But it is generally believed that the canal systems in the Kyaukse and Minbu Districts are the oldest. About 1.5 million acres of land are irrigated in this area out of the total figure of 1.8 million acres for the country, i.e., 82 percent are in the Dry Zone. The inadequacy of rainfall in this area, its seasonality and eccentricity, the soils and their capacity to absorb moisture, and slope and drainage factors have been described. The Dry Zone covers roughly the eleven districts of Shwebo, Lower Chindwin, Sagaing, Kyaukse, Mandalay, Pakokku, Myingyan, Meiktila, Magwe, Minbu and Yamethin (see Map No. 3). Table XXIV indicates the position of cultivated land under irrigation in 1948

TABLE XXIII

BURMA: YIELDS OF PADDY PER ACRE, 1936-41 to 1959-60
(Percent of prewar average) in baskets and pounds

Period	Baskets*	Pounds	Percent of Prewar Average
1936-41 (average)	28.17	1,296	100
1951-52	27.1	1,245	97
1952-53	25.9	1,192	92
1953-54	25.9	1,192	92
1954-55	27.4	1,259	97
1955-56	27.4	1,261	97
1956-57	29.8	1,372	106
1957-58	26.3	1,210	93
1958-59	30.4	1,397	108
1959-60	31.6	1,452	112

SOURCE: Economic Survey of Burma, 1960, Table 8, (adjusted)

* One basket of paddy rice = 20.865 kilograms or 46 pounds (FAO: Production Yearbook, 1965).

TABLE XXIV

BURMA: CULTIVATED LAND UNDER IRRIGATION: 1948 (by Divisions)
(Areas in Thousands of Acres)

DIVISIONS	Total Net Sown and Fallow	Total Land Irrigated	% of all Cultivated Land under Irrigation	Area of Govt. Owned Irrigation Projects
Arakan	1,252	-	-	-
Pegu	4,430	74	1.7	0.6
Irrawaddy	4,180	47	1.1	·
Tenasserim	1,948	62	3.2	-
Magwe	2,792	187	6.7	111
Mandalay	3,068	534	17.3	345
Sagaing	3,500	423	12.1	287
TOTAL	21,188	1,327	6.3	743.6

SOURCE: KTA, Vol. I, Table IX-1, p. 196.

At the time of the British annexation in 1886, several areas were under irrigation by fairly well organized works such as those in the Kyaukse and Minbu districts. But these were falling into disrepair. They were revived and even extended. Several new projects were also initiated A number of canals were constructed in the Shwebo, Minbu, and Yamethin districts. The general policy was to build small projects so that the transportation in the Irrawaddy and Chindwin rivers might not be impeded. Land protection embankments were built in the Lower Irrawaddy area The Mandalay Canal, about 40 miles long with 14 distributaries, was opened in 1902; the Shwebo Canal, 27 miles in length, was inaugurated in 1906, and later 2 branches, 29 and 20 miles long, were added. The Mon Canal, 53 miles long, was begun in 1904

Thus in 1940-41 about 1.37 million acres were under irrigation, chiefly in the Dry Zone, as follows:[5]

DISTRICT	ACRES
Shwebo	365,081
Sagaing	171,365
Yamethin	177,471
Kyaukse	159,231
Minbu	145,762
Meiktila	128,480
Mandalay	105,293
Magwe	65,069
Myingyan	26,181
Lower Chindwin	18,112
Pakokku	12,671
TOTAL	1,374,706

About 90 percent of the irrigated land is normally under rice, and the remaining is devoted to sugar cane and horticultural crops. Irrigation is mostly by canals, although tanks and wells are also used extensively. Careful year-round irrigation would promote double cropping and also benefit the newly opened up lands for cultivation. About 18 percent of the Dry Zone area annually lies fallow.

Some of the large tanks are found in the Myingyan, Meiktila and Yamethin districts. One of the chief areas of tank irrigation is the Kyaukse district. Tank irrigation is important in these

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5 Andrus: Burmese Economic Life, 1947, p. 57.

for paddy cultivation. Some of the larger tanks used are: Taunggon, Htonbo-Sedan (Mandalay), Kana, Pyogan (Myingyan), Meiktila Lake, Nyaunguan and Minhla (Meiktila) and Kyaukse. There are many other smaller tanks which are utilized, particularly in the Yamethin and Meiktila districts. One of the largest irrigation tanks is Meiktila Lake, which was built by Burmese kings and later modernized with masonry outlets. Silting of the old tanks has been rapid. It is estimated that Meiktila Lake receives about 8 million cubic feet of silt annually and the Nyaungyan-Minhla tank receives 11 million cubic feet. Silting has increased with the practice of cultivation in the drainage area of the reservoirs.

In recent years, pump irrigation has been introduced. But it must be noted that all irrigation works in Burma are not government owned; the private sector seems to claim about 40 percent of all works. The government, however, owns and constructs large embankments.

Lift irrigation of different types is practiced locally in Lower Burma for irrigating paddy fields after the monsoon period. A liberal supply of water for irrigation even in the Lower Delta would enhance the agricultural productivity. In addition to planned gravity flow irrigation projects, pumped irrigation from streams, shallow creeks and water-filled depressions could prove practical and thereby beneficial to the Delta Region. Probably a million acres of land can be irrigated here. Irrigation would facilitate the growing of second crops of pulses and quick-growing rice. It is said that pulses grow well under irrigation and also build up the soil. The green manure crops also could be grown under irrigation and would fit in with a suitable crop-rotation scheme. Thus, by increasing production and encouraging more diversified crops, it would be possible to achieve a fuller utilization of labor and overcome the drawback of slack periods in farming activity.

Most of the main canal irrigation works are in the Shwebo, Mandalay, Kyaukse, Meiktila and Minbu districts. After independence in 1948, the most irrigated areas were in Mandalay and Sagaing, followed by Magwe. (See Tables XXIV and XXV.) Some of the more important canal systems are:

(1) The Shwebo district systems, largely dependent on the Mu River by a diversion weir 455 feet in length constructed at Kabo. The Ye-U Canal branches off from the right side of the river, while the Shwebo Canal comes out from the left bank. These came into operation between 1906 and 1912. The old Mu Canal runs east of Shwebo Canal.

(2) The Mandalay Canal System, with its headworks at Sedan on the Chaungnagyi River This system came into operation in 1903.

(3) The Zawgyi River System, located in the Kyaukse district and consisting of five separate canals, the Nwadet, Nygapyaung, Thindwe, Minye and Tamok, and Zidon. It is said that these channels were constructed during the days of the Burmese kings, but were remodeled with modern masonry weirs at the end of the last century.

(4) The Pauglaung River system, also located in the Kyaukse district and consisting of four separate canals, the Kinda, Nathlwe, Kyime and Hytongyi. These also belong to an older construction dating back to the monarchical days.

(5) The Salin Canal system, brought into existence in 1926. There is a diversion weir across the Salin River near Linzin. These works lie in the Minbu district.

(6) The Mon Canal system, whose diversion weir across the Mon River is located at Mezali and became operational in 1912.

There are several minor irrigation works and some old canals which assist irrigation. There are also two well-known canals used primarily for transportation purposes, namely, The Twante Canal (21 miles long) connecting the Rangoon River and China-Bakir River with the Pegu-Sittang Canal, joining the Pegu and Sittang Rivers (38 miles long).

Water distribution in the canals is maintained by the Irrigation Department from the main and branch canals only. The system of distribution to individual farms is the concern of the farmers themselves. These are essentially a series of hand-dug canals and channels, maintained and modified from time to time by the farmers.

TABLE XXV

BURMA, DRY ZONE: IRRIGATED LAND AND STATUS OF AGRICULTURAL LAND (BY DISTRICTS), 1942 (in acres)

	Acres Irrigated	Dry Crop	Suitable for Agriculture Not Cultivated
Shwebo	628,300	491,400	350,000
Yamethin	302,200	335,400	769,000
Minbu	150,500	331,600	120,000
Kyaukse	140,200	134,700	65,000
Pakokku	116,500	762,600	452,000
Magwe	116,000	491,400	208,000
Lower Chindwin	110,400	804,300	343,000
Myingyan	58,200	1,131,200	157,000
Sagaing	55,100	796,500	141,000
Meiktila	20,800	684,400	226,000

SOURCE: KTA, Vol. I, Table IX-3, p. 200, also pp. 403-404.

Irrigation Schemes Recommended and Constructed Since 1953.

Water resources from stream flow are plentiful in Burma. But a good deal of this water supply is wasted, because it occurs in the rainy season and the storage facilities take care of only a small amount of the natural supply. The Dry Zone, as mentioned earlier, is the most important area where agricultural fortunes hinge on irrigation and there is an interesting relationship between irrigation facilities and crop production (see Table XXV).

Rice is grown under irrigation, and vegetables and leguminous crops also thrive on irrigation. Much land is left fallow and underused, due to the lack of irrigation, while some other lands are not cultivated at all because of the non-availability of water during the dry season The Delta Region also has problems of water storage for agriculture during the dry season (December through May). This is an important factor in economic development. If irrigation water is made available in geographically suited areas during the dry season, an additional crop of rice or other crops (vegetables, etc.) can be raised.

In 1953, the KTA included 17 plans in their proposals for improving irrigation at a cost of 45.14 million kyat. Of these, two were major projects, the Mu River Project and the Yamethin Project. The aim was to increase the irrigated acreage to 1.7 million at an estimated cost of about 95 million. The six most expensive schemes proposed were: the Mu River Storage Dam, Sinthe Chaung Dams Canal, Mu Diversion Old Canal, Westside Canal System, Ngalaik Chaung Irrigation System, Swa and Saing Irrigation System. KTA recommended[6] immediate implementation of four specific projects: Mu River, Yamethin District (Sinthe Chaung and Thitson Chaung well irrigation); Kandaw Village (Pakokku District, pump irrigation); and Loikaw Area (Ba-Lu Chaung). Of these the Mu River Project was meant to irrigate about 999,000 acres and the Yamethin District project about 609,000 acres.

The Mu River Irrigation area lies in the triangle formed by the Chindwin and Irrawaddy Rivers from their confluence to Wuntho in the north. It is suitable for growing paddy, groundnuts, pulses, sesamum, millet, maize and other crops. Considerable cultivated land is available and the population is still sparse. It was proposed to irrigate more than one million acres of land, and it was expected that the generation of power would provide energy for pumping water from the Chindwin and Irrawaddy Rivers.

[6] KTA: Vol. 1 Chap. IX, pp 195-248. (Details of various projects formulated including background data and maps.)

The Yamethin district irrigation area is, due to the lack of water, a large low-yield crop area. Seventy-five percent of the cropped area is planted to paddy, but the area is quite capable of crop diversification and can grow sesamum, maize, pulses, tobacco, sugar cane, groundnuts and vegetables. This project involves the development of water resources of the Upper Valley of the Sittang. About 609,450 acres would be supplied with water. Of these, 400,250 acres were in the Yamethin district and 209,200 in the Toungoo district in 1953. The Kandaw Village Irrigation Project included the reconstruction of the old embankments of the Meiktila Lake. The irrigation of this large rural area suffering from a shortage of water would depend on the reservoir. The region has fertile soils and is a good groundnut-producing area. The Loikaw Area Irrigation Project is in the Kayah State, on the Shan Plateau. The Yaunghwe Valley area in the same region is self-sufficient in rice and also produces groundnuts, oranges, papayas, vegetables and maize. The Valley is also well suited for raising livestock. Temperature and rainfall conditions are ideal for diversified crops and grasing. It is a very promising area for development.

It appears, however, that during the first six years of the 8-year development program envisaged by the government in 1953, the total expenditure on irrigation proved to be below K 50 million. Of this total, about K 30 million were spent on irrigation works proper and the remainder on tools and plant.

One of the major achievements has been the construction of the Thitson Dam in the Yamethin district. The work was started in August 1959 and was completed in about two years. It provides irrigation facilities to 16,000 acres, of which more than 12,000 acres can be double-cropped.

Since 1959-60, the following six schemes have been under consideration: the Nampilu River irrigation in Karenni, the Pegu River irrigation, the delta pump irrigation and drainage between Rangoon and Bassein, the Prome area irrigation, the Dry Zone pump irrigation northwest of Minbu, and the Buthidaung irrigation in North Arakan. A great deal of money has been put into the repair, renovation and modernization of existing canals[7] and tanks. The initial investments of new works are high and the technical personnel in the country are still limited.

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[7] Economic Survey of Burma, 1961, p. 81.

Undoubtedly a good deal of the future prosperity of Burmese agriculture is linked with expansion and development of irrigation. The position with regard to different methods of irrigation in recent years, is shown in Table XXVI. At present only 7 to 9 percent of the arable land in Burma is under irrigation. In several countries of Asia, including Burma, irrigated land is devoted to the cultivation of rice which generally yields almost twice as much per acre as other cereals. The small percentage of arable land under irrigation in Burma as compared with some neighboring Asian countries is shown in Table XXVII (following page).

TABLE XXVI

BURMA: AREA UNDER IRRIGATION, 1961-62 to 1965-66
(By various methods) - (in thousand acres)

	1961-62	1962-63	1963-64	1964-65	1965-66
Total Sown Acreage	19,014	20,697	21,586	21,645	21,682
Irrigated Area	1,324	1,401	1,872	1,941	1,857
Percentage	7.0	6.8	8.7	9.0	8.6
Canals	944	984	1,392	1,370	1,312
Tanks	163	174	182	204	163
Wells	24	25	21	25	22
Pump					
Others	193	220	192	257	271

SOURCE. Revised Govt. Budget Estimates, 1966-67, p. 7, Table 7.

Agricultural Characteristics of Natural Regions

At this stage, some of the agricultural characteristics in the different Natural Regions of Burma may be examined. Various authorities[8] have generally recognized seven fairly well marked Natural Regions in Burma:

(1) Delta Region
(2) Arakan Region
(3) Tenasserim Ranges
(4) Dry Belt or Zone
(5) Shan Plateau
(6) Northern Hills Region
(7) Western Hills Region

[8] Stamp: Asia, 1950, pp. 361-65.

TABLE XXVII

BURMA AND NEIGHBORING COUNTRIES:
Area Under Irrigation, 1962

Country	Irrigated Area as Percentage of Arable Land 1962	Irrigated Area 1000 ha 1962	Percentage Change Between 1953-62	General Yield per ha 1962	Net Chemical Fertilizer Input 1962
				100 Kg	Kg/ha
Burma	7	570	5	15	0.3
Pakistan	38	11,070	23	13	3.1
India	15	24,363	16	9	3.5
Ceylon	24	368	88	17	47.2
Iran	28	4,651	210		
China (Mainland)	67	74,000	-1		
Taiwan	57	492	23	32	190.0

SOURCE: Economic Bull., Asia and Far East, June 1965, Tables 14 and 16, p. 19.

The Delta Region has two somewhat similar areas, namely the Lower Irrawaddy Delta area and the Lower Sittang Valley. The forested Pegu Yoma highlands almost interpose between the lower valleys of these two important alluvial areas.

A large part of the delta is very flat and therefore there is constant risk of flooding during the rainy season (June to October). Protruding above the fresh and newer alluviums are some of the "islands" of older alluvium, such as the Twante "upland" and the long ridge at the southern edge of which Rangoon is situated. These so-called "uplands" are rarely more than 30 to 70 feet above sea level. But their boundaries with the newer alluvium are rather sharp and they provide bases for settlement on higher and better-drained land. With the exception of paddy cultivation, most of the economic activity is concentrated on them. Rubber trees, fruit, sugarcane, betel vines and woodland cover these raised lands. The edges of the "uplands" are usually occupied by elongated villages. Settlement sites in the Yoma foothills are close to valley bottoms.

In the delta proper, ninety percent of the land is under rice and monoculture is the common feature. The only other product of value is rubber, which is confined to a few small plantations of the Twante "upland" and the Rangoon Ridge. Jute is perhaps the only other crop which is favored by geographical conditions. An improvement under consideration is the extension of double-cropping through the development of irrigation in the dry season by means of small power pumps, as has been successfully demonstrated in the Bengal Delta area.

The Arakan Region consists of a narrow coastal strip with forested hills immediately at its back. Only small areas are sufficiently level to permit agriculture and settlement on the coast. The largest alluvial tracts are around Akyab and the islands. The coast is much broken up and has stretches of mangrove swamps. Rainfall in this region is perhaps the heaviest in Burma and wherever slopes are laid bare of forest vegetation, there is rapid soil erosion. The forest is dense evergreen with bamboo thickets. Rice occupies about 90 percent of the cropland area, and the best cultivated lands are along the coast and up the prominent river valleys. Some winter irrigation is desirable in North Arakan around Buthidaung, Rathedaung and Maungdaw.

The area is almost completely isolated from the delta region and the Dry Zone by the physically difficult barrier of the densely forested Arakan Yoma and associated hill ranges.

The north-south Tenasserim Ranges with their granite intrusions, limestone crags and narrow river valleys leave only the barest of a coastal strip which is studded with islands. The rainfall is heavy, averaging around 150 inches annually, with only short dry periods. The climate presents a close approach to the equatorial environment. These conditions are much more favorable to the rubber tree than those anywhere else in Burma. The area produces most of the rubber in Burma on modest-size plantations. In addition to rubber, coconuts and other tropical fruits are grown. Paddy cultivation is common along the coast. The land use is more varied than on the Arakan coast, and the economy is more viable.

The railroad covers a distance of 70 miles between Moulmein and Ye, but all-weather roads are almost non-existent. The Japanese-built Thailand-Burma railway has been largely dismantled. Most of the transport and communications are by sea and all important towns such as Moulmein, Tavoy, Palauk and Mergui, occupy positions on the coast.

The Dry Zone of Burma is the core area of the country. The area includes several old capitals and centers round Pakokku, Myingyan, and Pagan. Shaped like a cylinder tapering at the two ends, it stretches roughly from 23°N Lat to 19°N Lat. It is distinguished for its low rainfall (average between 20 and 40 inches) high temperatures, and types of land use and production which are in sharp contrast with other parts of Burma.

One of the significant features of land use is the less-dominating position of paddy in the crop pattern. Also, this crop is grown under irrigation. The diversity of crops is a typical feature of the area. (See Map No. 14.) In the south near Thayetmyo, where paddy begins to be cultivated without irrigation, the Dry Zone seems to merge into the Delta Region. Thus, Shwebo marks roughly the northern, and Thayetmyo the southern extensions of the Dry Zone. In Minbu district the irrigated crop area is 132,000 acres, while in the adjoining Thayetmyo district only 5,500 acres are irrigated.[9]

In general, the Dry Zone consists of undulating plains and low hills, with a light soil cover. The vegetation has an arid

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[9] Nuke: Rainfall in Burma, 1966, p 81.

appearance, with a good deal of thorny bush and shrub. The rainfall is not only low but also unreliable. However, human ingenuity as well as adjustment to conditions of environment has made the area one of varied economy. The cultivated area in this region covers about 5-1/2 million acres, of which over 2 million acres are given to paddy.

After 1886 a number of crops were introduced in Upper Burma, e.g., sugarcane, groundnuts, beans and pigeon peas. Groundnuts were introduced in 1906 and covered 781,000 acres in 1941, and in 1965 the acreage was over a million. Sesamum, covering about a million acres, is widely grown. In the alluvial riverine areas plentiful crops of vegetables, beans, grams, chillies and tobacco are grown. Groundnuts and sesamum provide cooking oil to other parts of Burma. Cotton is surplus for export to Japan and other countries. The Dry Zone is Burma's main cotton-producing area and prewar cotton acreage varied from 300,000 to 450,000 acres, but in 1964-65 production was about 90 percent of that. Sagaing, Myingyan, Meiktila, Lower Chindwin and Thayetmyo districts are the chief producers. Cattle breeding is also a part of the farming activity in the Dry Zone.

Towards the south, in the districts of Prome and Toungoo, which become transitional between the dry and wet zones, the increase of precipitation enhances production of sugarcane, tobacco, and vegetables. Fruit gardens also occupy more acreage, but paddy begins to dominate the cultivated lands. On the whole, it may be said[10] that life in the Dry Zone is harder and the standard of living lower than in the delta area. There is also occasional drought which is unknown in the south. But unlike the south there is no dependence on a single crop. The farming has more variety to it and the subsistence economy is more stable.

The Burmese farmers of the Dry Zone have developed a self-sufficient economy tuned to the environmental conditions and tradition. The farm sizes are said to vary from 5 to 15 acres per family. One-third of every holding, each year, is left fallow. Rotation of crops is a common practice.

Oil seeds, cotton, pulses and cattle are cash producers and figure in internal trade between the different regions of Burma as well as within the Dry Zone itself. This area also has double cropping to augment its resources. The agriculture is well

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[10] Spate: Burma (Pamphlet No. 2), 1941, p. 12.

adjusted to the natural conditons, and its diversification lends it a constancy and vitality to withstand the periodic upsets in weather and natural hazards. The whole gamut of life is based on simplicity and contentment with limited means.

Settlement is in nucleated villages, with a strong sense of community life. The local village crafts are dependent on available raw materials and traditional skills. Handloom weaving with a good deal of imported cotton and silk yarn is common. Nearly one-fourth of the country's people and one-third of its cultivated land are found in the Dry Zone. Yet the area does not grow enough for its needs. All the other crops together account for approximately twice the acreage of rice. Although dry farming techniques are used, crops frequently fail because of fluctuations in rainfall.

The Shan Plateau has widespread surfaces underlain by crystalline rocks, and also large areas underlain by porous limestones. The rainfall is from 60 to 80 inches per year. Large areas of the plateau are suitable for crops. The Karenni area in the south is deeply dissected, while the region east of the Salween River is less accessible and is thinly settled.

The Shan States area is about 61,000 square miles or over 29 million acres, but the cultivable area is only 5 7 million acres, of which about 1.7 million acres are cultivated annually. Relief varies from 3,000 to 6,000 feet. Owing to altitude, temperate-region plants can be grown including fruits, vegetables and flowers. Rice occupies terraces in valleys with gentle slopes. The production of rice can be expanded, along with such other crops as groundnuts, potatoes and soy beans. The Shan States have a deficit in rice. Irrigation and the introduction of mechanization in selected areas are likely to improve crop production. The tung tree has been introduced with good results and its oil is utilized in making high-quality varnish. Development of transportation by rail and motor car and increasing security and peace are bound to provide outlets for Shan products in the urban markets of the Delta area. In the South are the hilly regions of the Kayah and Karen States with limited valley and sloping lands available for cultivation. The paddy areas can be expanded and groundnuts, sesamum and corn cultivation have promising possibilities.

The Northern Hills Region slopes generally southward, and there is much wild country sparsely populated by Kachins and Shans.

The southern hills and fertile valleys are occupied by Burmans. This hilly and mountainous area has its own typical development of agriculture. There is both "taungya" (slash-and-burn with shifting agriculture) and sedentary cultivation. The areas outside teak reservations and other forests are peopled by groups of tribesmen who practice "taungya." In recent decades, permanent agriculture has come to stay in many areas. It is estimated that about 7 million acres of land may still be under "taungya." The villages and settlements move every few years as interest is shifted to a new clearing.

Shifting cultivation still survives in several parts of Burma. Migrant movement in hilly areas has been responsible for the "taungya." As in the somewhat similar shifting cultivation economy of the adjoining areas of East Pakistan and India, animals are not important in the taungya economy. The dependence is mainly on crops like cotton, rice, millet, yams and sugar. Chickens and pigs are kept. Irrespective of origin and language, the tribal groups have many customs of social and economic life in common arising out of similar environmental conditions. Rapid erosion of exposed surfaces is a common feature of taungya farming and though few reliable estimates of these conditions have been made, it is obvious that the problem has acquired vast dimentions since about 2-1/2 million people practice it in Burma. The changeover to more sedentary practices in agriculture has been taking place, but slowly. Various estimates have been made of suitable land awaiting settlement in several parts of North Burma. There are possibilities of extension of agriculture in several fertile valleys, especially in the Hukawng Valley, around Indawgyi Lake and near Washaung.

The Western Hills Region includes the thinly peopled tracts of the Arakan Yoma and its associated hill ranges. The hills have a north-south alignment and are densely forested. The region has many similarities in physical and cultural aspects with the Northern Hills region. Tribal groups include the Nagas, Chins, and Lushais. Both taungya and sedentary cultivation constitute the facets of the subsistence economy producing small crops of maize, millet and some hill rice. There is need to increase terrace cultivation and diversify crop production. There are potentialities for the production of coffee, tea, apples, oranges, and other fruits. The area needs more roads for promoting this development.

Crops of Burma

On the whole, it can be said that there are three types of agriculture in Burma; hill agriculture, Dry Zone agriculture, and delta agriculture. The Dry Zone has always had special significance for the Burmese people, as it became the basis of their traditional way of living Agriculture in the delta produced a surplus of rice, which became the leading export. Hill agriculture has always had an inward-looking subsistence economy.

Rice has the predominant position and wheat, barley, maize, millet and sorghum have comparatively small acreages. In 1965-66 paddy acreage[11] was 11.98 million, while only 350,000 acres were under wheat and the area under all the remaining cereals was only about a million acres. Other food crops are either providers of cooking oil base, i.e., groundnuts and sesamum, or root crops, pulses, sugarcane, vegetables and fruits. There are also a number of cash crops or commercial crops of great value, e.g., cotton, tobacco, jute, and rubber. The cash crops occupy a limited amount of land, but diversify and enrich the economy of the country. They also provide a basis for industrial development.

Rice is not only Burma's most important food crop but also the pivot of the country's commerce and economy. Rice occupies about 68 percent of the total cultivated area in Burma. About two-thirds of the country's people are engaged in rice cultivation, and a large number of the remainder are in one way or another connected with its transport, processing, marketing or export. Rice itself is the staple food of nearly half of the human race and nine-tenths of the world's rice is grown in the regions of Southeast Asia and the Far East where Burma is situated Burma's important position in the world as a producer and exporter of rice is given in Table XXVIII.

The Burmese peasant, like many of his compatriots in Southeast Asia, uses an old-style plow with a simple iron-covered share. Bullocks and buffalo are used as draft animals and the plow breaks up the soil rather than cut and overturn it With the advent of the monsoon in late May or early June the land is plowed several times. When the soil has been worked into a fine smooth mud and all weeds are either collected or buried, the plants from the nurseries are transplanted Most of the paddy grown in Burma is transplanted by hand, though in the Akyab district nearly all is sown broadcast In Lower Burma, although transplanting is the

[11] Quart Econ. Rev. EIU, London No. 2, June 1966, p 4

TABLE XXVIII

LEADING PRODUCERS AND EXPORTERS OF RICE IN THE WORLD
(Mid 1960's)

Countries	Production (million metric tons)	Exports (million metric tons)	Production Value Million $	Consumption Per Capita	Trade Value Million $
China (Mainland)	58.20	0.63	NA	NA	NA
India	55.30	-	3420	71	54
Pakistan	17.80	0.11	1010	102	26
Japan	17.10	-	2999	117	0.7
Indonesia	11.70	-	690	85	-
Thailand	10.10	1.44	443	123	211
Burma	7.50	1.60	231	137	147
Brazil	6.30	-	222	44	5
Vietnam (South)	5.10	0.32	476	NA	47
Philippines	3.80	-	290	89	4
Korea (South)	3.70	-	370	94	2
United States	3.10	1.20	350	3	206
Cambodia	2.70	0.37	140	149	57
Taiwan (Formosa)	2.60	0.16	253	134	20
Nepal	2.10	-	NA	NA	NA
WORLD	260.00	6.80	20000	27	904

NA = Not Available

SOURCE: State of Food and Agriculture FAO, 1966, Table IV-1, p. 138 and Monthly Bull. Agricultural Economics and Statistics, FAO, No. 12, Table 3, p. 19, Dec. 1965. (Other producers of note were UAR, Italy, Spain, Australia and Ceylon).

rule, there are areas in which labor is scarce or where land is poor, in which broadcast sowing is not uncommon. In general, threshing and winnowing is done in the usual age-old fashion with buffalo or bullocks walking round a stake over the sheaves, and wind is used to help in separating the grain from the chaff.

The major paddy crop is winter rice, so-called because of its harvesting in that season (November to December). There are also smaller rice crops in March-April and September and October. The winter crop in Burma makes up about 98 percent of the entire paddy area. The other crops are grown under irrigation. In many countries of Southeast Asia the rice crops have their own local names, but in general they are designated in accordance with their time of harvesting. Wind and weather hazards are ever-present and lower the yields, though rice plants are quite hardy.

The area of the heaviest production of rice is in the delta of the Irrawaddy and the lower part of the Sittang Valley. The total delta rice production is 2 to 3 million tons. The coastal districts of Akyab, Kyaukpyu, Thaton, Salween and Amherst provide another million tons of rice and the Sittang Valley districts contribute more than half a million tons. The Dry Zone rice production is approximately one million tons, but it is largely made up by the districts which are fairly well irrigated. In North Burma, Katha and Myitkyina produce about half a million tons of rice. Rice is also important in the economy of the Shan States and Chin Hills.

The Pegu and Irrawaddy Divisions in the south are the "rice bowl" of Burma. About 90 percent of the total cultivated area in Lower Burma is devoted to rice and the lands there bear one annual crop. The method of cultivation used is called "wet cultivation." The water supply is regulated from field to field during the monsoon season by small mud embankments, "kazin," which hold standing water in the fields. With this type of cultivation, the amount of abandoned or fallow land is small. If a proper rotation of paddy with other suitable crops is found possible, fertility of the soil could be maintained.

There are several types of paddy grown in Burma. Each includes a number of varieties falling within a defined range as regards quality and characteristics of the rice grain. Ngasein is the most important and is grown mainly in the southern districts.

Emata is a long and slender grain. It comes from Prome and Tenasserim areas. Midon is a short plump grain and is a later crop than either of the two main types.

Some mention may be made of the history of rice cultivation. At the beginning of the 19th century rice exports were prohibited by the Burmese Kings due to the fear that the grain might be sent out of the country to the disadvantage of the Burmese people. Some export trade was developed after the second Burmese War in 1852. Henceforward, there was a rapid expansion of rice cultivation in Burma. For example, in 1866, acreage under rice was only 1,750,000 but in 1896 it rose to 5,755,000 and in 1910 it topped 9,950,000 and in 1941 it surpassed 12-1/2 million. Exports rose from 520,000 tons in 1866 to 3.5 million tons in 1941. In 1941-42 about half of Burma's rice crop was exported and its value was about $74 million. It appears that the opening of the Suez Canal in 1869 had quickened the process of exports to Europe. In addition, the American Civil War had hindered rice exports from Carolina and had proved to be advantageous to Burma.

Indian migrant labor also played an important role in the development of rice cultivation in the delta area. The work of the pioneer cultivators and settlers in bringing wet, vegetation-covered land under paddy was remarkable indeed, and in a few generations the delta area became a granary of rice in Asia. The peak of this immigration was reached toward the end of the last century. Already labor of Burmese origin was running short and to extend cultivation and clear the land, more hands were required. These were supplied largely by migrants from the Tamil areas in Madras and the Bengalis from India.

Due to the disorder and destruction of World War II and later insurgent activity, about 3 million acres of land went out of active cultivation. A drive for increased paddy production was made by the Government of Burma. The Rice Production Expansion Committee (RPEC) was set up in 1956 and was charged with the responsibility of raising rice exports to about 3 million tons in four or five years. It was also proposed to improve the quality of export rice by better milling and storage methods. The program included rehabilitation of lands that had been abandoned since World War II and increasing the yields of paddy. This was to be done by improved methods of cultivation, use of chemical fertilizers, improved seed, eradication

of pests, adoption of flood control measures, and expanded irrigational facilities. It was a laudable and ambitious program and its success depended partly on the physical factors and hazards of nature and partly on the efficiency and success of the ideological and administrative measures. Outside judgments have ranged from severe criticism[12] to appreciation. But the statistics reveal (see Table XXII) that a fair amount of success was achieved.

World export prices of rice have been showing a constant rise since 1961-62. The rice exporting countries have been quick to respond to the wider market opportunities as reflected by these prices.[13] The pressure of demand has been concentrated on the lower grades of rice, mainly of the medium-grain varieties.

According to recent FAO and UN reports, Burma is still the largest single source of rice in the world. The prospects of the Burma rice crop in 1966-67 were good and the market for rice in 1965-66 was strong. The consumption of rice per capita in kgs. is highest in Cambodia (149), but Burma follows close behind (137); Taiwan (134), Thailand (123), and Japan (117), are other heavy consumers. The world average is only 27 kgs. At the present average level of rice consumption of one pound per person per day, Burma's population of about 26 million (1966) would need 3.5 million tons of rice per year. This still leaves an invisible margin of rice surplus in the country and is expected to take care of the increasing number of mouths to be fed in the coming years.

Millet and wheat are generally minor crops in Burma and have been cultivated in comparatively dry and poorer soil areas. They are mostly consumed by the non-Burman groups, particularly those of Indian origin. The hill people also use millet in their diet and the stalks after harvest make good animal feed. In the last thirty or forty years, the area under wheat, barley and millet production has remained somewhat static, around 400,000 to 600,000 acres. But interestingly, separate figures for wheat and millet in recent years indicate growing acreage under wheat and decreasing area under millet and sorghum. In 1948-49 to 1952-53 the average area under wheat was 14,000 hectares, but in 1964-65, it had gone up to 80,000 hectares. Perhaps this tendency may be strengthened

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[12] Walinsky: Economic Development in Burma, 1961, pp. 338-40 and Economist Intelligence Unit, Quart. Rev. No. 2, June 1966, p.4.

[13] FAO Monthly Bulletin of Agricultural Economics and Statistics, Vol. 14, Dec 1965, Table 1 p. 8-9.

further in the coming years due to increasing demand for wheat bread and flour, particularly in the urban areas.

The chief area for producing wheat and millet is in the Dry Zone of Burma, though the grain is also cultivated in fair quantity on the hill slopes of the Chin Division. Millet can stand lightness of soil and aridity better than paddy. Quite often the millet crop replaces paddy in dry years; if paddy fails, millet assumes more importance in that year's cultivation. Sown late, millet is harvested in November and December, though the harvest period may extend to March. Millet acreage in Burma, generally, fluctuates from year to year.

Pulses in Burma include several items such as red or yellow lentils, gram and chick peas. They are consumed at a fairly steady level. The area under cultivation in 1936-37 to 1940-41 was about 1,330,000 acres. It dropped to 968,000 acres around 1951-52, but has slowly gone up since then to reach 1,800,000 acres in 1964-65, an increase of about 25 percent in fifteen years. The production was about 352,000 tons in 1964-65. The Dry Zone produces a considerable quantity of pulses.

Vegetable fats in the form of cooking oils are indispensable to the Burmese diet, and normal consumption is around 10 lbs. per capita per year. The chief sources are sesamum and groundnuts which have been cultivated for generations. In 1947 it was necessary to import 7,000 tons of vegetable oil. Therefore, since independence the government policy has been to encourage sesamum and groundnut cultivation to reach a level of self-sufficiency and reduce the imports. The area under sesamum was about 1.4 million acres annually as an average between 1936-37 and 1940-41. In recent years, there has been a small increase in sesamum production. In 1956-57 the acreage was 1.46 million and in 1959-60 it had risen to 1.55 million acres with a production of about 65,000 tons. In 1964-65, the acreage was about 1.75 million and production rose to nearly 100,000 tons. The chief area of cultivation is in the Dry Zone.

Early sesamum is sown and reaped during the rains and late sesamum is sown in September or October and reaped in January or February. But the two varieties are quite different and not interchangeable in terms of seasons. The plant is not tolerant of either too little moisture or too much of it. It requires light soils. The seed is generally sown broadcast at the rate of 3 to 5 pounds per acre.

In the sesamum areas of the Dry Zone, the crops rotated with early sesamum are millet and groundnuts. The late sesamum is generally sown on river-inundated lands which are plowed in September. The seed is broadcast at the rate of 2 to 4 pounds per acre. It is often cultivated with pulses. The oil content is about 48 percent, but country presses extract only 40 percent, leaving the rest for cake which is used as cattle feed as well as fertilizer.

Groundnuts (or peanuts) are an important crop in the Burmese agrarian economy and one of the main sources of cooking oil. The crop is especially important in the districts of Magwe, Pakokku, Myingyan, Mandalay and Sagaing. Sandy soils are best suited to this crop.

Sowing is now generally done in rows and sometimes intercropping is practiced. Sowing rates are about 60 to 70 pounds per acre of shelled kernels, or the equivalent of 100 pounds of unshelled nuts. Sowing is usually done in June, but may extend from May to early July. Before sowing, a good deal of cattle manure is applied. Both row sowing and square sowing are practiced. Harvesting is done by pulling up the whole plant. After drying in the sun the pods are removed and the halms are stacked for cattle fodder. The kernel contains 36 percent oil, but of this about 4 percent is left in the cake for cattle feed.

In the postwar years, groundnut cultivation has been very much encouraged. In recent years, the Agriculture Department and the Agricultural and Rural Development Corporation (ARDC) have continued to extend to the cultivators facilities such as credit, better seeds, fertilizers, and tractor services. Therefore, the acreage and production of "Kaing" as well as "Kaukkyi" varieties of groundnuts have substantially increased.[14] The average annual acreage between 1936-37 to 1940-41 was 808,000. By 1954-55 the acreage had passed the prewar figures, and in 1958-59 about 1,100,000 acres were under crop and production was 285,000 tons. In 1961 the production rose to 350,570 tons. And in 1964-65 there was 1,320,000 acres under groundnuts with a production of nearly 355,000 tons. It is estimated that about 80,000 to 90,000 tons of vegetable oils are needed every year, of which nearly two-thirds are locally produced.[15] The imports of vegetable oils cost about $10.5 million[16] annually on the average between 1961-62 and 1965-66

[14] Economic Survey of Burma, 1961, p. 16

[15] May: Ecology of Malnutrition in the Far and Near East, p. 187.

[16] Monthly Econ. Indicators, June 1967, Table 8, p. 10 (Ministry of Finance, Rangoon).

Sugarcane is an extremely important crop and the government and the cultivators are all interested in the expansion of its cultivation and production. Between 1936-37 and 1940-41, an average of about 65,000 acres were devoted to sugarcane, producing nearly 100,000 tons per year. After the War cultivation fell to 21,000 acres with about 90,000 tons of cane as an average between 1948-49 and 1952-53. The Agricultural Resources Development Corp. gave a good deal of assistance to sugarcane cultivators by making available chemical fertilizers, pesticides, improved strains, marketing facilities and tractor services. As a result the production in 1960-61 went up to 1,035,000 tons on an acreage of 67,000. This tendency has been maintained and in 1964-65 there were about 75,000 acres under the crop, producing about 2.5 million tons of cane. Two new sugar mills have been built, at Mogaung and at Zeyawaddy (near Pyu south of Toungoo).

Cultivation of sugarcane is being extended in the Thaton district[17] in the northern part of the Tenasserim Division. Government pilot farms, like the one at Taungale, are experimenting with new varieties and using modern methods of cultivation. The yield per acre has been raised to 20 tons of cane.

Tobacco is of considerable importance in Burma's agriculture, as the Burmese love tobacco smoking (mainly cigars and cheroots). The production is the basic raw material for a widespread cottage industry as well as modern cigarette manufacture.

Between 1936-37 and 1940-41 the average annual production was 44,000 tons, but since independence the figure has dropped to 40,000 tons. Yields are generally between 800 and 1,000 pounds of dried leaves per acre. During 1948-49 and 1952-53 the production was 45,000 tons and the area was about 120,000 acres. Constant attempts are being made to increase tobacco production. In 1955, the delta area produced about 30 million pounds of tobacco. The largest area is in Henzada district followed by Tharrawaddy, Bassein and Pegu. In the western part of the Dry Zone, tobacco is grown on the Kaing lands of the Irrawaddy and Chindwin Rivers.

Under the Virginia tobacco project, the Agricultural Resources Development Corp. assisted the tobacco planters by granting advisory services and providing training and storage facilities. About 6,000 acres of Virginia tobacco were planted by 1958 and about 1000 curing

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[17] Forword: Rangoon, Vol. 4, No. 23, July 15, 1966, pp. 9-11.

barns were set up and hundreds of cultivators were trained in methods of flue curing of tobacco. By 1959, about 9,000 acres were under Virginia tobacco.

The import of foreign cigarettes was heavily taxed to encourage home-grown tobacco for cigarettes. Output of all types of tobacco was 40,000 tons in 1960-61 and in 1964-65 there were about 75,000 acres under tobacco with a production of some 43,000 tons. Thus, the position of tobacco cultivation has considerably improved in recent years; the prewar production level has been achieved and quality is better than in the past.

In 1941, there were 377,000 acres planted in fruits and 96,000 acres in vegetables.[18] Among the fruits, the largest areas are occupied by mangoes, bananas, and pineapples. Coconut production is of great importance, and they are a source of cooking and vegetable oil. In order to promote the production of coconut oil, the acreage under coconuts was increased from 7,000 to 40,000 after Independence. In 1954 the Land and Rural Development Corporation developed a program of planting 2 million coconut trees over a 10-year period. By 1956, it had established state-owned plantations covering over 14,000 acres and bearing 45,000 trees. Self-sufficiency was expected in 1964 when the trees would begin to bear fruit. This has proved a successful scheme.

Among the fruits produced in Burma, mangoes cover the largest area. Mangoes are a prominent fruit crop in 21 of the districts in Burma. Some mangoes are grown in the Dry Zone area and are known for their fine quality like "Nette" and "Sinboung." The famous "Langras" from India are grown in the Arakan and in Lower Burma.

Pineapples are a favorite fruit crop in Burma and occupy the third largest area under fruits after mangoes and bananas. Approximately 15,000 to 20,000 acres are planted in pineapples. The major producing districts are Mergui, Maungmya, Pegu, Amherst, Insein and Tharrawaddy, though pineapples grow as far north as Katha district and thrive fairly well in the Arakan area They grow from sea level up to 3,000 feet. The plants prefer somewhat dry conditions, but grow well under well-drained conditions in moist and hot areas. Best soils

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[18] Andrus: Burmese Economic Life, 1947, p. 51

are rich sandy loams. Propagation is by suckers or slips. Indigenous fruit weighs from 4 to 6 pounds, but improved varieties are larger. Average yields in Burma are 750 pounds per acre.

The more common fruits grown in the various parts of Burma and the seasons during which they are available on the local markets are as follows:

ARAKAN AREA: COAST AND HILLS

Fruits	When Available
Cape gooseberry	November to January
Custard apple	September to October
Guava	August to January
Lichi	April and May
Lime	The year round
Mangoes	May to June
Papaya	The year round
Banana	The year round
Pomelo	July to August
Sapota	March to May & August and September
Sweet lime	August and September
Coconut	The year round
Jack fruit	November to January

TENASSERIM AREA: LARGELY UPLANDS
(Thaton to Victoria Point)

Guava	August to January
Durian	September and October
Baccaurea Sapida	May
Jack fruit	November to January
Lichi	April and May
Lime	The year round
Mangoes	May to June
Mangosteen	August and September
Marian	April and May
Bananas	The year round
Papaya	The year round
Pineapple	June and July
Pomelo	July and August
Coconut	The year round

Thaton and Amherst districts are surplus areas for several varieties of fruits which normally find market in the Rangoon urban area. There are also plenty of vegetables grown in the northern part of the Tenasserim area, especially near the towns.

DELTA REGION: UP TO 100 MILES INLAND

Baccaurea Sapida	May
Coconut	The year round
Custard apple	September and October
Durian	September and October
Guava	August to January
Jack fruit	November to January
Lichi	April and May
Lime	The year round
Mangoes	May and June
Pineapple	May and June
Pomelo	July and August
Sapota	March to May & August to September
Bananas	The year round

Plenty of vegetables are grown locally, but market gardening is practiced near large towns.

MID ZONE: AREA BETWEEN DELTA AND DRY ZONE
(Roughly from Prome-Pyu to Allanmyo-Pyinmana)

Coconuts	The year round
Custard apple	September and October
Jack fruit	November to January
Jujube	March and April
Lime	June to October
Mangoes	May and June
Papaya	The year round
Pineapple	July and August
Pomegranate	The year round
Pomelo	July to August

DRY ZONE: CENTRAL BURMA
(Thayetmyo-Yamethin and Shwebo-Mandalay)

Bael fruit	January and February
Custard apple	September and October
Guava	August to January

Jujube	March and April
Lime	The year round
Mangoes	May and June
Melons (watermelons and cantaloupes)	April to June
Papaya	The year round
Coconuts	The year round
Pineapple	The year round
Pomegranate	The year round
Bananas	The year round
Tamarind	February to March
Wood apple	October to November
Pomelo	July to August

Fruit gardens are scattered over this area wherever more water is available. But generally production of fruits is below the demand. Best quality mangoes are produced in the Mandalay and Kyaukse districts, mainly along the banks of the Myitnge River. Surplus mangoes, especially the best quality "Nette," are sent to Lower Burma.

Cotton is an important cash crop in Burmese peasant economy. The optimum area for cotton production is the Dry Zone. Its cultivation is fairly widespread in the inner core districts of the Zone, but the heaviest concentration of acreage is in the districts of Meiktila, Sagaing, Myingyan, Lower Chindwin and Thayetmyo. Cotton cultivation is also found in the hill and valley areas of Northern Burma and the Western Shan States, and it is grown in Upper and Northwestern Burma as a taungya crop. Sagaing, Myingyan and Thayetmyo are the chief centers of cotton cultivation.

Except in the Thayetmyo district, other areas mainly grow a short staple variety. Thus most of the cotton grown (about 80 percent) is "Wagale," small cotton, and few areas produce "Wagye," the big cotton. Cambodia or American Upland type is also grown to a certain extent. Over 90 percent of Burmese cotton is for export. In the old days, China was a heavy buyer through the Burma Road via Bhamo.

Generally, cotton is an irrigated crop and though it occupies the moisture-absorbing soils, its fate is influenced by variation in yearly rainfall. It is grown on small farms and is sown in May for harvesting after the end of paddy harvest. Often it is intersown with pigeon peas; these ripen after the cotton harvest and are important in the Burmese diet.

The most widely cultivated variety of cotton in Burma, "Wagale," is planted about the third week of May with the advent of the monsoon. The land is first prepared by summer tillage. Row or hill planting is gradually replacing broadcast sowing. In row planting, about 50 to 60 pounds of seed per acre are used. Pick[illegible] commences in September and sometimes extends to November. There are usually three pickings in each field. Yields generally vary, but 300 pounds per acre may be considered as an average.

The raw cotton is known as "Kapas" and is sold to gins which remove the lint and return part of the seed to growers. Some of the seed is crushed for oil. Some of this oil is refined for cooking and some is used in soap making. "Wagale" cotton is usually grown in rotation with other crops e.g., one year cotton, next year early sesamum or beans and then again cotton. Burma cotton is relatively free from insect and pest damage, though about 30 kinds of insect pests have been found. But the indigenous cotton (Wagale) seems to have an inherent resistance to all cotton pests in the country.

The position of cotton cultivation and the production from the prewar period to 1965-66 is shown in Table XXIX. It took several years after independence to turn the corner with regard to this important crop and exceed the acreage in the prewar period. Total output has increased but yields are still low. Cotton is a fairly heavy input crop as regards good seed, irrigation, fertilizers and careful harvesting.

In recent years, the Burmese government has devoted considerable attention to the improvement of cotton cultivation. The expansion of t[illegible] own acreage of the long staple cotton, especially the M5 variety, has taken place in Thayetmyo, Minbu, Myingyan and Yamethin districts. Higher prices have provided an incentive.[19] The building of the Myaungbintha reservoir, about 90 miles from Myingyan, in 1965 promoted cotton cultivation considerably. About 200 viss of cotton is produced per acre (1 viss = 3.6 lb.).

The objective of the cotton improvement program in the 1957 Four-Year Agricultural Plan was to convert the existing 400,000 acres under cotton from short and medium staple "Wagale" and Mahlaing-3 varieties to a 7/8-inch staple

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[19] Economic Survey of Burma, 1961, p. 16.

TABLE XXIX

BURMA, COTTON, Area and Production: 1936-37 to 1964-65

Years	Acres (Thousands)	Production (Tons: Thousands)
1936-37 to 1940-41, Average	453	21
1948-49	219	..
1951-52	255	16
1954-55	370	15
1956-57	399	16
1958-59	350	12
1960-61	371	12
1962-63	500	18
1964-65	570	23
1966-67 *	591	-

* Planned

Source: Economic Survey of Burma (various years) and FAO Production Yearbook, Rome, 1965 (various Tables: adjusted).

Mahlaing-5 variety which would provide the necessary raw material for the government textile mill in operation and for the additional mill capacity contemplated. It was hoped eventually to use 75,000 bales of M5 cotton per year in the proposed textile mill and therefore, the production target was set at that figure.[20] Nevertheless, it is likely to take much more effort to augment M5 cotton production. Recent progress in this direction has been noticed, in spite of lack of foreign optimism.

For a long time the Lower Irrawaddy region had been regarded as a suitable area for the cultivation of jute. But the tremendous production in the Bengal Delta made it easier to import the fiber from there for Burma's needs. However, in recent years the expansion of jute cultivation was made a part of the agricultural improvement plans. The Agricultural Resources Development Corporation (ARDC) initiated the jute project in 1952-53 with the objective of making Burma self-sufficient in jute by bringing about 150,000 acres under the crop and producing 50,000 tons of the fiber annually. In the early years of its initiation, the scheme did not succeed, but to the surprise of some severe critics jute cultivation in Burma has finally achieved moderate success. The per-acre yields average around 1200 lbs; in 1965-66 there were 62,000 acres under jute, mainly in the delta area, which yielded about 30,000 tons of fiber. In 1966-67 the planned area was to be about 108,000 acres with a 75 percent increase in production.

JUTE PRODUCTION

Years	Area (acres)	Production (tons)
1957-58	22,000	2,700
1958-59	30,000	3,000
1959-60	20,000	2,500
1960-61	22,000	3,500
1962-63	45,000	11,000
1963-64	47,000	12,000
1964-65	43,000	10,000
1965-66	62,000	30,000
1966-67	108,000	50,000

20 Walinsky: Economic Development in Burma, 1951-60, p. 276

Practically all of Burma's rubber is grown in Lower Burma. The largest plantations are in the Mergui and Tavoy districts although a few sizeable estates are found in areas of laterite soils in the Southern Pegu Yoma and around Rangoon. Rubber trees thrive in the warm steamy climate of the Tenasserim Coast and the hills behind it. Before the War over 100,000 acres were under rubber trees producing approximately 8,000 tons of latex annually. There were some 3,700 small estates of less than 100 acres each, most of which were owned and operated by Burmans. Many large rubber estates were established by foreign groups before the last war.

Over one hundred large estates were owned by British interests in 1947. Before the Japanese invasion three-fourths of the labor was Indian. It is estimated that between 1942 and 1946 about 25 percent of Burma's planted rubber was destroyed. After some rehabilitation and replantings, by 1955 there were 84,499 acres in rubber plantations, mostly in Mergui, Amherst and Thaton districts. In the Delta area, of about 15,000 acres under rubber cultivation. nearly 9,000 were in Hanthawaddy district and 5,300 in Insein. There were also some plantations near Toungoo.

Between 1952 and 1962 there was a small increase in the area under rubber but neither output nor yield had recovered to prewar levels. Most of the trees had been planted between 1910 and 1930. It was necessary to undertake a replanting program if the exports were to be maintained around 11,000 tons of rubber a year. The government had fixed a buying price for crude rubber for export in 1962. In 1962-63 the LRDC (Land Resources Development Corp.) formulated a scheme to replace the existing rubber trees over a 10-year period with seedlings and to expand the acreage to 160,000. The Corporation established four nurseries for seedlings to be sold on a subsidized basis. It also established a 500-acre rubber plantation for the production of budwood for grafting. In 1963-64, rubber export which was in private trading hands was nationalized

Draft animals are essential to Burmese subsistence farming, as in many other lands with similar economies. Generally, large numbers of cattle are bred in the Dry Zone for sale in other parts of Burma. Since the overwhelming proportion of the population is Buddhist and Hindu, meat is not a major item in the diet. But the loss of cattle suffered by Burma during the last War due

to the slaughter of animals for food by foreign armies was enormous. In fact, for several years this proved to be a great handicap in the rehabilitation of agriculture and transport after the War. Oxen and buffalo are both used as draft animals. The death rate of animals in the wet areas in the south seems to be higher and also more and more of them are needed for work in the paddy fields; therefore, cattle from the Dry Zone and the Shan States are always in demand. Until some degree of mechanization of agriculture takes place, more cattle will be required to do farm work. Even after considerable mechanization, draft animals will still be important for generations in Burma. Cattle diseases are prevalent, particularly in the delta area. Rinderpest and hemorrhagic septicemia are among the most important contagious diseases for cattle in Burma, and in 1941 there were about 9,500 deaths from these causes. Other causes of death included debility, old age, and snakebite. On the whole, cattle in Burma are in poor condition.

Few Lower Burma villages have milk cattle. Formerly, the milk supply in many towns of Burma was furnished by dairies operated by Indians. The Burmese drink relatively little fresh milk, and supplies of butter and sweetened powder milk are imported. In 1940-41, cows numbered 1.43 million but in 1951-52 their number was only 1.21 million. Due to the shortage of milk products, Burma imported 37,000 metric tons[21] in 1963 and 32,000 tons in 1964. Butter and clarified butter (ghee) are not popular in Burma. Fats necessary to tne diet are mainly derived from vegetable oils. But in recent years, in urban areas, demand is developing for milk and animal fats To meet this demand, and primarily to produce sweetened condensed milk, dairy farms can be established, on both a subsistence and a commercial basis. This development would depend upon the improvement of pastures and the introduction of suitable breeds of milch cattle. It would promote other related economic activities such as the establishment of canning factories producing sweetened milk. The position with regard to livestock and fishery products is shown in Table XXX. Table XXXI gives the number of livestock and other animals.

The traditional pattern of agricultural land use in most parts of Burma has consisted of tilling the soil and producing crops to the exclusion of pastures, stock breeding and organized

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21 Monthly Bull. Agricul. Econ & Statist. FAO, Vol. 14, No. 12, Dec. 1965, Table 12 p 13.

TABLE XXX

BURMA: LIVESTOCK AND FISHERY PRODUCTS, 1961-62 to 1965-66
(in thousand Kyat)

Items	1961-62	1962-63	1963-64	1964-65	1965-66
Meat	1,353	1,430	1,470	1,981	2,243
Eggs	283	310	330	671	733
Milk	699	731	776	729	743
Hides	9	9	9	10	10
Chicken feathers and pig hair	-	..	-	-	-
Draft cattle	1,186	1,291	1,384	1,465	1,478
Fish	1,622	1,656	1,691	1,199	1,179
Pearls and oyster shells	1	1	..	8	7
Others	1	1	-	8	8

SOURCE: Rev. Govt. Budget Estim. 1966-67, Table 18, p. 15

TABLE XXXI

BURMA: LIVESTOCK AND OTHER ANIMALS, prewar and postwar

Animals	1940-41	1947-48 to 1951-52 Av.	1963-64
Cattle (bulls, bullocks, cows, calves)	5,246,000	4,494,000	6,069,000
Buffao	1,049,500	741,000	1,230,000
Pigs	570,400	419,000	815,000
Goats	297,200	179,000	513,000
Sheep	78,000	25,000	135,000
Horses and Mules	-	12,000	27,000

SOURCE: FAO, Production Yearbook, 1965, p. 161, (various tables).

dairy farming. There is some animal grazing in the hill areas of Upper Burma and in coastal areas, but it does not play a serious role in the local or regional economy. Cattle are mostly stall-fed during those periods of the year when natural pastures are lacking. But no serious attempt is made to improve the pastures, cultivate animal feed, or practice selective breeding.

Fish and Fisheries

After rice, fish and fish products constitute the next most important element in the Burmese diet, and the leading source of protein. Due to a lack of cold storage and refrigeration facilities, most of the catch is dried or salted, and much of it is pounded into "Ngapi," a fish paste eaten with rice. But most of the consumption is of fish locally caught and imports are small. Many more follow fishing as an occupation than the figure given in the Census Reports. In 1931 the Census listed 61,000 persons engaged in fishing and hunting, but many off-season agriculturists and their dependents catch fish and they do not seem to have been enumerated. Fish and fish products are the most important sources of animal protein in the Burmese diet and they make up about 30 percent of the average Burmese family's food budget.[22] About 70 grams of fish are available per person per day.

Revenue derived from fisheries in 1946-47, just before independence, was 5 million kyats.[23] But before the Japanese invasion fishing was paying in normal years a revenue of Rs 2.45 million (one rupee may be considered to have approximately the same value as one kyat) and provided employment to over 55,000 full-time and 16,000 part-time workers.[24] An average Burmese family spent monthly Rs 6 on fish against Rs 9 on rice. Around 1965, the home consumption of fish was more than production. About 80 percent of imports consist of dried fish. Thus, the expansion of fishing in Burma is of great economic importance in its three main aspects, viz., revenue to the State, welfare of the large number of people engaged in the industry, and needs of the home market.

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22 Union of Burma Nutrition Survey, Oct-Dec 1961, p. 31. A Report by the Interdepartmental Committee on Nutrition for Natural Defense, May 1963, Washington, D. C.

23 Two-Year Plan, Burma Govt. 1948, pp. 28-39.

24 Fisheries in Burma, Govt. Burma, p. 1

Inundation water during the monsoon spreads over low-lying land forming sheets of shallow water and strings of pools (inns).[25] These breeding grounds form the most important fresh water fisheries in Burma.

There are many other bodies of water such as lakes, tanks, and irrigation channels, which are capable of supporting a rich fish life and, under proper management, yield valuable annual harvests.[26]

Thus the inland fisheries may be classified as under: (1) main channels of rivers; (2) seasonally formed riverine lakes--the "inns," "aings" and "gayets;" (3) estuaries, including "tons;" (4) inundated paddy fields and low-lying areas within the flood-line of rivers; (5) perennial lakes and tanks; and (6) irrigation canals and distributaries In the estuarine waters, the tons constitute an important class of leased fisheries Fisheries in irrigation canals are much less developed

The European carp has been introduced and breeds well in impounded water and reaches marketable size in one and a half years. The predominance of the carp is noticeable in the "inns" both in Upper Burma and the delta Surplus rice bran can be used as feed. But due to a large demand for these fish they are expensive, costing about $1.45 per pound. On the other hand, Tilapia from Thailand is a prolific breeder and is raised in ponds and rice fields. They are half the price of carp The Burmese Army had 80 acres in ponds for raising carp in 1961 The shortage of fish inland is generally due to lack of cold storage facilities. Often there is a shortage of salt needed for drying large fish.

The marine fisheries of Burma need attention Both the inshore fisheries within the 100-fathom line and deep-sea fishing can be further developed Of course, marine fishing on a big commercial scale depends on several factors such as catch by mechanically driven trollers, cold storage facilities on shore, transportation inland and commensurate marketing facilities and the development of canning and preserving industries.

The Union of Burma Government has recently established the "Agency for Fishing and Pearl Culture" and a part of its task is to promote offshore mechanized fishing, process fish and to install cold storage facilities to preserve fresh fish.

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[25] See Glossary for details of geomorphological terms

[26] Fisheries in Burma, Govt Burma, Rangoon, 1948, p 30

Table XXXII is indicative of the fact that Burma has a surplus of grains and basic foods but is deficient in cooking oil, fish and fat resources. It has been repeatedly stressed that in her improvement and expansion of agriculture the production of vegetable oil-yielding crops (particularly sesamum and groundnuts) should receive special attention and the indigenous sources of milk and sugar be expanded.

The pattern of food production in Burma is such that no region has a deficit. Normally, rice moves[27] internally from the delta area to the Dry Zone and other parts of the country and the diversified products of Central Burma find markets in other parts of the country. But in times of need the Shan Plateau area, North Burma, Arakan and Tenasserim coasts can fall back on their regional resources. The delta area has big rice surpluses, but shortages of other foods. The regions of the interior need the delta rice to strengthen their food resources.

Apart from the social and religious prejudices against meat eating, meat prices are beyond the means of the average Burmese family, except for occasional consumption. Even ngapi (fish or shrimp paste), which is one of the favorite condiments eaten with rice, is expensive. In general, most fresh and canned food items are more expensive than rice and therefore, in average families, are consumed in smaller quantities. A good deal of cheaper leafy vegetables, edible plants and saps are also eaten.

The Burmese generally take two main meals a day. The first one is a breakfast at about 8 o'clock in the morning, and the second one is a dinner at five in the evening. Basically, the two meals are similar since rice is the main dish in each case. Large helpings of rice on a tray or platter are eaten with curries, sauce, fish (fresh or dry) and vegetables. The most popular fish sauce is ngapi. Many Burmese eat meat of all kinds if they can afford it, but still many more do not consume any meat due to religious prohibition. Those who slaughter meat are non-Buddhists, and the fishermen and fishmongers also belong to other faiths. There is an abundant use of vegetables, including leafy plants, fleshy arums and young bamboo shoots and wild asparagus.

The Burmese make profuse use of onions, garlic, tamerisk, tamarind and unripe mango. There is also an immense variety of pickles, relishes, preserves and condiments of different kinds which are commonly consumed. There is a small consumption of

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[27] The role of transportation in these exchanges is vital and there are storage and stocking problems. The maximum amounts of food items are moved by railroads and waterways. Trucking is not yet much developed.

TABLE XXXII

BURMA: FOOD BALANCE SHEET (1958)

Items	Production (1000 m tons)	Imports± Exports-	Total (1000 m tons)	Consumption per capita Per Yr. (lb.)	Consumption per capita Per Day (Calories)
Rice	5,226	-1,494	3,255	354.0	1,585
Wheat	10	± 29	28	3.0	15
Maize	44	- 27	14	1.5	5
Millet	81	--	67	7.3	30
Sugar	185	± 33	200	22.0	100
Potatoes	50	--	48	5.3	5
Groundnut oil	157	--	21	2.2	15
Pulses	300	- 88	183	19.8	80
Other vegetables	1,200	--	1,080	117.3	30
Fruits	814	± 10	723	78.5	60
Meat	87	--	87	9.2	25
Fish	500	± 25	525	57.0	45
Fats	77	± 19	88	9.5	105
Whole Milk	359	± 24	364	40.0	30
Eggs	92	--	97	10.6	20
TOTAL CONSUMPTION					2,150

SOURCE. Union of Burma Nutrition Survey, U. S. Inter. Dept. Commtt. Nutrit. for National Defense, Oct- Dec 1961, Washington D. C , May 1965, Table 14, p. 30 (adjusted).

fresh milk and pulses. The Indian, Pakistani and Nepalese elements in the population consume approximately 200 to 300 grams of milk a day, while the Burmese daily ration is around 5 grams a day.[28] Burmese common fruits are bananas, pineapples, oranges, lemons, papayas, durians, mangoes, letchis, guavas, custard apples, berries and jackfruits.

Diets are fairly similar over a large part of Burma except the hilly tribal regions of the north and the remote Shan Plateau areas. Rice holds the predominant position, but in the cooler areas more maize or millet and local fruit are consumed. The average daily per capita intake of calories[29] has been computed by some at 2,020 in which rice constitutes about 70 percent of the total; oils and fats follow with a percentage of nearly 6. Meat and eggs make up only between 4 to 5 percent. Fruits and vegetables provide less than 3 percent of caloric intake and milk and milk products make up less than 2 percent of the total.

A normal diet intake of an average Burmese may be set down as follows:

DIET INTAKE: per person per day

Rice	-	One pound
Fish	-	70 grams
Fat	-	12 grams
Meat	-	11.5 grams
Pulses	-	20 grams
Salt	-	10 grams (Army 11.8 grams)
Ngapi	-	0.4 ounces

A great deal of rice is polished and milled mechanically. The processing removes much of the thiamin-rich hull from the rice kernel, thereby reducing its nutrient content to a great extent. It is said that milled rice-eating sections of the population are more susceptible to diseases like beriberi than those who consume rice hulled at home by wooden pestle and mortar. But the widespread popularity of mechanically hulled rice has created the problem of how to maintain a fairly safe 0.18 or higher thiamin-to-calorie ratio. Some individuals advocate the revival of hand pounding methods, but the competition from milled rice is hard to overcome.

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28 May: Ecology of Malnutrition in the Far and Near East, 1961, p. 192.

29 Ibid.: Table 5.

Therefore, one of the solutions to overcome the thiamin deficiency is to parboil all rice intended for home consumption. This processing yields a grain very similar in appearance to white rice; however, the flavor of the rice thus treated becomes somewhat different. Another device is the enrichment of rice This requires the addition of small quantities of thiamin impregnated rice grains to the bulk rice as it is being milled. A third method is to control the amount of hull removed from the rice kernel. Habits and convention also rule out this method as a common practice, due to the weight of custom and taste related to the eating of white milled rice

Attempts at the diversification of diets, and the addition of some local nutrient foods like eggs, pulses, more vegetables, some meats and milk and other animal fats to daily diets, may improve the general health. However, habits die hard and such changes are no easy matter

In their report, the Nutritional Survey experts observed that there was little malnutrition in the population of Burma.[30] The caloric intake was adequate and no clinical signs of deficiency were observed. More meat and milk could serve as excellent complementary foods to the rice diet. According to the survey, fat supplies approximately 18 percent of the calories in the diet. The principal source of fat is cooking oil and some fat is also obtained from meat. They did not discover any pronounced deficiency of fat in the diet. But May[31] says that the WHO has indicated that the diet of the average Burmese is more deficient in fats than any other item.

No clinical evidence of protein malnutrition was found, though the dietary intakes were slightly less than in ICNND acceptable levels. Twenty-seven percent of the daily intake of 58.8 grams of protein is from animal sources. Niacin intakes were acceptable and vitamin A deficiencies were not found, though they were below the ICNND level. No evidence of vitamin D deficiency was found in any person examined. It was concluded that the major nutritional problems in Burma were those relating to iron, iodine thiamine and riboflavin, though there was no critical situation

In sum the food resources of Burma are adequate and there is a surplus for export This situation is reasonably satisfactory when compared with that of most parts of Asia and the tropical regions in general. The diets are somewhat deficient in animal proteins, vitamins and minerals, but there is little malnutrition reported so far. Food

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[30] Union of Burma Nutrition Survey, Oct - Dec 1961, op cit p 132-133

[31] May: op. cit. p 189

production per unit of land and per individual is generally low. Though the yields are still low, there is a substantial export of food, mainly rice, which forms the chief means of sustenance as well as a foreign exchange earner. The food production-population ratio is in Burma's favor.

Agricultural Problems

The sown acreage in 1961-62 surpassed the prewar records and this growth has continued. However, this growth has been short of expected levels.

About 75 percent of the farming is financed by money lenders,[32] who make a good margin of profit in these transactions by providing the seed above market prices and taking the return in kind at below these prices. The farmer makes about $3.40 U. S. per acre by planting paddy while he gains a profit of $42.00 per acre by growing sugarcane. The Government buys its sugarcane crop directly for the state-owner mills, while many middlemen make profit on paddy and rice sales. Prices of all agricultural commodities have been generally rising except rice; this may promote a diversification in agricultural land use.

The improved metal plowshare is commonly used. The bullock and the ox are still the favorite draft animals, even on the large farms of Lower Burma. An attempt has been made to introduce tractors, but their operation is extremely difficult, the lack of spare parts and technical personnel have also been responsible for slow progress in the acceptance of this technological change.[33] The usual method of demonstration in agricultural farms and agricultural exhibitions has not helped to promote the desire for changed technology and mechaniza tion. Perhaps good extension work showing clearly the benefits of mechanization in relation to the costs of production may lead to technological change.

Some[34] hold the view that Upper Burma is more ready to accept the change. In this region, the people have a closer association with land in terms of ownership and may be ready to improve it. In the delta, apart from the difficult land question, the favorable geographical factors involved in cultivation, i.e., plenty of rainfall, silt-spreading floods and inundations and generally fertile soils, make present day agriculture fairly successful. The great

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[32] Union of Burma, Nutrition Survey, op. cit. p. 42.

[33] Jacoby: Agrarian Unrest in South East Asia, p. 78.

[34] Margaret Mead: Cultural Patterns and Technical Change, 1955, p. 54.

national need to enhance yields as a key to Burma's modern economic problems has not yet been fully realized.

The Five-Year Agricultural Plan in 1952 contemplated the introduction of mechanization wherever possible, not only to overcome the shortage of plow cattle, but also to make the farmer progressive. It was realized that to begin with the most suitable area for the introduction would be the Dry Zone rather than the wet and inundated areas of the delta. If mechanization were successful in Upper Burma, the cattle no longer needed there could be diverted to the south. Foreign consultants also favored farm mechanization.

In 1956 the Department of Agriculture operated about 100 tractors. As first steps in the new program, it had been using these for custom plowing work for sugarcane, for second crop groundnuts after paddy and for jute cultivation. Plowing was the only agricultural operation which employed tractors, and their use was hampered by maintenance requirements, breakdowns and lack of spare parts as well as difficult physical conditions. Their average use for about 500 hours per year was lower than required for economic operation. But a very encouraging factor was that the cultivators displayed much interest in tractor use. This is admitted even by those foreign critics who did not wholly favor the scheme.[35] However, they admitted that the initial success of mechanization indicated that under private enterprise there was a better chance of efficient utilization of tractors.

Tractors can be used to advantage in harrowing and harvesting work. In 1952 there were only 109 tractors in use; but in 1962-63 their number increased to 2,324, and in 1965-66 their number was 3,720 and more are likely to be used for agricultural work.[36] (See Table XXXIII for data on plow cattle and tractors.) In fact, in recent years mechanized farming has been encouraged in a number of suitable areas. In the southwestern part of the Shan Plateau between Taunggyi and Loikaw near Banyin there is a 2,700-acre government farm which is largely mechanized. It experiments with scientific farming and the cultivation of crops such as groundnuts, paddy, soya bean and wheat is being carried on. The FAO has supplied Burma with a complete machine shop for repairing tractors and other farm machinery. About a thousand young men are trained every year to drive, repair and maintain tractors

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35 Walinsky: Economic Development in Burma 1951-60, p 288

36 FAO Production Yearbook, 1965, p. 309. Also Rev. Govt. Budget Estimates 1966-67 Table 9, p. 8.

TABLE XXXIII

BURMA: PLOW CATTLE AND TRACTORS IN USE, 1961-62 to 1965-66

YEAR	Plowed Area in thousand acres	No. of plow cattle	Av. Acres per yoke of plow cattle	No. of tractors	Av. Acres per tractor
1961-62	19,014	3,069,317	12.39	440	43,214
1962-63	20,697	3,333,665	12.42	2,324	8,906
1963-64	21,586	3,461,380	12.47	3,436	6,282
1964-65	21,645	3,662,893	11.82	3,440	6,292
1965-66	21,682	3,694,460	11.74	4,535	4,781

SOURCE: Rev. Govt. Budget Estim. 1966-67, Table 9, p. 8.

The use of fertilizers has always been low in Burma. Fertilizers are used in paddy nurseries and for some special crops such as sugarcane. Much of the cowdung is allowed to go to waste near the villages and very little is burnt as fuel. Chemical fertilizers are certainly needed to improve the yield of crops, and engineering consultants recommended a fertilizer factory to be built before 1959-60 at a cost of about K 70 million. However, according to FAO, a nitrogen fertilizer plant would cost about $50 million i.e.. approximately K 250 Million. In 1962-63, the net chemical fertilizer input was only 0.3 kg per hectare in Burma. This was the lowest input[37] in any country in Southeast Asia except Laos and Cambodia. It is generally recognized that the use of fertilizers, pesticides and weed killers along with more efficient sowing, weeding and harvesting would contribute substantially to improving agriculture production in Burma. Due to lack of home production of chemical fertilizers, Burma imports large amounts of ammonium phosphate, ammonium sulphate and urea, costing about K 810,000 in 1965.

Before the War about 50 percent of the land in Lower Burma was in the hands of non-agriculturists. In upper Burma, 85 percent of the land was owned by agriculturists. Chettyars from South India had acquired a big share in land ownership of Lower Burma. Land was usually let out on a short-term basis with high fixed rents. It is said that about 39 percent of all agricultural lands were held by the Indian landowners.[38] Europeans rarely owned rural agricultural

[37] Econ. Bull. Asia & Far East, No. 1, June 1965, Table 16, p. 22.

[38] Walinsky: op. cit. p. 276

property in Burma. The Land and Agricultural Committee reported in 1938 that the Indian Chettyars held 25 percent of the total rice lands in the thirteen principal rice-growing districts in Burma.[39] Interestingly, it was the most recently cultivated land which usually passed out of the hands of the original owner. Land alienation became an acute problem in Burma, particularly after the depression of 1930.

After Independence in 1948, lands owned by the absentee landowners were expropriated and redistributed. Some of the earlier ad hoc measures were repealed and superseded by the Land Nationalization Act in 1953, which provided greater flexibility in the allotment of holdings and the distribution of land. The main purpose of the Act was the redistribution of agricultural land to the cultivators. The Burmese farmers no longer pay rents to the landlords. They pay only taxes on land, and that only in cash, and their property is exempt from being seized by others in order to recover debts. The Second Five Year Plan (1961-65) provided for the establishment of a cooperative farming system in which greater reliance was to be placed on mutual aid teams.[40] By the end of 1958, a total of 567,000 hectares had been distributed to 178,000 families, or an average of about 3 hectares per family However, the implementation of the Act was superseded in 1958, and action was resumed after certain amendments As a result, by 1965 the per capita cultivable land in Burma was 2 acres, while in the neighboring countries the position was less satisfactory, e.g., India 1.1 acres, West Pakistan 1.0 acre, East Pakistan 0.5 acre, Ceylon 0.8 acre and Japan 0.2 acre.

In the foregoing pages an attempt has been made to describe and explain the main elements in the agricultural situation in Burma. It is clear that agriculture holds the key position in the economy of the country. It is also patent that war and conflict, insurgency and political changes have adversely affected the development of agriculture. But in fairness to the leadership in the country it must also be admitted that in their quest for the economic betterment of Burma, agriculture and its improvement engaged their serious attention. The results have not always been in accordance with the plans and many weaknesses, both in input and production, still persist. The foreign consultants and observers often lose patience and disagree with priorities and phases fixed in recent years.

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39 Christian: Modern Burma, 1941, op. cit p. 117

40 Econ. Bull. Asia and Far East (ECAFE), UNO, June 1965, Vol. XVI No. 1, p. 15 For comments on changes in the Land Nationalization Act of 1953 made in 1958, see Gunnar Myrdal's Asian Drama, 1968, Vol II, pp 1312-13

It is widely recognized that traditionally Burmese agriculture was mainly on a subsistence basis and was dominated by the outlook of a traditional society. It provided a reasonably good economic base for food and handicrafts. In fact, the village cottage industries were thriving. There were also fairly extensive irrigation works. With the advent of Europeans, the Indian immigration in the Delta Region, and money lending and the beginnings of commercial agriculture based on rice, there was a rise in total production. But, there was no commensurate rise in the economic level of the community at large. Incalculable harm was done to Burmese agriculture during the Japanese occupation, by the neglect of land, indiscriminate slaughter of cattle, forced labor by occupation authorities, and restriction of marketing and disruption of transport. In fact, a growing commercial agriculture was converted into one of subsistence farming.

After the War and independence, the continuance of insurgency led to an insecure atmosphere for agriculture as an outdoor activity. However, it is claimed that by 1953 the average agricultural production had been restored to the prewar level, with certain exceptions. Some crop diversification has been achieved, in general, as opposed to overemphasis on rice. Some evidence of this newly emerging pattern has been pointed out already. The share of paddy in the total sown acreage dropped to 62 percent in 1954-55 as compared with 67 percent in prewar days. In fact, the acreage of all cash and other grain crops (sugarcane, sesamum, groundnuts, pulses, wheat and millet) showed an increase over the 1939-40 figures. In addition to the rice exports, Burma has a surplus of certain other agricultural products such as pulses, maize, potatoes, oil cakes, and short-staple cotton. But agricultural production has not reached its potential. Imports of several well-known products of Burma, i.e., sugar, coffee, vegetable oils, coconuts, tobacco, fruits and vegetables and fish are required.

In general, Burma may be producing low yields and showing only small increases in an overall total volume of its crops, yet it is quite obvious in view of the basic physical and human conditions that it is capable of increasing the output of its agriculture by adopting some of the well-known methods leading to a betterment of farming and improving the technical basis of its agriculture Burma has in her favor the fact of having lower population (approximately 25 million in 1966) in relation to available land, a situation not usually met with on the Asian scene.

According to a recent Nutritional Survey[41] (1963) of Burma, Lower Burma has 52 million acres of cultivable land of which only about one-third was in actual use. North Burma had over 4 million acres of cultivable land of which only 371,000 acres were being used. Paddy covers about 68 percent of all cultivated land in Burma. A further diversification of crops is possible

In his well-known work on malnutrition, May seems to overemphasize the prevalence of traditional agricultural practices in Burma when he remarks[42] that, "the country goes on importing important food materials and has dwindled toward a primitive economy, not beyond the subsistence level, almost solely relying upon raising of paddy." But the fact remains that on the one hand Burma's rice production has improved both in quantity and quality and on the other hand several other crops have shown increased production

It is necessary for Burma to strengthen the technical basis of its agriculture which consists of continued improvements in irrigation methods, increasing application of chemical fertilizers and the use of pesticides Some degree of mechanization is necessary and agricultural extension work will help to bring the peasant out of his traditional practices. A considerable number of land tenure reforms have already taken place The hazards of wind and weather will still be there, but the cultivators will be better equipped to cope with the seasonal variations.

Being a major producer and exporter of rice, Burma has an intimate relationship with the world's rice crops and its nutritional and commercial aspects The value of the world's rice crop, according to FAO in 1966 was approximately $20,000 million. The production was around 260 million tons of paddy. It is estimated that more than half of the world's harvest is retained on the farms where it is grown without entering the market channels The farmers are generally less responsive to monetary incentives than in a commercial farm economy. Leading producers are China, India Pakistan, Japan, Indonesia Thailand, and Burma By value of exports, the United States has the leading position, followed by Thailand and Burma. In terms of exports by volume, Burma and Thailand compete for the leading position followed by the United States.[43]

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[41] Nutritional Survey of Burma 1963, p. 28 Also see May: Ecology of Malnutrition in the Far East, 1961, p 184

[42] May: Ecology of Malnutrition in the Far East, 1961, pp 184-5

[43] See Table XXXII (FAO 1966). Since 1961-63 average, Thailand seems to have forged ahead into first position as exporter of rice in the world by countries

Nine-tenths of the world's rice production is still concentrated in Southeast Asia and the Far East, but there has been a remarkable extension of rice cultivation in the Western Hemisphere and Africa. In recent years, mechanization in rice cultivation has come to be increasingly practiced in the more advanced countries. But the structure of the world rice trade, as well as demand for rice, is also undergoing substantial changes.

The average increase of 3.5 percent per annum in world production during recent years was slightly above the rate achieved in wheat output. The average world yields per hectare have also risen from 1,700 kilograms in 1950-54 to about 2,000 kilograms in 1960-64. This is a new and encouraging development[44] in view of the rapidly increasing populations, particularly in the rice consuming parts of the world. According to a recent FAO estimate Burma has shown a rise of 39 percent in yield for its 1950-54 average and 1960-64 average.[45] Among the countries of the world in this respect, Burma held an intermediate position; but she could certainly improve upon this position.

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[44] FAO is preparing (1966) the Indicative World Plan for Agricultural Development which would provide a better assessment of the needs of agriculture in relation to industry. An International Rice Study Group has now been formed and meets annually to review production and trade outlook.

[45] Ibid., See Table IV-2, p. 140

VII MINERAL RESOURCES

Minerals are of great consequence in the economy of Burma and hold out considerable promise for the future All mines and mineral exploitation activities have been nationalized. The Burmese Government established the Petroleum and Mineral Development Corporation (PMDC) to promote active search and exploitation of minerals. The Corporation has several departments such as Mining Projects, Control of Mining Enterprises, and Mineral and Geological Studies The Burmah Oil Company, Ltd was also nationalized on January 1,1963 and was organized as a public enterprise into the People's Oil Industry. Several mining surveys and explorations for oil have been in progress during the last several years Exploitation of minerals is likely to improve by the use of more technical personnel and mechanical devices as well as the establishment of better security and restoration of law and order in the mineral areas close to insurgent-held territories.

At present, the main minerals are lead ores and concentrates, tin ores and concentrates, wolfram (tungsten ore), zinc concentrates, petroleum, natural gas, coal, precious and semi-precious stones. The production of minerals in 1939-40 and from 1960-61 through 1965-66 is shown in Table XXXIV and exports of minerals for prewar and recent periods are given in Table XXXV

The importance of minerals in the pre-War (before 1939) economy of Burma can be gauged from the fact that around 1938, the exports of petroleum made up about 23 percent of the value of all the exports of Burma and the share of other mineral exports was nearly 12 percent. At this time, Burma occupied a prominent position in the world as regards the production of certain minerals The British-owned Mawchi mine ranked as the leading individual tungsten-producing mine in the world. It was the source of approximately one half of Burma's tin and tungsten production [1] The other half of the tin and tungsten came mainly from mines in the Tenasserim area where a number of smaller mining companies operated. The more important of these were also British-owned and supplied the major part of that region's output.

For several minerals, before World War II, Burma had acquired a world position,[2] i.e., Burma was second in the production of tungsten (12,000 tons), sixth for lead (80,000 tons) and eighth for tin (7,000. tons). In 1933, the output of silver and lead ore from the Bawdwin mines was 472,000 tons, and 5 million ounces of silver were produced. There was a sizeable output of zinc concentrates also (35,000 tons).

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[1] Walinsky: Economic Development in Burma, 1951-61, p 45.

[2] Stamp: Asia pp. 353-4.

TABLE XXXIV

BURMA: MINERAL PRODUCTION, 1939-40, 1960-66
(in tons)

Minerals	39-40	60-61	61-62	62-63	63-64	64-65	65-66
Tin Ores and Concentrates	5,441	924	896	786	802	770	400
Tungsten Ores and Concentrates	4,342	333	249	71	121	56	30
Mixed Tin and Tungsten	5,593	1,151	1,157	1,229	1,079	690	422
Lead Ores and Concentrates	77,180	27,015	31,146	34,654	30,318	31,586	22,301
Zinc Concentrates	59,347	12,713	14,678	14,961	14,400	14,000	11,487
Others*	27,089	982+	8,389	5,648	5,257	5,257	NA
Petroleum (00 imperial gallons)**	270,000	142,801	147,621	152,830	NA	NA	NA

*Includes iron ore, manganese, antimony copper and nickel.

**One imperial gallon equals 1.2 U.S. gallons. 249 gallons equal one metric ton

+Excludes iron ores and concentrates.

NA Not Available.

SOURCE: Economic Survey of Burma, 1961, Table 17, and 1964, Table 21. Also see Revised Govt. Estimate, Rangoon, 1966-67, Table 23, p. 19 and Monthly Economic Indicators, Govt. Burma, Rangoon, June 1967, Table 9

TABLE XXXV

BURMA: Exports of Minerals, 1939-40 to 1960-61
(Tons and *K Million) By Quantity and Value

Minerals	1939-40	1957-58	1958 59	1959-60	1960-61
Tin	3,744 K7.93	1,829 K10 77	1,733 K11.65	1,953 K13.22	1,863 K12.58
Tungsten	12,145 K23.81	676 K2 51	990 K3.69	842 K5.28	789 K4.73
Mixed Tin and Tungsten	-- --	751 K3.52	208 K0.91	105 K0.59	163 K0.83
Lead	79,596 K25.65	15,565 K15 84	21,249 K19.86	18,076 K17.25	15,670 K14.09
Zinc	34,473 K1 52	38,336 K3.69	32,050 K3.26	22,864 K4 34	18,074 K3.16
Silver (in oz.)	6,194,151 K7 12	1,219,687 K5.13	1,803,569 K7.71	1,506,324 K6 58	1,442,575 K6.34
Jade (lb.)	51,184 K0.07	72,544 K0 32	46,991 K0.34	105,046 K0 37	80,562 K0.41
Others (include nickel, manganese and copper)	9,444 K3.03	792 K0 46	1,206 K0 92	617 K0 82	721 K0.77
Total Value of Exports**	K93.90	K42.60	K48.10	K47.10	K40.60

*One Kyat Burmese (K) equals 21¢, U.S.

**The total value of mineral exports in 1964-65 and 1965-66 was 60.5 and 49 0 million Kyat respectively.

SOURCE: Economic Survey of Burma, 1961, Tables 18A and B, p. 27. Also, Monthly Economic Indicators, Govt. Burma, Rangoon, June 1967, Table 9, p. 18.

Geologists[3] and mineralogists who investigated mineral prospects in Burma before World War II recognized roughly seven different areas of the location of minerals and have pointed out the association of these minerals with diastrophic events when mineralization was brought about.[4]

1) Shan-Yunnan, comprising most of the eastern and northern parts of the Shan Plateau where the rocks vary in age from Cambrian to Cretaceous The mineral association is essentially a sulphidic one and some Jurassic coal is found in enclosed basins

2) The Mogok-gneiss region in the northwestern part of the Shan Plateau is Paleozoic rocks with igneous intrusions and crystalline linestones. It is in the latter where most of the famous rubies, spinels,[5] other precious stones and graphite occur.

3) Karenni and Southern Shan Plateau where there are two well-known mining areas;the Mawchi mines of Karenni producing tin and wolfram, and the Myelat division of the Southern Shan States yielding wolfram, molybdenite and copper and iron compounds In the Mawchi mines area, all the lodes are in granite, and the capping of the granite hills in which they occur is composed of limestone. The vein material in all the lodes is cassiterite, arsenical pyrites, chalcopyrite and in some places tourmaline Cassiterite and wolfram occur as intimate mixtures and also separately

4) Tenasserim is composed of quartzites and argillites of the Mergui series, which were invaded by granite. The minerals characteristic of this region are cassiterite and wolfram (ore of tungsten). The mines are located in the Moulmein, Tavoy and Mergui regions.

5) The Western Edge of the Shan Plateau generally extends from Maymyo to Pyinamana. Here the main mineral items are tin, wolfram, copper, silver and gold

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[3] Material concerning the geological basis of minerals in Burma is found in several excellent Memoirs and Records of the Geological Survey of India written before 1935 Works of geologists and other specialists describe the pre-war (1939-40) exploitation Re-ent working of mines and mineral production has been dealt with in occasional Government publications and Reports of consulting firms and technical and planning schemes. For Detailed references see Bibliography

[4] Chhibber: Mineral Resources of Burma, 1934, pp 1-4

[5] A hard crystalline mineral composed chiefly of oxide of aluminum, magnesium and iron, and found in various colors A red variety called spinal ruby is used as a gem

6) The Central Belt of Burma is the chief area of petroleum in the typical Tertiary formations. There are also quantities of gas and coal. The extractions of salt from the lake sides is done chiefly in the northern part of the Dry Zone.

7) Arakan where there are few minerals at an exploitable stage; but where there are potential yields of gas, oil and some coal.

In recent years, new discoveries have been made in several parts Burma. Lignitic coal deposits have been found in the Northern Shan States, Northern Burma, the middle Chindwin Valley near Kalewa, as well as near Minbu and Prome and in the Mergui district Other finds include residual iron ores of the Shan States and the Kamaing sub-division, the manganese ores of Meiktila, the gem gravels of the ruby mines, the gold and platinum placer deposits of the Irrawaddy, Chindwin and other rivers, and the wolfram and cassiterite deposits of the Tenesserim area

In general, it can be said that the rubies, sapphires, and spinels are associated with the Archaean gneisses and crystalline limestones, particularly those of the North-Western Shan Plateau. The rhyolite and rhyolite tuffs of the Bawdwin mines area of the Shan Plateau carry ores of lead, silver, zinc and copper. In central Burma, in Tertiary times, petroleum, natural gas, oil shales, coal and amber were formed. Tin and tungsten ores are generally found in or near the outer margins of granite intrusions as segregations. Tin ore is also obtained from placer deposits and detrital material. These conditions are commonly found in the Tenasserim area The distribution of minerals is shown on Map No. 15.

Burma has been well-known for a long time for its gems and precious stones. It appears that the ruby mines had been worked since the sixth century A.D. The ruby mines tract in the neighborhood of Mogok in the Katha District has been the most important source of these gems. Geologically, the rocks are of Archaean Age and comprise a complex series of highly metamorphosed paragneisses. The gems are the product of contact-metamorphism and are commonly enclosed in calcite. Ruby-bearing crystalline limestones form a series of narrow parallel, lenticular bands in the hills extending from the neighborhood of Mogok (22°55'N, 96°33 E) where the most productive mines occur, to Thabeitkyin on the Irrawaddy, a distance of about 40 miles. Another locality is Katha, west of Mogok In fact, all nearby mining localities are close to Mogok. The Burma Ruby Mines Company came into being in 1889 and went into voluntary liquidation in 1925 But the mining of rubies in the Mogok tract may be revived.[6]

[6]Chhibber: Mineral Resources of Burma, p 11.

Spinels are found under the same conditions at the localities containing rubies. They are found in the sands of the Irrawaddy above Myitkyina and also in the lower part of the Irrawaddy headstream, the Mali Hka. From Mogok to the Northern Shan States, here and there are areas yielding topaz, tourmaline, and sapphires.

Jade has always been regarded as a stone of great beauty. Above all, it is greatly prized by the Chinese and half of Burma's output finds its way there. The chief area of mineral jadeite is in Northern Burma near the localities of Kansi, Lonkin, Tawnaw, Hpakan and Hamon. This region is a highly dissected upland, consisting of ranges of hills which form the Chindwin-Irrawaddy watershed. The Uyu Chaung is the main stream of the area. Tawmaw, where the true outcrops of jadeite are situated, is about 68 miles by road from Mogaung Railway Station which lies on the Sagaing-Myitkyina branch of the Burma Railways. The mines are worked in the driest season from March to May and all mining activity ceases with the advent of the rains. During the working season the water is pumped out of the mines thrice daily and the drilling is carried on round the clock. The bulk of jade cutting is done in Mandalay, some is done in Mogaung, but very little at the mines. It is rough-polished in Mandalay. Finished articles of jade from Burma are usually hand cut Most of the jade cutting and artistic carving however, is done in Hong Kong and in China. It used to be sold all over the world as Chinese jade

Burmese amber is sometimes known as "burmite," and has been known to the Chinese for at least the last 2,000 years. Burmese amber is derived mainly from the area of the Hukawng Valley in North Burma. The chief mining area is near Maingkwan about 3 miles southwest of the village of Shingban Mogaung in the Myitkyina district is the nearest railway station which is 25 miles from Kamaing, not far from the mines. Amber occurs in the lower Tertiaries (Eocene), where the rocks have been thrown into rather tightly compressed folds. The amber occurs in pockets embedded in blue sandstones or dark blue shales with fine coal seams locally called "Pajin Kyaw." Good amber generally occurs at a depth of 30-50 feet. Big blocks of amber are rarely found in small pits. The deep pits, especially when they are made largely in the soft shales and close to one another, are lined with thin bamboo barricades. Mining is carried on throughout the year, but an especially active period commences after the middle of February following the local harvest Some amber is also extracted from the Miocene formations in the Shwebo, Pakokku and Thayetmyo Districts. Most of the amber is cut into necklaces, earrings, bars for brooches, buttons, and various kinds of trinkets The tribal peoples of North Burma use amber pieces as personal ornament. The Nagas purchase and use it most. Most of the amber from Burma goes to Assam and China through the Kachins, Lushais and Shan-Chinese areas, respectively

Gold is found in many parts of Burma associated with quartz veins. The principal gold mines which have been exploited in Burma occur at Kyaukpazat, 26 miles north of Wuntho and 11 miles from Nankau, the nearest railway station Veins similar to those at Kyaukpazat occur at and near Legyin, 11 miles farther north and also close to Banmauk. The Southern Shan States west of Kalaw, has been a gold mining area for a long time. Other areas for gold 'in situ' have been located in Hkamti Long at the head of the Irrawaddy Valley, near Woragahtaung in Myitkyina district and south of the Shweli River in the Northern Shan States

Placer or alluvial gold is obtained from several localities. The auriferous gravels of the Irrawaddy in the Myitkyina district and other gold-bearing gravels occur near Prome and at Shwedaung. The gravels of the Chindwin are also known to be auriferous in several places, and the gold-washing is carried on sporadically by the local people in the Upper (Shwebo district) and Lower Chindwin districts. Other gold-washing areas are the Uyu valley (Lonkin and Hamon), Hukawng Valley (Meshe Daru and Masumzup), Northern Shan States (tributary valleys of the Salween), Southern Shan States (Loi Twang), Karenni (east of Toungoo) and in Lower Burma in the gravels of the Sittang River at Shwegyin and in the Valley of Ye River and Heinze basin in the Tavoy district

The Bawdwin and Namtu Lead, Zinc and Silver mines are located 60 miles from the Chinese-Burmese border, some 600 miles by rail north of Rangoon and about 52 miles northwest of Lashio Namtu, the site of the lead smelter, mill and administrative offices, is 42 miles from Lashio and 12 miles southeast of Bawdwin. The Hansam falls, where the hydroelectric power plant is situated, is 28 miles southeast of Namtu. A blacktop road runs parallel to the railroad from Rangoon to Lashio

The Chinese were the first to work and exploit the Bawdwin mines for silver. They probably started to work the mines in the 12th century, and were very active in the 16th century Hundreds of slag piles scattered over the hillsides, typical bamboo supports inside the mines and some ruins of masonry work are ample proof of the Chinese activity. The Burmese moved in to occupy the mines in 1851. But between this time and 1906, when the British took over, there appears to have been no mining activity in the area. The British operations continued until the Japanese occupied the area from 1942 to 1945 The Japanese did not mine more than 200,000 tons of high-grade ore due to the disruption of transport and extensive destruction of property. The British re-entry did not solve these problems and even pre-war production was not achieved. The Burmese floated stock in the new Burma Corporation in 1951. But due to the retention of old-style administration and lack of know-how, the production remained static and there were indications of a rapid exhaustion of high grade ores.

The Bawdwin-Namtu area mines were nationalized on January 18, 1965 as the People's Bawdwin Industries. Production had dropped since World War II and affected the Burmese balance of trade and earnings of foreign exchange On the request of the Burmese Government, a survey of lead and zinc mining and smelting was approved by the United Nations[7] in May 1961. But it was not until the middle of 1962 that the survey was organized with a skeleton staff. It was obvious that the mines contained impressive tonnages of lower grade ore that could be mined profitably. The survey recommended modernization and expansion in two stages, namely: initial modernization, and later the addition of either an electric lead-furnace or an electrolytic zinc-smelting plant. An investment of about $11.3 million was suggested by the experts for the improvements, to begin early in 1968.

The power demand of the present operation averages 3,000 Kw. Therefore, the installation of an 8,000 Kw hydroelectric power plant at Kon Yaung Falls was considered necessary and it was to be supplemented by a diesel power plant for dry-season operation. A topographical survey and a storage reservoir feasibility study were to be made. An exploration program was also suggested, which could lead to the discovery of further high-grade deposits for which geological possibilities exist.[8]

Some of the problems met with in the improvement and modernization of the mines concern efficiency of labor, better transportation and schemes of afforestation. Unfortunately, some insurgent unrest in the area still continues.

There was an attempt at mining nickel several years ago in the Tagaung Hills in the Katha district in Upper Burma, but due to the smallness of the deposits, activity ceased. In the rainy seasons of 1964 and 1965 a party of Burmese geologists discovered valuable nickel deposits in the Mwaytaung Hills (Snake Mountains) while prospecting for chromite 30 miles north of Kalemyo in the Mawlaik District in the Upper Chindwin region. The mineral area is also about 30 miles northwest of Kalewa coal mines. The deposits have been located below an average depth of about 8 feet, not far from the chromite ore.

It is estimated that in ten places nickel viens run to a depth of 100 feet and it may be possible to extract the mineral up to a million tons. Even at an ordinary price in western markets, this may provide K 500 to 1,500 million for Burma in foreign exchange. The nickel ore here contains from 1 to 2 percent of metal of good quality. It is expected that thicker deposits up to 150 foot deep vein may be discovered.

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[7] United Nations Development Program. Survey of Lead and Zinc Mining and Smelting in Burma, U N., 1966, pp. 69

[8] Ibid., p 3.

Chromite is found in Mwaytaung Hills at an average depth of 8 feet. The deposits are of moderate dimensions But for both chromite and nickel mining and their economic aspects, transport costs will figure prominently due to the isolation and distance of mining sites from the port of Rangoon.

The tin-producing areas of Burma are almost a continuation to the north of the mineralized region from Banka and Billiton Islands through Malaya and Western Thailand They extend to the Mergui, Tavoy, Amherst, and Thaton districts and to the Karenni Hills The two minerals, siterite and wolfram, are usually associated, and mixed concentrates are obtained in most localities In some areas the proportion of wolfram has been reduced by disintegration, removal or decomposition. In that case, the alluvial deposits yield more tin ore; but in other localities more wolfram is present and can be extracted. The tin and wolfram ores are generally found in or near the outer margin of granitic intrusions in pegmatite or gneiss veins. Tin ore is also obtained from placer deposits and is recovered from detrital or alluvial deposits Of all the tin-bearing minerals, the most important is cassiterite or "tinstone," the dioxide of tin containing 78 6 percent of the metal. The mineral most commonly obtained is either black or brown, but white, grey, pink and chocolate colored cassiterite is found in some localities A considerable portion of the tin ore as cassiterite is obtained from detrital deposits. The Mergui and Tavoy districts are important areas for tin mining. Exploitation of the tin deposits of these areas was improved under British superintendence from 1888 to 1892. The chief localities for tin and wolfram mining are Palauk, Palaw, Mergui, Tenasserim, Bokpyin, Kambay, Kanbauk, Pachaung, Kalonta, Pagaye, Taungpila, Wagon, Widnes, Meke, Zimba and Hermyingi. Further north are the tin and wolfram mining areas of the Amherst and Thaton districts.

The Mawchi mines are situated east of Toungoo in the Karenni State. Sometimes there mines are said to be the leading producers of tungsten in the world. Tin is also mined in the same area. The mines are situated in the Shan Sub-State of Bawlake at Kehdaung (Tin Hill) at an elevation of 3,000 to 4,000 feet above sea level near Mawchi on the Ke-Ma-Byu River a tributary of the Salween. There are said to be at least ten important lodes, varying from 2-1/2 to 5 feet in thickness. All the lodes are in granite.

Production of salt in 1941 was 90,000 tons. But Burma imported roughly 60,000 tons from Germany, Aden and Egypt. The Amherst district produced approximately 80,000 tons by boiling sea water. In 1946, after the War, production of salt was only 40,000 long tons annually. In 1959-60, the production had risen to 144.230 long tons Salt is produced by 190 small producers in the Bassein Amherst, Kyaukphyu and Pyapon areas chiefly by boiling sea water. Sometimes solar evaporation is used prior to boiling. There are two large salt refineries at Bassein and Amherst

No rock salt deposits occur in Burma. But salt is obtained by boiling the brine from springs, wells, saline soil, etc., in the Dry Zone. Chief areas of salt-making, inland, are Northern Shan States (Bawgyo near Hsipaw), Myitkyina district (Lama), salt springs of Hukawng Valley, Katha district (Wuntho), several districts in the Dry Zone, and Prome and Henzada districts.

In Burma, geologically, the origin of petroleum is related to sequences in the Tertiary Era In the Irrawaddy trough and in Central Burma, flanked by the Arakan Yoma and the Shan Plateau, the sediments mostly belong to the Eocene, Oligocene, Miocene and Pliocene Periods and are said to be 50,000 feet thick. The principal oilfields of Burma are by the banks of the Irrawaddy about 300 miles from Rangoon. The oilfield area extends from Indaw on the lower Chindwin to Padukpin just north of Prome. The oldest wells are at Yenangyaung and the tracts at Twingon and Beme had been tapped in pre-modern times. It is said that during the days of Chinese ascendency in the area, towards the last quarter of the 13th century, a traveller from China mentioned the oil seepages. It is also believed that the Burmese Kings brought captives from the Arakan Coast to Yenangyaung and that these men developed the industry and became the first oil well owners (locally called Twinzayos). Oil from these shallow hand-dug wells was sent down the Irrawaddy in the middle of the 19th century in earthern jars and was used in preserving the timber of boats and houses. Before Drakes' well was struck in Pennsylvania in 1859, the crude oil from Burma was already being exported to England for extraction of wax for candle making and also for the production of lubricants and illuminating oil. Some of the illuminating oil was also shipped to New York. But soon the larger production of the new United States wells overshadowed the importance of oil from Burma.

Before the British annexation of Upper Burma, a company was operating a small refinery at Dunneedaw near Rangoon, but supplies of oil from the Burmese King's territory were irregular. In 1888, the first machine-drilled well began to operate. Gradually, oil wells at Yenangyat and Singu came into operation and the Burmah Oil Company also produced oil from the group of oilfields near Minbu. In 1907-1908, a 275 mile long pipe line was constructed to carry the crude oil from Yenangyaung to Syriam. Later, this was extended to Singu and Yenangyat. The electrification of the Yenangyaung field was embarked upon in 1920. Then the modern refinery was set up at Syriam, south of Rangoon.

The Indo-Burmah Petroleum Company came into the picture at a later dat · than the Burmah Oil Company. Oil was discovered at Indaw in the Upp ·r Chindwin district and then at the Lanywa field across the Irrawaddy fro. Singu. This Company also developed a gas field at Pyaye near Thayetmyo. They had a refinery at Seikkyi below Syriam. The British

Burmah Petroleum Company had a refinery at Thilawa. Three firms[9] monopolized the oil industry: The Burmah Oil Company (accounting for about 75 percent of the output); the Indo-Burmah Petroleum Company (12 percent); and the British Burmah Petroleum Company (9.5 percent). Steady development of the oilfields continued up to 1939; the production was maintained at about a million tons per year until the invasion by Japan. The refineries were put out of action in March 1942, the big power station at Yenangyaung was destroyed the next month and finally all oil wells were choked with junk

For a long time the Yenangyaung oilfield, situated on a broken surface plateau about 400 feet above sea level and 260 miles north of Rangoon, was the largest and most important in Burma. It was the first well from which petroleum was obtained in Burma. The wells at Singu, Lanywa, and Yenangyat were the next in importance. Singu is on the Irrawaddy about 30 miles north of Yenangyaung and the Lanywa field is a continuation of the Singu field. Yenangyat is on the western bank of the river north of Lanywa The Minbu oilfield is a group of three fields namely, Minbu, Palanyon, and Yethaya on the Irrawaddy, some 20 to 30 miles south of Yenangyaung The fields include the well-known mud volcanoes of Minbu. Production is small and inferior. The Indaw field is situated in the densely forested Upper Chindwin District about 175 miles north of the main oilfields. It had produced for about 20 years before the destruction preceding the Japanese invasion took place. Another oilfield, developed at a later period, was Yenama field in Thayetmyo District to the west of the Irrawaddy river about 50 miles south of Yenangyaung. In the same district, is also located the Pyaye gas field yeilding gas under high pressure, which was used as fuel in cement manufacture.

Before the war, Burma produced about 270 million gallons annually. This was rather less than 1/2 percent of the world production. Though Burma was fourteenth on the world list, yet in the British Empire it was second to only Trinidad.[10] Inside Burma, the distribution of oil and its products was determined by the Irrawaddy, the railroad system and the coastal shipping facilities Outside, most of the Burmese oil went to India, the nearest market, providing for half of its consumption of petroleum

A large labor force at various stages of skill, is required in oil industry operations. Before the war about 21,000 workers were employed, including 13,000 in the oilfields and 8,000 in the refineries. Generally, more Burmans worked in the oil fields, and the number of Indians was greater in the refineries. The Burmah Oil Company employed about 70 percent of the workers in the oil industry.

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[9]Walinsky: Economic Development in Burma, 1951-1960, p. 45.

[10]Burma Pamphlet (Anon.) No. 10, p 23.

It is said that in the immediate pre-war years the average sum which went into the Burma Exchequer from the various sources generated by oil production and distribution was about Rs. 12.25 million per annum, making up nearly 1/10 of the total revenue of Burma. Only a negligible fraction of the capital invested in the oil industry was provided by the Burmese public.

After the establishment of an independent Burma, the refinery at Syriam was rebuilt and the pipe lines were repaired. In 1955 the production of oil was 190,000 tons. The Chauk and Lanywa oil fields were brought back into full production and two small refineries were built at Chauk and Syriam. Nearly all the derricks at Yenangyaung had been pulled down and removed by thieves,[11] but serious attempts were made to get the Yenangyaung wells working again; actually by 1961 three wells were producing and four were soon to be in operation. More than 40 wells have been drilled in the Chauk field. When the oil industry was nationalized in 1963, the oil production was only about 60 percent of the pre-war output. The production of oil since World War II is given in Tables XXXVI, XXXVII.

Although the current production is comparatively small, Burmese petroleum is of high quality. The main items of production from Burma in the order of their quantity are: Kerosene, petrol (gasoline), wax, jute batching oil, lubricating oil, diesel oil, and aviation fuel.

In recent years, new deposits of oil have been found in the Myanaung and Prome areas It has been estimated that the oil deposits in Myanaung would amount to 26.5 million barrels and those in Prome to about 105 million. In view of these deposits, it is expected that in a few years Burma will attain self-sufficiency in oil.[12]

Gas has been discovered at several places and plans are being developed to utilize gas as fuel in factories and in the production of fertilizers.

The meager deposits of coal have been a handicap to industrialization in the country. Low to fair grade lignites occur in several localities. But the seams at Kalewa are the best known. However, these deposits were not highly rated in pre-war years. There are three chief areas of coal occurrence: (1) the Loi-an area in the Southern Shan States (Jurassic); (2) the Nam-ona area in Northern Shan States (Pleistocene);

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[11] Maxwell-Lefroy: Land and People of Burma, 1963, p. 62. Also, U.N. Flood Control Ser. No 11, pt. 2B, Bangkok, 1956, p. 4

[12] Union of Burma: Budget Estimates, 1966-67, p. 19

TABLE XXXVI

Burma: Production of Petroleum: 1939 to 1966
(in tons)

YEAR	PRODUCTION (tons)	YEAR	PRODUCTION (tons)
1939	1,109.000	1958	462,000
1947	11,000	1959	529,000
1948	43,000	1960	545,000
1949	33,000	1961	564,000
1950	N.A.	1962	584,000
1951	96,000	1963	638,000
1952	121,000	1964	558,000
1955	153,000	1965	542,000
1956	231,000	1966	600,000
1957	395,000		

Source: Quart. Econ. Rev. (EIU) London, No. 1, 1967, p. 2

TABLE XXXVII

Production of Petroleum and its products (in thousand gallons) 1954-55 to 1963-64

PERIOD	Crude Oil	Gasoline	Kerosene	Other Fuel Oil
1954-1955	52,491	10,654	14,316	8,978
1955-1956	60,965	11,369	16,782	9,757
1956-1957	96,030	23,570	21,941	13,824
1957-1958	114,016	34,969	21,922	20,383
1958-1959	135,621	40,196	25,338	24,363
1959-1960	143,342	44,084	28,595	26,847
1960-1961	145,328	43,799	24,038	30,845
1961-1962	153,389	45,874	25,111	39,378
1962-1963	161,847	43,731	27,868	43,926
1963-1964	156,961	43,996	30,062	47,062

Source: Economic Survey of Burma, 1964, Table 18, p. 25.

(3) The Kalewa-Chindwin area (Lower Eocene). In the Northern Shan States, the localities are Namyau River Valley (Lashio), Man-se-le, Man-Sang, Namma and Wetwin. In the Southern Shan States coal deposits have been noted at Panlaung River, Pwehla, Legaung, Thamakan and Loi-an. In the Myitkyina district there are some scattered lignite seams which may be investigated from an economic point of view Similarly, the Hukawng Valley coal seams need more prospecting. There are traces of Tertiary coal in the Bhamo, Upper Chindwin, Katha, Pakokku, Minbu, Meiktila, Thayetmyo and Henzada districts.

In 1948, thirty seams were located four and a half miles west of Kalewa. In 1951, the potential yield was estimated at 750,000 tons per annum with estimated exhaustion in 15 to 30 years. The coal is brown lignite and is suitable for furnaces and for briquettes in locomotives. In its exploitation there are difficulties of transport, labor, and skills. The first consignment was brought to Rangoon in January 1956. Then a production of about 50 tons a day was started. Experts from West Germany installed some coal cutting machinery in Kalewa mines in 1963. In 1966-67, it was reported that the production of Kalewa coal may be raised to 400,000 tons annually within 3 to 4 years.

Burmese lignites have a high percentage of volatile constituents and ash and their caloritic value is low. These coals are seldom suitable in the raw state for steam-raising in locomotives and ships. These lignites also disintegrate quickly into small fragments on exposure to air, leaving a high percentage of small coal and slack. The remote locations of mines, high transport costs and low heating qualities make poor prospects for the utilization of the Burmese Tertiary coal deposits. Only local uses may be developed to promote regional economies.

About 50 minerals of commercial value are known in Burma [13] Copper is found in both Northern and Southern parts of the Shan State. Copper ore workings in the Lower Chindwin area have a long history, and the present exploitation near Monywa arises from this continuous exploitation. Manganese is worked close to the western edge of the Shan Plateau. Mica mines are located in the Mogaung area in the Kamaing Subdivision; also, there is some mica in the Mandalay and Katha districts. Burma has ample road building material, limestone and gypsum (near Hsipaw) for the cement and fertilizer industries. Uranium deposits are being prospected in the Northern Shan States and the Mogok area.

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13 Burma Map (and folder), 1962, Ministry of Geology and Mineral Resources, USSR, Moscow. See Map No 12. Also, Econ. Surv Burma, 1964, pp. 156-159

One of the main problems in the upgrading of the economy and development of natural resources in Burma is quickly to raise the mineral production beyond the prewar level. The total value of mineral exports[14] from Burma in 1939 was K 93 90 million, but in 1961 it was only K 49.1 million, though minerals occupied the fourth position in the country's exports. In 1962, Burma paid $5.1 million for coal and $4 3 million for refined mineral oil imports Minerals of Burma were valued at approximately K116.66 million in 1965-66 Of this, crude oil alone was worth K 47 million. Value of salt and tin was about K 10 million and " 4 million, respectively Zinc concentrate, copper matte, nickel, .ined lead and antimonial lead together added up to about K 28.5 million

It was with a view to promoting the mineral exploitation at a faster pace that the Burmese Government seems to have brought the activit under the public sector Before the War, most mining enterprises were owned by Europeans and the labor was largely Indian and Chinese. After nationalization, Government participation in exploitation of the mineral resources has taken two forms, namely, management through the Mineral Resources Development Corporation (MRDC) and some joint management ventures in association with private enterprise. Due to the not too successful exploitation of the Kalewa coal mines, MRDC (now designated as Petroleum and Mineral Development Corporation, PMDC) confined itself to prospecting alone. The Corporation has recently discussed with Japanese firms the formation of new joint ventures to work copper and iron ore deposits in Monywa District and Maptuteh Island. Mineral surveys are being actively conducted.

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[14] Budget Estimates, Govt Burma, Rangoon, 1966-67, Appendix 1D, pp. 70-71

PART FOUR

VIII. INDUSTRIES AND INDUSTRIAL DEVELOPMENT, POWER AND ENERGY

Modern manufacturing industry in Burma is of comparatively recent origin. In fact, it was after Independence in 1948 that the Burmese realized the meagerness of their industrial development. During the pre-war period progress was slow, and fearful losses during World War II obliterated a good deal of what had existed. The Japanese efforts at the revival of manufacturing were beset with obvious wartime difficulties and the young republic on its birth inherited a poor legacy. The present development of industry is the product of the Burmese way of Socialism, conscious planning with all the handicaps, and lack of adequate financial and technical resources available to the country.

The shortage of financial resources and technical personnel forced the Government of Burma to cut down the capital allocation for the construction of new industry and give more attention to industrial expansion based on rice processing, wood and mineral utilization and transportation. Above all, processing of home-produced materials such as sugar, salt, tea, tobacco and canned food received most attention.

The limited development of industries in Burma in the pre-war period is shown in Table XXXVIII. Rice milling, timber sawing and processing, oil exploitation and mineral extraction were the major sectors of activity employing the largest number of workers. A small cotton textile industry, some sugar manufacture, a few medium-size engineering establishments and other minor consumer goods industries made up the rest of the manufacturing activity. There was little indigenous capital; European and foreign investments were mostly in trade rather than industry. The biggest outside investments were in oil exploitation and mineral extraction. Manufacturing on the whole, contributed only about 13 percent of the total national product. Most of the modern industry was concentrated in Rangoon and its suburbs.

In 1939, there were only 103 public power installations including the thermal station for the Rangoon area with 24,000 kw capacity. Mandalay and Maymyo stations had 2,000 kw each. The rest did not exceed 500 kw. There were also 77 commercial generating plants, of which the largest generated 20,000 kw. The total for the country was less than 100,000 kw. There was no large hydroelectric plant and no rural electrification.[1]

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[1] Human Relations Area Files· 1956, Vol III, p. 1349.

TABLE XXXVIII

BURMA: PRE-WAR INDUSTRY, 1938

Industry	No. Factories	No. Workers
Textiles	5	2,650
Engineering	57	9,764
Minerals and Metals	18	7,656
Food, Drink and Related Products	700	43,562
Chemicals, Dyes etc.	36	4,274
Paper and Printing	16	2,477
Wood, Stone and Glass Processing	124	11,375
Gins and Presses	48	3,527
Miscellaneous	15	1,198
	1,019	86,483

SOURCE: Govt. Burma Ann Rep. on the Working of the Factories Act etc., in Burma for 1938, Suptd. Print. Staty. Rangoon, 1939. (Adapted)

Before World War II the Burmese oil fields were extremely useful to the British Empire. The Brunei, Trinidad and Bahrein oil fields were rapidly increasing production, but Burma was geographically well located in relation to India, Ceylon and Malaya. The Burmah Oil Company, though organized in 1886, drilled its first wells in 1904 when the American drillers introduced modern techniques. Refineries in Chauk and Syriam processed 400,000 imperial galls of crude oil a day, all for Burmese use. Before World War II Burma's wells yielded 275 million imperial gallons a day.[2] The total output from some 4,000 wells averaged about 1 percent of the world total.

Rice milling started as a Europeanized industry near the ports. But as the trade assumed larger proportion and more surplus rice began to be available, a large number of small rice mills were established at favorable points on the navigable streams close to the main producing areas, in order to draw the local product cheaply. By 1940 there were about 700 mills in operation and of these, except fifty, all were of small category handling less than 100 tons of rice per day. These comparatively small units sometimes called "jungle mills," with capacities varying from 10 to 100 tons of finished rice a day, were spread over a large area from the Delta Region of the south, to the Dry Zone around Minbu, Magwe, Yamethin, Mandalay and Shwebo, to further north, in and around Katha and Myitkyina. The larger mills were mainly located in Rangoon, Akyab, Bassein and the Henzada region and produced up to 400 tons of rice a day. The mills performed the dehusking and polishing operations which are essential to large-scale trade in the grain. The milling activity was spread over most of the year.

Some believe that the pre-war economy of Burma was continuing to expand. But statistics relating to the decade before the commencement of hostilities belie this feature of the colonial economy. Exports did not increase as rapidly as in the previous decades. The increase in agricultural acreage had slackened. Timber production was on a stabilized sustained-yield basis. The exports of minerals had already reached their peak in 1920. Dividends were freely distributed by foreign companies at rates of 20 to 40 percent and it was not their practice to plough back a substantial part of the earnings into plant expansion and modernization. Assuming a 3 to 1 ratio of capital input to income response, this would indicate an annual increase of 2 percent

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[2] National Geographic Magazine, Washington, D.C., February, 1963, p. 196.

in the output of economy during 1938-39 Thus the Burmese economy could be said to be stagnating by all standards.[3] No new industrial enterprizes were set up during this period

When the war came more than half of the scanty industrial structure of the pre-war years was devastated and the rather thin network of land and water communications and transport was utterly disrupted. The cranes on the wharves of the Rangoon Harbor were smashed and many railway bridges, including two spans of the famous Ava Bridge on the Irrawaddy near Mandalay, were destroyed. About 220 of the 350 railway locomotives were put out of action, nearly half of the 600 craft of the Irrawaddy Flotilla Company were sunk; and the Syriam Oil Refinery, the pipeline and the plant at the Yenangyaung oil field were entirely destroyed. The Rangoon waterfront, railway network, Sahmaw sugar factory, Myingyan cotton mill, the Swedish match factory at Mandalay and many other industrial units were blasted. The Japanese tried to work the Bawdwin and Mawchi mines and repair the oil wells and lay fresh railway tracks They constructed the infamous "death railway" to provide transport facilities connecting with Thailand and Malaya This railway was completed in November 1943 They also built the road over the An Pass through the Arakan Yomas. Their constructional activity was limited due to the stresses of war, and when they retreated they destroyed many things Thus, Burma's industry and means of transportation were extensively damaged.

With the coming of peace, it was found that 48 percent of the assets of the Burma Railways were destroyed Only 355 factories of all types were registered in 1946, as against 1,007 before the war The road and water transport was in no less of a sorry mess The three pre-Independence years from 1945 to 1947, were a period of immediate rehabilitation. But the outbreak of internal disorder made recovery extremely slow. For over 2 years, trains ran no farther than 10 miles outside Rangoon. Railway tracks were removed for many miles north of Pyinmana, cutting off communication between Rangoon and Mandalay. Most of the railway stations between Rangoon and Mandalay were burnt down all bridges were broken and the signalling system was destroyed.[4] It was only after February 1950, that railway communications began to revive and skeleton services were possible between Rangoon and Upper Burma. River transportation was also revived, and the Twante Canal was reopened.

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[3] Walinsky. Economic Development in Burma, 1951-60, p. 46 Also See Andrus: Burmese Economic Life, 1947, Table 21, p. 142.

[4] Tinker: Union of Burma, 1957, p. 287.

During the war and occupation interesting changes had taken place in the complexion of the labor force in industry. The Chinese had considerable influence on Burmese economic life, but relatively few of them were laborers and industrial workers, though a good many were engaged in mining work Indians and Gurkhas constituted a somewhat permanent work force in the mines and mills in general. Burmese workers were mostly recruited in Upper Burma. Burman workers generally showed more interest in skilled and semi-skilled jobs In 1939, Burmans comprised about 31 percent of Burma's labor force in industry and mining The share of the Indians and Chinese was gradually declining.

One immediate effect of the Japanese occupation was to open up for the Burmans a wide variety of jobs previously held by Europeans, Indians and Chinese. Higher civil service jobs were also taken up by the Burmans. The amount of Indian labor was reduced by half and outside the urban areas of Rangoon, Moulmein and other places, they quietly withdrew Thus Burmese competition with foreign labor was drastically cut down. Due to war-time destruction and later on disruption by insurgents, work on the railways and in the factories was reduced. Virtual cessation of rice exports also meant less employment for Indians. The Japanese encouraged the Burmans to participate in all forms of activity from industrial work to military training. The idea that the Burman was not a satisfactory laborer was proved wrong and with the growing opportunity available to him, he was working with considerable efficiency and skill.

At the end of the War, Burma found itself industrially maimed and economically greatly handicapped. After gaining independence the new leaders set their minds firmly on the need for industrialization of the country. They wished to achieve this on the basis of socialist policies. They desired to plan and build a modern industrialized country as early as possible. There were those inside and outside the country who disagreed with them both as regards the aims and methods of bringing about this transformation. That the overwhelming number of the Burmese people were behind their leaders in this burning national desire has been proved with the passage of time. As to the rate of progress, perhaps many doubts may be expressed. But one must concede that Burma remains steadfast in its desired goals and has achieved a considerable degree of industrial development.

The people wanted the Government to forge ahead with the public sector and to shoulder a great deal of responsibility in building up the Welfare State idealized by them. Important public bodies were created for handling mineral resources, power and energy production, forestry and industrial activity Enterprizes concerned were: the Mineral Resources Development Corporation, the Electricity Supply Board, the State Timber Board and the Industrial Development

Corporation. A number of industrial establishments were nationalized and put under the last-named body. These include steel works, cotton mill, silk factory, cement plant, sugar factories, etc

Free Burma, it was declared at the Pyidawtha Conference, had put its faith in the creation of a "happy land" by utilizing all its resources for the welfare of its people [5] This conference was called for 14 days from August 4 to August 17, 1952 to discuss plans for the development of the country. A firm of American Consultants[6] was also called in to formulate and recommend plans for the overall economic development of the country They were expected to lay special stress on industrialization Their Preliminary Report was presented to the Pyidawtha Conference in 1952, and later on the Comprehensive Report was submitted to the Government

After making an evaluation of the various factors infiuencing the site selections for certain key industries in 1952-53, it was suggested by KTA[7] that the three centers should be around (1) Rangoon, (2) Akyab,(Sittwe) and (3) Myingyan They also recommended that a dispersion of industrial development was needed to promote the welfare of the interior and coastal regions

Forty-five major projects were included in the KTA plan, and the role of such relevant factors as raw material resources, power and energy, labor force, market demands, fringe benefits and costs of production as compared with the costs of imports were emphasized It was also pointed out by the KTA that the success of the whole program would depend very much on the achievements in the key industries proposed by them, such as textiles, sugar mills, steel mills, power generation and the link industries. Interdependence in industrial growth and economic development in general, were visualized. Unfortunately the ideal goals were not easily attainable, due to various foreseen as well as unexpected developments. Progress was slow and the pattern has been subjected to modifications, amendments and even certain abandonments in the years that followed the recommendations.

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[5] Pyidawtha Conference, August 4 - 17, 1952, Resolutions and Speeches, Ministry of Information Rangoon, December 1952 (Introduction).

[6] Knappen Tippetts Abbett McCarthy Engineers in association with Robert R. Nathan and others, New York, 1953, (Report: 2 Vols.). This organization is referred to as KTA.

[7] KTA: Vol II, p. 693 et seq.

In the suggested industrial growth around Akyab, there were two basic assumptions in development, namely, availability of low-cost power from the Saingdin Falls and early establishment of a paper mill at Pownagyin, 13 miles above Akyab (Sittwe) on the right bank of the Kaladan River. Other industries in the Sittwe area were to be based on the following: salt and salt chemical manufacturing; limestone and limestone products and lime manufacturing (Ramree Island was to be the chief limestone area); bamboo paper pulp and paper manufacturing; carbide and carbide products manufacturing and other chemical products. In all, 7 projects were recommended for this area.

The Rangoon area was to be primarily the location of such industries as jute textiles, cotton textiles, meat packing and animal products, dairy products, soaps, edible oils, rice milling, flour milling, starch, sugar and sugar chemical products, pulp and paper, lumber and wood, rubber and rubber products, paints and varnishes, ceramic products, glass works, ready-mixed concretes and limestone products, cement, asbestos products, lime, iron and steel products, pharmaceutical products, tobacco, fruit packing and processing, fish and sea-food processing. A total of 29 projects were recommended for this industrial area, to be called the greater Rangoon Industrial Group. It would extend up to Moulmein and the surrounding area.

Myingyan was to develop into the industrial hub of the Dry Zone and there were to be established the following industrial plants: limestone and limestone products, lime manufacturing, cement, natural gas, petroleum products, zinc products, sulphuric acid manufacturing, gypsum products, fertilizers, ammonia chemical manufacturing.

A number of miscellaneous industries were also suggested for establishment, particularly in the Rangoon area. These were the rubber industry, canvas shoe making, ceramics, glass works, bicycles, motor car and truck assembling. The development of the Kalewa coal mines was visualized to increase the domestic sources of energy.

For the industrial expansion which it recommended, the KTA Comprehensive Report proposed the total estimated cost of K 3,074 million. Of this, K 2,581 million were to be spent between 1953-54 and 1959-60 and the balance was to be laid out in early 1960's. Total net investment proposed was K 6,600 million.

The year 1965-66 marked the end of the Second Four year plan in Burma, therefore, it is a convenient point for taking stock of industrial development. Among the industries established since independence may be

mentioned oil mills in Rangoon using rice husk as raw material, tin can, soap, and match factories in Rangoon, pottery works at Moulmein, a glass and bottle factory near Chauk, a brick and tile factory near Hmawbi, a cotton textile mill near Prome, a paper mill at Penwegon - north of Pegu, a condensed milk factory at Maymyo, tea packing in Mandalay and a dairy farm north of Rangoon. (For distribution of industries see Map No 15.)

According to official production figures,[8] the share of industry in National production was K 4,350 million in 1965-66, as against K 2,310 million for agriculture and K 2,860 million for commerce. The value and percentage of industrial production up to 1962-63 is shown in Table XXXIX

Rice milling has been traditionally the largest sector of industry and by 1966 Burma had over 1,000 mills of varying sizes, from small units to large establishments, spread over many parts of the country There is a concentration of rice mills in the Delta Region and in the Dry Zone Other areas where many rice mills operate are the Sittang Valley, northern part of the Tenasserim Coast, and in Katha and Myitkyina districts in Northern Burma Rangoon and its environs constitute the largest single area of this activity. From Sinmalaik to Monkey Point, the waterfront on either side of the Rangoon River is dotted with rice mills and sawmills This industrial activity extends to the Kanuangto Creek, Twante Canal and Pazundaung Creek, near and around Rangoon.

As a result of slow industrial development and the severity of War damages, even four or five years after independence the value of cotton textiles and yarn annually imported into Burma was greater than the value of any other commodity In 1962, its value[9] was second only to imports of machinery and transport equipment and amounted to $34 million out of the total value of imports in the country which reached the $219 mark.

In 1952-53, eight yards was the amount of cotton cloth used per person, per year in Burma. At that time, the comparable figures for use in some other countries were: The United States (60), Western Europe (54), Japan (35), India (28), China (20). Most of Burma's cotton is short staple and not easily adaptable to spinning the higher

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[8] Quat Econ. Rev. (EI) London, No. 1, 1967, p 2

[9] Overseas Business Reports: Economy of Burma, Washington, D.C., December 1963, Table 10, p. 6.

TABLE XXXIX

BURMA: VALUE AND PERCENTAGE OF INDUSTRIAL PRODUCTION, 1952-53 to 1962-63
(Value in millions of Kyats)

Industries and Groups	1952-53	1956-57	1962-63	Percentage Change from 1952-53 to 1956-57	Percentage change from 1956-57 to 1962-63	Percentage change from 1952-53 to 1962-63	Percentage distribution in 1962-63
Union of Burma: Total	1,696,042	2,646,041	4,100,885	+ 56.01	+ 54.98	+ 141.76	100.00
Food and Beverage	1,263,378	1,478,160	2,153,362	+ 17.00	+ 45.68	+ 70.44	52.51
Manufacture of Textiles	114,276	335,926	515,782	+ 193.96	+ 53.54	+ 351.35	12.58
Tobacco Manufacture	51,109	99,808	146,292	+ 95.28	+ 46.57	+ 186.24	3.57
Chemical Products and Chemicals	69,937	148,525	151,400	+ 112.37	+ 1.94	+ 116.48	3.69
Petroleum Refineries etc.	27,428	85,571	174,869	+ 211.98	+ 104.36	+ 537.56	4.26
Manufacture of Wood and Bamboo	40,028	98,681	272,539	+ 146.53	+ 176.18	+ 580.62	6.65
Manufacture of Rubber etc.	1,484	10,551	26,252	+ 610.99	+ 148.81	+1,669.00	0.64
Non Metallic Minerals etc.	11,652	18,848	42,631	+ 61.76	+ 126.18	+ 363.87	1.04
Metal Products	16,495	42,868	82,315	+ 159.88	+ 92.02	+ 339.03	2.01
Basic Metal Industries	545	976	22,234	+ 79.06	+2,187.30	+3,994.31	0.54
Manufacture, Repair, Transport Equipment	14,897	76,773	104,526	+ 415.33	+ 36.14	+ 601.66	2.55
Others							9.96

SOURCE: Economic Survey of Burma, Rangoon, 1964, Table 24, pp. 38-39 (rearranged and adjusted)

count yarns For weaving purposes, it is generally mixed with long staple imported cotton or rayon. About 80 percent of Burma's cotton is BCF or "Wagale," which has a short strand 1/2 inch to 5/8 inch. Therefore, ever since the end of the War, increased production of long staple cotton has been advocated. By 1953 there were only about 400 power looms in Burma and the remainder of the indigenous supply of cloth came from 250,000 handlooms, each of which produced about six yards per eight-hour day Indeed, the production of hand-woven materials will continue to play an important part in the general economy of the country and provide additional income for many rural families between the harvesting periods of the crops. The question of open competition with the local machine-made materials will still take many years as has been the case in the somewhat similar economies of several other developing countries in Asia.

One important enterprise of the Industrial Development Corporation (IDC) is the three-unit cotton textile mill at Thamaing near Rangoon. Of the three units, Nos. 1 and 2 are spinning and weaving mills, which began operating between 1951 and 1957; No. 3 is engaged in bleaching, dyeing and finishing and was started in 1957-58 Together the three units have 40,000 spindles and 392 looms and employed 2,000 workers in 1960 At that time the mills produced 8 5 million pounds of yarn and 3.5 million yards of cloth They satisfy only about one-tenth of the national requirement For self-sufficiency Burma would require about 350,000 spindles and 40,000 looms. Almost all raw material used now is local cotton. There are a number of small private cotton gins in the cotton-producing area of the Dry Zone

Under a Chinese loan agreement a textile mill was to be completed[10] at Meiktila in 1967 The Chinese also built a textile mill at Thingangyun near Rangoon This textile mill was the fifth to be completed since independence. It produces tarpaulin and has 6,000 spindles Formerly, it was under private ownership, but was nationalized in 1965.

In 1952-53, Burma's average annual import of jute bags was about 24 million, requiring an annual foreign exchange outlay of about K 30 million In 1953, KTA suggested it would be proper to set up a mill, having an annual two-shift capacity of about 6 million bags and 281,000 pounds of seam and mouth sewing twine to meet a steady market demand.[11]

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[10] Quat Econ. Rev. EIU, London, No. 1, 1967,p. 7.

[11] KTA: Vol II, p. 707.

The jute mill was eventually built near Rangoon as a state enterprise by a British firm from Belfast. Construction took over a year, and it cost about K 35 million. Production started in 1957. Most of the machinery is of United Kingdom origin, and the mill is one of the leading examples of the Industrial Development Corporation (IDC) enterprises. It employs 3,800 workers on a six-day a week basis. In the early years of production most of the raw jute came from East Pakistan and some from India, but now most of the raw jute needed is supplied from production in Burma. The annual rated maximum capacity of the mill is 36 million bags requiring about 36,000 tons of fibre, but the level of production attained until 1961-62 was only about 50 percent of this capacity.[12] For the export of rice alone Burma needed about 40 million bags.

Burma is a heavy silk material importer. The Burmese love silk and their women especially glory in its use. Most of the silk yarn is imported from Japan, and the silk materials from China.

Silk production can be further promoted in Burma. The climate in many parts of the country is suitable for the cultivation of mulberry trees and the rearing of silk worms. This activity also fits into the peasant economy of limited means. It is estimated that one acre of mulberry trees will help to produce about 500 pounds of cocoons or 45 pounds of raw silk, or in other words about 9 pounds of silk per 100 pounds of cocoons.

The areas favorable to silk production as well as industry are: Myitkyina district, Maymyo, Lashio, Kutkai, Kalaw, Taunggyi, Loikaw and Loilem. Many tribal people are especially suited to be engaged in silk culture, i.e., Karens, Kachins, and Shan-Burmans.

The generally cheaper rayons are popular in Burma, but nylons and dacrons are finding their way into widespread use. The essential raw materials required in the production of rayon are cellulose materials including inferior cotton, bamboo, bagasse, reeds, and soft woods. The only notable silk reeling factory in Burma was established in 1956 at Anisakan near Maymyo. The raw material for manufacture is derived mostly from China and Japan. Other modern medium-size plants for silk reeling and weaving could be sited both in the port towns and the interior

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[12] Econ. Surv. Burma, Rangoon, 1961, p. 29

Burma produces considerable quantities of raw wool, but exports most of it Natural wool production was much harmed by the loss of animals during the war. Still mostly in the cottage industry stage, it is likely to remain in this phase for quite some time. The notable center of industry is at Natmauk in the midst of the producing area. Wool thread, yarn and carpets and floor rugs continue to be imported. Exports are small.

There was no meat packing industry in Burma either before or after the War. Large numbers of animals were lost in the War and the religious attitudes towards eating meat reduce the demand for meat and allied products. Lack of refrigeration and storage facilities is further responsible for not getting a meat industry organized. Imports of meat are also small. A meat packing industry would cater only to the country's armed forces, sophisticated city folks and non-Burman elements in the population

Modern slaughter houses and packing plants could be sited near the cattle-raising areas. Their size should be somewhat small, but expandable

In 1960-61, there were five canning factories in Burma including those at Rangoon and Taunggyi All the plants were canning fish and meat curries, beans and vegetables and fruits, especially mango and pineapple. In 1962-63, there were 8 firms producing about 23,000 cases with a sale value of over a million kyat. Eleven cordial and syrup factories produced about 19,000 dozen bottles in 1962-63 Various other privately owned food processing establishments produced noodles, sweets, and vermicelli.

The Burmese Army food canning factory at Kalaw between Meiktila and Taunggyi is a modern plant and normally has a surplus production beyond the needs of the armed forces. It requires further expansion and modernization in the years to come in order to serve as a model establishment to compete on the civilian and export market

This factory is far removed from the main fishing areas of the country; therefore, a major fish canning unit is needed in a coastal situation well connected by transport facilities with the inland centers of consumption. This unit should be equipped for the drying of fish, shrimp and prawns and could operate a shrimp and fish paste section The Burmese Army already operates a modern fish and shrimp paste factory

There are six wheat flour mills in the environs of Rangoon. Of the five modern mills, the largest has a capacity of 60 tons of wheat per day. Extraction is about 70 percent. There are 15 other grain mills (other than rice) in different parts of the country. Since bread is not commonly eaten in Burma, the number of indigenous bakeries is small and none are mechanized. In 1963-64, there were 22 biscuit making concerns and 52 bakeries and confectionaries, mostly concentrated in Rangoon and other urban areas. The State Brewery at Mandalay produces about 730,000 gallons of beer per year. The yeast is discarded. There is a distillery operated along with the brewery, but it discards its spent liquors It is suggested that both these products on being dried could be useful in animal feed programs.

Milk drinking has not taken root in Burma, and the consumption of butter and cheese is not large. The estimated average consumption of milk per capita is about 8.18 kilograms (18 pounds). But, particularly in large urban areas and prosperous towns, and hill resorts and mining towns modern milk collecting and processing systems are needed. Initially stress might be laid on the pasteurizing and bottling of milk and on butter making. But production of powdered and sweetened tinned molk, so popular in Burma, could be produced at modest-size plants located conveniently in relation to market and based on firm supplies of milk. In 1962, $10.90 million worth of tinned or dried milk was imported by Burma. A condensed milk plant capable of producing 18 million tins per annum (or 36 million on a two-shift basis) is nearing completion in Mayagon near Rangoon. A few years ago, the Burmese Army developed a condensed milk plant near Maymyo, and a state-owned plant at Rangoon bottles fresh milk.

Burma is a vegetable oil consuming country. Well organized modern manufacture of vegetable oils is essential in spite of the numerous small units existing in many parts of the country. Its import can be eliminated by thoughtful planning of this industry. Groundnu and other such oils are still being imported. In 1962, the import value was around $1.3 million and in 1964-65 the value was still higher i.e., about $10 million. In 1953, KTA had suggested the setting up of a large plant for producing rice bran in the Rangoon area The idea was to process 100 tons of bran per day producing 14 25 tons per day of marketable rice bran oil. Rice bran contains 14 percent to 22 percent oil. Bran from Burma rice yields about 17 percent oil.[13]

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13 KTA: Vol II, pp. 28-29

There were two modern sugar factories in the pre-war period, at Sahmaw and Zayawaddy The one at Sahmaw was badly damaged during the war For establishing new sugar factories, it was necessary to locate the plants in the sugar cane producing areas. Sugar cane cultivation is especially concentrated in such districts as Pegu, Toungoo, Kamethin Kyaukse and Myitkyina New sugar factories have come into existence near Pyinmana and Namti, Southwest of Myitkyina and at Bilin The factory at Bilin was built in 1966, with Chinese aid, under the Sino-Burmese Economic and Technical Cooperation Aid Agreement covering 30 million ($90 million). The mill can produce 100 tons of sugar a [illegible].[14] The Zayawaddy factory was nationalized in 1954 and Pyinmana and Namti were built in 1956 and equipped with Dutch and Japanese machinery respectively Another sugar mill is nearing completion at Inle. A site for a new distillery has been selected at Zayawaddy. Two small sugar mills are under construction in the Kachin State and another in Shan State.

The sugar production in recent years, has gone from[15] (tons): 1954-55 (16,512) to 1964-65 (62,475) The production in 1966-67 was over 60,000 tons but still about 20 percent of the national requirements are imported. In 1962, imports cost $1 30 million [16]

The quality of sugar produced is fair Molasses is kept at low prices for export by the government In the country the molasses can be used as a nutrient medium for the production of food yeast, alcohol, rum and various chemicals through fermentation with microorganisms. Some of the domestic requirement of sugar on a local basis is met by palm jaggery which has been traditionally a popular confection. Burmese production from this source amounts to 30,000 tons per year. Firewood and groundnut husks are used to boil the palm oil juice. The production of factory made sugar is the responsibility of the State, and the Agricultural and Rural Development Corporation of the Government is promoting the cultivation of better cane and ensuring proper supplies to the mills, though often much of the sugar cane does not reach the factory at the time of its optimum maturity.

Timber is one of the great natural resources of Burma and has been the basis of an industry providing occupation and employment to many people Sawmilling is the basic process in the industry and, by virtue of the nature of the work, is centered at convenient places on river banks and near ports where the bulky raw material as well as exportable woods can be handled economically. Sawmilling ranks next to rice-milling in the number of workers employed. The three most important

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[14] Quat. Econ. Rev. EIU, London No. 2, 1966, p 5

[15] Econ. Surv. Burma, Rangoon, 1961 p 31, and Surv. 1964, p 43.

[16] Overseas Business Reports, U S. Dept Commerce, Dec. 1963, Table 10 p. 6

sawmill centers are Moulmein, Rangoon and Mandalay. In 1951-52, among them they had 97 mills (about 1/3 of all sawmills in the country, numbering around 336) handling 372,055 cubic tons round logs, and sawed about 58 percent of the lumber produced in the country.

During recent years, the State Timber Board has been very active in promoting timber extraction as well as drawing up schemes for raising the milling capacity. The Forest Department is continually improving the maintenance of forests and proposes to introduce the system of the standardization of lumber products.[17] The old sawmills are being renovated and new ones erected.

The timbers and woods in Burma are divided into four categories: (1) teak (seasoned and green), (2) durables (Pyinkado, Padauk, Thitya-Ingyin), (3) semi-durables (Pyinma, In-Kanyin and others), (4) non-durables (green utility woods).

The plywood industry in Burma has a natural basis and plywood can be produced at less than the cost of the imported product. The imported products generally do not stand up properly to the tropical climate. The industry caters to many needs in the nation's economy including housing, furniture, cabinets, tea chests, boats, toys, transportation and general construction for industrial and other purposes. Apart from teak, many other timbers are used in veneers and plywoods. Under a loan agreement with the Chinese Government, a plywood factory at Swa was to be completed at the end of 1967. Round the timber and wood resources in the country other industries like furniture making, wood distillation, tannin and cutch extraction, and paints and varnish, have been developed.

The Burmese Government has recently planned to give a filip to the forest industries This will lead to the development of a number of integrated forest industries. Each project will include at particular locations plants for furniture, veneer, plywood, chipboard, fabricated houses, production of doors and windows, etc.

After the war there was only one cement factory in Burma, at Thayetmyo, with a rated capacity of about 60,000 long tons per year. But the actual production was not even half of that in 1951-52. In 1957-58, the production was 30,021 tons. The production rose[18] to 43,823 tons in 1960-61 After a further extension to the factory in 1962, production reached a level of 123,000 tons in 1963-64. The

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[17] Econ. Sur. Burma, Rangoon, 1961, p 82.

[18] Econ. Surv. Burma, Rangoon, 1961, p 94. The Russian experts gave a figure of 39,000 tons for 1961. See "Burma" (Text and Map: in Russian) Geographic Literature, Moscow, 1962.

use of natural gas discovered nearby has brought down the cost of production. The cement is transported by water largely to the Rangoon urban area which remains its best market

It seems quite desirable that another cement plant should be established and located at Rangoon, the largest user of the product. The present demand for cement in Burma is about 150 000 long tons per year, and more than K 2 3 million worth of cement was imported in 1962 In the future expansion and development of the cement industry, it would be advisable to also produce asbestos cement roofing, siding, and interior wall material for which demand is likely to develop, especially in the larger urban areas.

More than 140,000 acres of land are under tobacco in Burma, and on the average about 120 million pounds of dried cured tobacco is produced every year The chief producing areas are in the districts of Thayetmyo, Tharrawaddy Myingyan, Mandalay, Toungoo and Pegu.

The modest-size tobacco industry is concentrated in the Rangoon area. In 1952-53, KTA reported that there were 35 factories in Burma producing cigars, 46 producing cheroots, and four and three producing "beedies" (leaf-wrapped cigarettes) and cigarettes respectively. Rangoon was the chief manufacturing center with 27 out of the 88 factories for the whole or Burma. Mandalay was a close second with 25 factories There were small cigarette plants in Myingyan, Prome, Bassein and Pegu. The industry employed 5,083 people, 598 of whom were men and 4,485 women. Most of the manufacturing was really on a cottage industry basis There was no modern humidifying and curing equipment in use.

By 1958, nearly 1,000 curing barns had been established and the Land Resources Development Corporation (LRDC) took active interest in training private producers of tobacco. By 1959 the cultivation of better quality Virginia tobacco had increased to 9,000 acres High duties were imposed on imported cigarettes onward from 1956 and this protection encouraged the home manufacture, thus also ensuring a more profitable market for domestically grown tobacco There is a future for further growth of the cigarette and cigar and cheroot industry in a more modern and organized form, as Burma in general consumes more tobacco per capita than do people of any other country except the United States

A new cigarette factory is to be built at Pakokku in the midst of a major tobacco producing district. The factory will cost K 10 million. All cigarette companies were nationalized in October 1963 and cigarettes are manufactured by the People's Cigarette Industry Management Committee. About 1,000 million cigarettes were manufactured in 1963-64.

Fertilizers will have increasing use in the improvement of Burmese agriculture. In many developing countries of the world the fertilizer industry has been established on a large modern scale at home, so that the heavy burden of these vital imports may be lightened. All the basic fertilizer materials, potash, phosphorus and nitrogen are being used Natural gas is being used as an important basic material for the industry. Burma can produce larger quantities of urea and ammonium sulphate.

Therefore, two fertilizer plants, each capable of producing 200 tons of urea a day, are to be built at a cost of K 110 million and completed by 1969-70. One is to be located at Sale and the other in the Pakokku district.

There are two paper mills, located between Pegu and Toungoo near Penwegon. A new paper mill was to be completed at the end of 1967 at Sittang under the loan arrangements with China. It will produce 40 tons of paper a day from the local bamboo raw material. The Chinese are to build another 40-ton-a-day mill in Northern Burma which will produce both writing paper and newsprint. This will make substantial reduction in Burma's paper imports of about 35,000 tons per year. Paper imports cost the country 7.20 million dollars in 1962. Under an agreement with the West German Government in 1966, a packing paper plant was to be built within a year with a 5-ton-a-day capacity.

For many years, it has been suggested that bagasse could be used as raw material for making paper. This would lead to the development of a few sugar-paper mill factory complexes. During 1961 negotiations were conducted by the Burmese Government with two United States firms for building a cellulose and paper factory in the Mandalay area which would use palm leaves as raw material. But the proposals did not materialize.

The manufacture of some iron and steel products was considered an important step in the industrialization of the country. KTA had recommended the establishment of a modest-size plant. The construction of the first steel rolling mill was started in 1956 at Ywama near

remaining within a few miles of Rangoon and south of Insein. The Rangoon River provided water and transport facilities, and the raw material was to be the war-time steel scrap plus iron ore from the newly worked Par-- mines north of Taunggyi, promising reserves of about 63 million tons o. ore In 1958, it started producing about 20,000 tons of steel per annum in the form of the re-rolled steel and sheets, bars, wire, nails, bolts and drums. The mill cost about K 36 million and was equipped with German machinery

The oil production of Burma and associated industry has been gradually recovering from the severe scars of War In 1966, about 20 percent of Burma's oil needs had yet to be imported. The Burmah Oil Company was nationalized on January 1, 1963 Soon after, new deposits were found in Myanaung and Prome areas In 1966 the Syriam refinery was producing 20,000 barrels daily and the Chauk refinery was yielding 6,300 barrels daily. These two refineries are connected by a pipe-line 300 miles long It is estimated that 41 million gallons of petrol, 35 million gallons of paraffin and 51 million gallons of diesel and other oils are sufficient to meet the present domestic requirements Due to power generation and increasing dieselization of locomotives on railways and other transport systems, oil is imported in Burma.

As in many other Asian countries of traditional society and subsistence economy, in Burma rural and cottage industries have a significant place in the local economy. In 1940, it is said 80 percent of the workers in industry were in the rural areas The more important handicrafts are cotton spinning and weaving, silk weaving, lacquer work, pottery, jewelry making, metal casting, women s umbrella making, sandal making, cheroot making, oil pressing and rice milling.

Cotton and silk weaving are first among the handicrafts and are widely spread. Second in importance is lacquer work. There is the well-known lacquer work school at Pagan A leading item of this industry is the "thabeik" or the begging bowl of the Buddhists. A large number of flower vases are also made Teapots and other objects for either use or decoration are made Bronze images of Buddha and silver work are made.

During the Japanese occupation, due to disruption of industrial production, many cottage industries received a boost. The Japanese were also interested in these ventures to reduce the shortage of consumer goods. Thus, there is considerable scope for the development of cottage industries in Burma, since they paly a useful part in the rural and urban economy

In 1965-66, only the Industrial Development Bank offered credit to industry in the private sector. No outside investment was allowed. On October 19, 1963 a law had been published by the Revolutionary Government of Burma authorizing the government to take over any remaining privately owned company.[19] Between 1963 and 1964 nearly all the banks were nationalized.

Until the end of 1965, about 40 percent of the miscellaneous manufacturing industry was still in private hands. But the private sector was in a state of uncertainty due to the rapid program of nationalization. About 90 percent of trade was in government hands and only agriculture was left entirely in private hands. In the budget, industry and mining were expected to provide some 31 percent of the total production as against 26 percent by agriculture.

The present Government policy in Burma is for the State to take over large and medium-sized industry, but only a limited part of this program has been implemented. As a national policy, priority is given to further the development of industries which utilize domestic raw materials and food stuffs.

The Burmese intelligence, resourcefulness and enthusiasm and eagerness to achieve progress has borne some fruit. Through their wartime handling of technical and semitechnical jobs under Japanese stewardship, they amply demonstrated their potential capabilities for a future program of industrialization. Therefore, when they achieved independence, they visualized economic development with the help of public and state enterprises, as far as possible gradually dispensing with private investment. Obviously, a half-way situation was bound to emerge in which private investment both indigenous and foreign has to play its role in economic development though circumscribed by many state regulations and ideological attitudes of the political leadership and public sentiment. The realization may sooner or later come to Burmese leadership that even a socialist pattern of economy in their underdeveloped country will have to make a series of compromises with the outside investors and traders while they are yet on the long road toward economic development.

[19] In early 1963, in a meeting of businessmen and industrialists, General Ne Win, the Chairman of the Revolutionary Council and Head of the Government, announced that henceforth the State would handle all work relating to procurements, production and distribution of industrial goods in the country. Import and export trade would be nationalized. No new private industry was to be allowed, and private enterprises were to be taken over by the Government in due course. (See Gunnar Myrdal: Asian Drama, 1968, Vol. II, pp. 836-37.)

As to the type and pattern of industry, it is clearly indicated that the pivotal position will be occupied by the forest-based and agro-indistires e g , rice-milling cotton and silk textiles, vegetable oil pressing, fruits and preserves milk products, sugar, matches, paper, cigarettes, rubber goods timber and wood products. Thanks to nature's gifts, Burma's mineral resources will lend it not only variety in economic development, but certain products such as oil and gas will lead to the development of sophisticated industries hinging around petrochemicals

Other industries needing further development and encouragement are cement, lime, potteries, fertilizers and general engineering. It may not be necessary to erect large establishments of heavy industries, iron and steel and metal complexes However it may be planned to develop one or two more medium-size steel mills near port locations in order to cater to some of the immediate needs of industrialization, i e , sheets, bars, bolts and nuts, girders, pumps, etc. Steps in this direction have already been taken in adjoining countries with economies similar to Burma

In fact, there is unlimited scope for industrial advance through numerous easy-to-establish and mobile industries ranging from electronics to pharmaceutics and synthetic fibers. It is not necessary to start with steel plants automobiles and aviation industries. There is need for outside assistance and cooperation either through UN agencies or private or state enterprises from the more developed parts of the world.

Basically, Burma s industrialization demands the provision of work opportunities for its moderately growing population and labor force, to increase the per capita productivity and to promote stability in the economy by reducing the imports of types of consumer goods and other items which may be easily processed and economically manufactured in the country. This would release a large part of foreign exchange for the import of necessary raw materials and machinery

Burma has been traditionally an exporter of food (rice) and raw materials (teak, minerals, rubber etc) It is a well known world-wide trend that raw material commodities in the world markets have been increasingly affected adversely as compared with manufactured articles and products. This reacts unfavorably on the economy of developing countries like Burma It is not just because of ambition and unrealistic desire that progress in the developing countries is being measured in terms of industrialization Development of industry may not necessarily be at the expense of developing agriculture, as it is likely to result in better balance and greater stability in the national economy of Burma.

Power and Energy

Low-cost electrical power is one of the principal requirements of industrial development and general economic advance. In pre-war Burma, the development of electrical power was very small. Few towns had thermal stations, and the villages were still burning kerosene, mustard oil and candles for lighting. In 1939, power installations were mainly small thermal high-cost units. Out of a total of 179 plants, only 102 were supplying energy to the public and 77 were catering to the needs of industrial enterprises.[20] Out of 102 plants supplying the public, 83 were small diesel units. There was a 24,000 Kilowatt steam station at Rangoon and there were 9 minor hydroelectric and steam plants elsewhere. The industrial plants included 6 hydroelectric units, with capacities up to 20,000 Kilowatt. In all, electric generation in the public plants, in 1939, amounted to 48 million Kilowatt-hours,[21] while in commercial and industrial enterprises the generation totalled 185 million Kilowatt-hours.[22] On the whole, only 100 towns were electrified.

After extensive war damages, only 19 towns had electricity in 1947-48; and in 1952, there were only 52 plants of all kinds in operation with a capacity of only 35,000 Kilowatts. Except for 3 steam plants and two small hydroelectric plants (Maymyo and Mogok) all of the 52 plants were diesel operated. By 1954, the total installed power capacity had increased to only 41,000 Kilowatts. But, according to a United States Geological Survey[23] estimate in 1954, Burmese hydroelectric potential based on ordinary minimum flow was said to be 3.73 million Kilowatts. It was also stated that the estimated per capita hydroelectric potential of Burma was one of the largest in the Far East including Japan, India and Pakistan.

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[20] KTA, Vol. II, p. 561.

[21] Ibid, pp. 561-62.

[22] Kilowatt is a unit of electrical power equal to 1,000 Watts: abbreviated KW. Kilowatt-hour is a unit of electrical energy or work equal to that done by one Kilowatt acting for one hour: abbreviated KWh. Watt is after James Watt the Scottish inventor 1736 to 1819. (Watt in electricity is a unit of electric power equal to a current of one ampere under one volt pressure or about 1/746 of one horsepower).

[23] U.S. Geological Survey: Circular 367, December 1954.

After independence, the Electricity Supply Board (ESB) prepared a plan for the installation of diesel and small hydro plants in 36 towns. The Rangoon Electric Supply (RES) became responsible for the supply of energy in the Rangoon urban area.

Some of the suitable sites for hydroelectric plants from the point of view of future economic development were those pointed out by KTA: Saingdin Falls (Sittwe area), Pyaungsha Rapids on Namtu River (Mandalay area), Namsam Falls (Northern Shan States), Balu Chaung River at Loikam (Southern Shan States), Bawgata Chaung (Rangoon area), Pegu River (Rangoon area), Lampha Chaung (Amherst district), Upaungdan Chaung (Tavoy district).

The KTA consultants, taking into account the existing markets, population centers and probable development of the manufacturing industry also recommended the undertaking of three medium-size power developments: The Pegu River Hydroelectric Plant 30,000 Kw; Myingyan Steam Plant 30,000 Kw; and Saingdin Falls Hydroelectric Plant, 40,000 Kw. They expected the completion of these projects within three or four years after 1953; but in 1954 the government dropped the Pegu River and the Saingdin Falls Projects for the time being and instead concentrated on the enlarged construction of the Balu Chaung Plant.

In April 1960, the largest hydro-electric station was completed at Balu Chaung River at Lawpita near Loikaw with a capacity of 84,000 Kilowatts. This plant serves 44 towns including Rangoon (about 300 miles away) and Loikaw; and more than 150 large villages are served by it. A good deal of the construction of the Balu Chaung Project was done by Japanese engineering firms, and it was financed mostly from the Japanese reparations funds.[24]

In spite of the initial difficulties in terms of technical assistance, costs and rates, it was admitted even by some severe critics[25] of public enterprises in Burma that the development of electrical power production bore somewhat striking results. The electrical energy capacity in Burma, in 1961, was more than six times the output in '951-52. Absolute growth was highest in the Rangoon urban-industrial area but relative growth was highest in the outlying areas. The number of towns electrified had increased from 26 to 313, and for the first time in the history of modern Burma, 361 villages were served by electricity.

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[24] Second Four-Year Plan, 1961-62 -- 1964-65, Table 89, p. 130.

[25] Walinsky: Economic Development in Burma, 1951-60, p. 330.

With the operation of the hydroelectric power station on the Balu Chaung at Lawpita, in 1957 the installed electrical capacity in the country was raised to 191 mw (191,000 kw).[26] The installed capacity in the Rangoon Electric Supply area became 60 mw. During the fiscal year 1960-61, the total units generated were estimated at about 270 million kwh, comprising[27] 184 million kwh in RES(Rangoon Electric Supply) area and 86 million kwh in the EBS (Electricity Supply Board) area. Of these, 147 million kwh in RES area and 18 million kwh in EBS area were supplied from the Balu Chaung power station. The power supply in the hydro-grid area is linked with the thermal plants in Rangoon (RES) and functions as a combined system. The industries in the Southern Shan States are fed by hydroelectric power. Power-consuming small and medium industries have grown in number in the EBS and RES areas.

The yearly power generation in Burma in the EBS and RES areas combined was as in Table XL.[28]

TABLE XL

YEARLY POWER GENERATION IN RES & EBS AREAS

(In million kilowatt hours)

YEAR	RES Area	EBS AREA	TOTAL
1954-55	69.3	20.6	89.9
1957-58	126.6	52.0	178.6
1960-61	184.0	86.0	270.0
1963-64	104.0	240.0	344.0

According to UN Statistical Yearbook 1965, the power generation figures for 1963 and 1964 were at the level of 252,000 kw. But the same figures are reported since 1960 for five consecutive years in this publication.

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[26] 1 mw equal to 1,000 kw.

[27] Econ. Surv. Burma, Rangoon, 1961, pp. 32-33.

[28] Econ. Surv. Burma, Rangoon, 1961, p. 33 and Surv. 1964, pp. 56-58.

The yearly power consumption [29] was as in Table XLI.

TABLE XLI

YEARLY POWER CONSUMPTION IN RES & EBS AREAS

(In million kilowatt hours)

YEAR	RES Area	EBS Area	Total
1954-55	54 9	16 0	70.9
1957-58	101.2	35 0	136.2
1960-61	156 1	51 2	207.3
1963-64	210.0	70 8	280.8

In the second stage of development of the Balu Chaung Project, by 1965 or 1966, the installed capacity was to be extended to 168,000 kw by the construction of the Mobye Dam at about 19 miles upstream from Loikaw by the installation of three additional generators. Mandalay, Thazi and Kalaw were to be linked by power transmission with the Balu Chaung Hydroelectric plant. This plant was also to serve 107 additional towns and 260 villages with the help of the hydro-grid. But with all these developments, Rangoon's urban and industrial area still consumes about two thirds of the total output of energy in the country

Coal played a considerable part in the fuel and power requirements of Burma before the War Coal was principally imported from West Bengal, India. The average import was about 360,000 metric tons annually. After the War, a much-reduced quantity of coal was imported. In 1952-53, the approximate consumption of 170,000 tons was divided[30] into about 87,000 tons for Burma Railways, 30,000 tons for Rangoon power plant, 17,000 for the Inland Water Transport Board, 8,000 for the Port Commissioners and the rest for other uses In the years that followed, the consumption of coal in transportation declined, chiefly due to dieselization of locomotives, but the demand for coal has increased for power plants and industries

The possibilities of the development of the Kalewa coal have been extended and it is quite possible that the mines may meet the solid fuel requirements of Burma Its transport by barges and power boats would entail high costs but selling about Kyat 35-40 per ton at

[29] Ibid , pp 58-61.

[30] KTA. Vol III p 1500

Rangoon and Kyat 15 to 20 at Myingyan and Mandalay respectively, it would be competitive with the imported coal. Burma's need for coal around 1965 was about 700,000 tons. The value of coal imported in 1964-65 was about 12 million Kyats.

IX TRANSPORTATION

Development of transportation is essential to modern material progress. Agricultural development, urbanization, industrialization, trade and commerce receive stimulation from the ease and rapidity with which men and things can be moved.

Surface transportation follows the line of least resistance, and slopes, gradients, and flow of water are its basic guide lines. Economic activity in its turn attracts lines of transport and communication in proportion to its intensity of development, other things being equal. Surface and relief features, drainage, vegetation and climate all influence transportation forms and trends; difficult and even insurmountable barriers are crossed in the interest of national and strategic necessities and attractive economic and commercial gains.

In Burma the major surface transportation lines run north and south and have cross connections wherever possible or desirable (See Map 16). In the south, the delta is criss-crossed by streams so that transport by waterways is the most practical way of movement. Air travel with small planes, helicopters and amphibian craft is a possible modernization of these facilities. The horsehoe rim of highlands, forests and deep-cut valleys together with the previous lack of development of transporation across them is likely to keep connection with the neighboring countries confined largely to the seaways and airways

The Irrawaddy River, its many tributaries and distributaries formed the main arteries of traffic before the age of the steam locomotive. The mule, the horse and the bullock- or buffalo-driven carts used trails or the mud roads whenever possible Railroad and highway development marked the beginning of modern times The construction of railways and the building of roads made economic development possible in colonial times and promoted the commercially oriented rice cultivation in the Delta

Railways

There is one railway system in Burma. The distance by rail from Rangoon to Mandalay, on the main line via Pegu, Toungoo, Pyinmana, Thazi, and Kyaukse is 386 miles. The connection between Rangoon and Prome is 161 miles long The third line branches out from Pegu 47 miles north of Rangoon and curves around the bay to reach Martaban.

From there a ferry crosses the Salween River to Moulmein. A section runs from Moulmein to Ye 100 miles to the south, and it is from this line that the 267-mile connection formerly ran via Kanchanburi to Ban Pong and Bangkok in Thailand. The route of this wartime railway constructed by the Japanese, was via Ataran and Haungtharaw Valleys, through the Three Pagoda Pass, down the Gue Hoi Meklogng Valleys to Kanchanburi. It is now dismantled.

From Letpadan near the head of the delta, a branch of the railway system goes westward to Henzada and Bassein. From Henzada another branch goes north to Kyangin on the west side of the Irrawaddy River. An important line branches off from Thazi, about 306 miles from Rangoon, to Shwenyaung in the Southern Shan States, 12 miles short of the important town of Taunggyi. Another line from Thazi provides connection with the Irrawaddy River at Myingyan, near its confluence with the Chindwin River. The line from Sagaing across the Irrawaddy to Myitkyina traverses 400 miles through difficult, yet beautiful hilly country via Shwebo, Indaw, and Mogaung. The branch line from Sagaing to Monywa on the Chindwin River turns round to reach Ye U on the Mu River.

Large rivers in Burma are spanned by few railway bridges. There were five major bridge gaps in the linking of the Burma railway system after the war. The Ava bridge on the Irrawaddy near Sagaing, was reopened in October 1954. The Sittang bridge on the Moulmein branch 30 miles east of Pegu, also destroyed in the war, was rebuilt. Similarly, the Daga River bridge on the Henzada-Bessein section was also reconstructed. The Irrawaddy River between Tharrawaw and Henzada has not been bridged and trans-shipments are by ferry. Likewise, the Salween River between Martaban and Moulmein has never been bridged and goods are moved across the river by barges.

It is an interesting fact that there is no connection between the railway systems of the countries of South and Southeast Asia. There is also a variation of gauges, though it is true that along the frontiers complex highlands, dense forests, forbidding plateaus, swift-flowing streams and fierce tribal groups intervene.

The southern railhead of Ye on the Tenasserim Coast is within 300 miles of Bangkok. The existence of this obvious gap gave the Japanese the idea of constructing the 267-mile railway known as the "Death Railway" from Namtok via Khwae Valley north of Ye. This terrible episode has been immortalized in the famous American movie "Bridge on the River Kwai". The Japanese brought locomotives from Thailand and Malaya on this line. Some services were run between Moulmein and Pnom-Pehn in Cambodia and some connections were also

maintained with the Mekong Delta railways Another rail connection developed by the Japanese was the one across the Isthmus of Kra from Chumphon (or Jumbhorn) in Thailand via Kao Fachi to Victoria Point. Goods brought on this railway could be shipped to Mergui or Moulmein.

The northern rail terminus of Myitkyina is only 100 miles from the Chinese border. From the northernmost head of the Bay of Bengal in East Pakistan next door to Burma, the mighty Yangtze Kiang is only 500 miles away as the crow flies (and only one hour flight on commercial jet planes in 1967), but by sea it is almost eight times that distance. No continuous surface communication yet pierces the maze of hills and valleys, forests and warlike tribes to establish this transport connection In 1967 only the jet planes of the Pakistan International Airlines (PIA) were flying between Dacca and Shanghai. Thus Burma has no railway link with any of the neighboring countries. There is not yet a foot of rail track in the Arakan. Below Sagaing, west of the Irrawaddy River, there are only about 150 miles of rail line. In the lower delta area the lines run north-south without cross connections.

Of the commodities moving by rail, rice has the greatest tonnage and most value though the "rail paddy" has a hallmark of a somewhat inferior grain as it comes from high and dry areas. Other agricultural products from the dry zone move into the monoculture area of the delta. Minerals from the Bawdwin and Mawchi mines move on the railway Oil and teak mostly use the river Oil is piped down to the south, though for internal distribution of refined products railways provide the easy transportation

Railways were built in Burma soon after the opening of the Suez Canal in 1869 Construction began in 1877 and the Rangoon-Prome section was the first to be opened to traffic In 1899, the main line from Rangoon was completed to Mandalay The northern terminus, Myitkyina, was also reached in 1899. The Mandalay-Lashio section, opened in 1903, was at one time regarded as a step toward making Rangoon the outlet of the remote southwestern area of China History, politics, and geography seem to have always conspired against the realization of this dream, yet at times it seemed almost to come true.

By 1930, the southern section to Ye had been built and other connections were completed This brought the railway mileage to 2,058 on the eve of World War II The railways of Burma were efficiently run before World War II, and their passenger and freight services ranked high among the meter-gauge railways in the world. More than 60 percent of the officers of the Burma railways were English, only 16 percent of them were Burmans The remaining officers were Anglo-Burmans, Anglo-Indians and Indians

In 1940-41, the gross earnings of the Burma railways were Rs 43,863,000. The added war traffic to China via Lashio and the Burma Road produced a profit. The number of locomotives was 350 and there were 1,156 passenger coaches, 9,500 freight cars, and 44 major stations. The railways carried about 20 million passengers and 4 million tons of freight per year There was a locomotive works at Insein and railway car works at Myitnge.

Prior to the war, the railways carried from 80 to 90 percent of Burma's freight and a large proportion of passengers. Railway travel whenever available was preferred because of speed and convenience. The war almost destroyed the Burma Railway system. More than two thirds of the locomotives were put out of action, bridges were destroyed, and workshops were dismantled. In fact, no single section of the railways escaped heavy damage from one belligerent or the other. By the end of the war the Burma railways had ceased to exist as a transportation system.

On the Burmese Independence Day, January 4, 1948, limited service had been restored on some 1,800 route miles of railways. Of course, the vicious insurgency which followed made the task of railway rehabilitation extremely difficult. Soon after Independence, the railways were nationalized along with other leading forms of transportation.

The KTA Report recommended an expenditure of K 270 million on railways as part of the development program as a complete, efficient and well-functioning railroad operation is essential to the success of the national plan for increased agricultural production and industrial development, and consequent economic progress and welfare of the country.[1] They suggested a dieselization of locomotives as early as possible. This has been actively pursued, and a World Bank Loan was used for the purpose in 1959-60. During the last few years an active program of replacement of passenger coaches and freight cars has taken place. Much of this rolling stock is now made in Burmese railway workshops.

In recent years, both passenger and freight traffic has been on the upgrade. The rate of growth in the passenger traffic on the railways has been faster than that on inland water transportation. The total number of passengers travelling by railway as well as the total passenger miles in 1959-60 was more than the pre-war level[2] (see Table XLII). At the end of 1966, there were 1,900 miles of

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[1] KTA Report, Vol. 1, p. 266.

[2] Economic Survey of Burma, Rangoon, 1961, p. 37.

TABLE XLII

BURMA: PASSENGER TRAFFIC OF THE PRINCIPAL CARRIERS, 1937 to 196

(in millions)

Year	Union of Burma Railway Board		Inland Water Transport Board	Union of Burma Airways Board	
	Passengers	Passenger miles	Passengers	Passengers	Passenger miles
1937-41	19.2	432 6	8 0	...	...
1948-49	7 4	74 1	0.4	...	...
1950-51	9.7	206.3	2.5	0.13	29.9
1951-52	11.8	252 0	3.1	0.12	25.8
1952-53	15.3	353.5	3 2	0.13	25.7
1953-54	17.2	421 6	3.3	0.14	26.4
1954-55	21.9	494.8	3.6	0.14	27.1
1955-56	23.8	525 3	4.3	0.13	26.1
1956-57	26.0	589.8	4 5	0.08	17.?
1957-58	26.9	661.7	4.3	0.08	16.8
1958-59	33.7	807.5	4.9	0.09	17.8
1959-60	39.2	949.6	5.0	0.11	20.2
1960-61*	42.3	1,088.3	5 5	0.12	24.0

*Estimates based on six months actuals

SOURCE: Economic Survey of Burma, 1961, Table 29, p. 38

railways in operation. A great deal of freight traffic is transported by rail, and its volume rose from 458 million-ton miles in 1961-62 to 544 million-ton miles in 1964-65. Passenger traffic was increased from 953 to 1,416 million passenger miles over the same period.[3]

Inland Water Transportation

The efficiency of waterways and seaports is vital to the economy of Burma. Both external commerce and inland navigation provide the life-blood to the country's economic activity.

The great rivers of Burma with many tributaries, flowing from north to south, and traversing almost the entire length of the country and then forming a vast network of streams in the delta, provide more than 5,000 miles of commercially navigable waterways. In addition to these, thousands of miles are used by small craft which in many parts of Burma are the principal means of travel and transport. Especially in the delta of the Irrawaddy due to numerous streams, channels, and creeks, rail and road transportation are at a disadvantage and water transport is the most economical and convenient form of movement.

Railways supplemented rather than replaced the waterways. They were not built to compete with the traffic on the Irrawaddy River and, except for touching it at some points, generally kept away from the river to promote transport facilities beyond it. In the Sittang Valley, water transportation is not important and continuous, and therefore the railroad runs almost parallel to the river beyond Pyinmana. There are no railways within 25 to 30 miles of the main oil fields and nearly all petroleum not sent by the pipe line is taken into Lower Burma by river transportation. At harvest time, numerous delta streams are used for transporting rice. These streams are tidal up to about 70 miles from the sea and barges, boats and steamers ply easily. Most of the teakwood, the third most important item in the export of the country, floats down the main rivers, i.e., the Irrawaddy, Chindwin, Sittang and Salween.

The Irrawaddy Flotilla Company (IFC) was formed in January 1897 and in a few decades grew into one of the largest inland waterway companies in the world. Before the coming of the Japanese in 1942, the Irrawaddy Flotilla Company operated about 600 vessels, ranging in length from 50 to 326 feet and in capacity from 36 to 1,680 tons.[4] The annual average pre-War commerce was over 1.2 million tons of cargo

[3]Ann. Supplement, Quart. Econ. Rev., EIU, London, 1967, p. 6.

[4]Trueblood, L.W. Burma: A Study in Political Geography, 1954 - PhD Dissertation (unpublished), p. 147.

and more than 8 million passengers. They had 263 power craft and 383 non-powered barges. The steamer crews numbered 5,500, dockyard employees 3,000 and clerical staff 500 During the War a great many of its craft were sunk by their crews so that they might not fall into Japanese hands In 1946, the IFC was restored but after Independence in 1948, it was nationalized and its activities were merged with that of the newly created Inland Water Transport Board

After the War and a few years of rehabilitation, commerce carried by the Inland Water Transport Board was as follows:-

	1950-51	1951-52
Cargo, tons	641,000	662,000
Passengers	2,530,000	3,080,000

When compared with the pre-War figures the above figures show a reduction of approximately 45 percent of cargo trade and 62 percent of passenger trade. The principal goods transported by the vessels of the Inland Water Transport Board (IWTB) were still rice and local consumable commodities. The reduction in services was due in these early years of independence not only to fearful War losses of the vessels and crafts as mentioned already, but also to the continued and vicious insurgent activity which adversely affected regular transport movements For several years the IWTB vessels moved only during daylight hours and under military escort.

Soon after independence, the IWTB adopted a 3-year program as the first phase of a 10-year program to rehabilitate the fleet. Their starting point was 1950 when the fleet numbered about 556 vessels; however, out of this number only about 19 powered craft and 86 barges were salvaged and reconditioned pre-War vessels. The balance consisted of 84 powered vessels and 50 barges of new construction and of some 300 craft given over by the Military Directorate of Transport. These military craft proved uneconomical and unsuccessful in commercial operations. The total gross tonnage of the powered craft amounted to only 22,000 tons as compared with 49,000 tons and 191,000 tons.[6]

The Arakan Flotilla Company started operating water-borne cargo services in the Arakan area as an agent of IWTB. Their passenger service was a separate venture The length of the sailing routes was reduced by nearly 50 percent, mainly due to insurgent trouble and lack

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[5] KTA, Vol I, p 339

[6] Ibid , p. 341.

of vessels. The weekly sailings from Akyab (Sittwe) were reduced from 22 to 9 in 1953. Goods carried[7] by waterways in 1963-64 amounted to 119 million tons and the number of passengers travelling on waterways was 9.8 million in 1964-65. Expansion of the fleet and improvement of dockyards continues under the IWTB.

In addition to the need of acquiring new vessels, there were three other aspects of vital significance to the improvement of inland transport, namely, the need of personnel to run the services, the removal of wrecked and sunken craft from the rivers and proper pilotage on the Irrawaddy to avoid shoals and sands. The greatest difficulty arose with the rapid nationalization of personnel by the elimination of European officers and eventually of the Pakistani Sarangs. This was bound to create a vacuum.

The Inland Water Transport Board in 1965-66 owned the following categories of crafts:[8] passenger and cargo vessels (166), cargo vessels (20), pusher cargo barges (49), non-powered craft of various type (410), motor boats (9), tugs (60), tugs for jetty use (7), water tankers (4), salvage vessels (2). Various kinds of privately owned river craft registered up to June 1966 totalled 1,009.

The Irrawaddy and the Chindwin River systems constitute the main inland waterways transport in Burma. The Irrawaddy River itself is navigable for 900 miles throughout the year, and for 105 additional miles during the rainy season and after it (about seven months). The Chindwin is navigable for about 400 miles. The Irrawaddy and its distributary channels in the delta form about 1,500 miles of commercially navigable waterways throughout the year. Many smaller channels and streams are navigable by boats and small craft and in many places they are the only means of transportation and trade. The Lower Irrawaddy is in flood from July to September. The lowest levels on the river are reached in February and March. In northwestern Arakan, the Kaladan, Mayu and Lemro Rivers and their tributaries are navigable for 350 miles and constitute the most important means of transportation in that area. The Sittang is navigable near its mouth for only 25 miles, and for about 155 miles during the monsoon from July to October in its middle portion. The Salween can be navigated for only 55 miles from

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[7] Ann. Supplement, Quart. Econ. Rev. EIU, London, 1967, p. 5.

[8] Union of Burma: Budget Estimates, 1966-67, Table 33, p. 27.

Moulmein to Shwegun. Navigational facilities of tidal rivers expand during and after the rainy season. The Rangoon River and its principal tributaries, the Pazundaung Creek, Pegu River and others, though relatively small in their drainage areas and navigable lengths carry perhaps the largest amount of waterborne commerce of Burma, especially because this waterway system constitutes the link with the great port of Rangoon.

Some main river routes (see Map No. 16, Transportation) are as follows: Rangoon-Bhamo, from the port of Rangoon via Twante Canal to the China Bakir River and the eastern distributary of the Irrawaddy touching at Maubin, Kyaiklat or Dedaye and thence through the main river to Prome, past the oil fields to Mandalay and onward to Bhamo, a distance of about 1,000 miles (standard river steamers with a draft of 3-1/2 feet can ascend the river up to Bhamo throughout the year and during the high water period, June to October much larger vessels can use the river); Irrawaddy-Chindwin, up the Irrawaddy to Pakokku and then into the Chindwin to reach Homalin in the upper Chindwin Valley, about 400 miles away, not far from the Assam border in India; Delta Region routes, across the several Irrawaddy affluents from Rangoon to Bassein, constituting an important transport link for the movement of rice, and routes in the Delta Region connecting Rangoon with Pyapon, Bogale, Maubin, Henzada, Wakema, Kyaiklat, Kungyagon, Labuta, Dedaye, Yandoon, and Moulmeingyun. The Twante Canal, about 22 miles long, is a vital link connecting Rangoon with the navigable distributaries in the Delta Region. The canal was excavated to a depth of 6 feet below sea level at low tide. The Sittang Canal, links Pegu and Rangoon with Toungoo, though the mouth of the Sittang is influenced by a big tidal bore rendering navigation risky.

The rivers of Burma are greatly affected seasonally by the heavy rains during the monsoon period, and low water and flood stages are experienced each year. The lower reaches of all the main rivers joining the sea are subject to tidal occurrences. The differences between mean low water spring (MLWS) and mean high water spring (MHWS) tides vary approximately as follows:[9]

Kaladan River at Akyab(Sittwe):	7.3 feet
Bassein River at Diamond Island:	6.3 feet
Rangoon River at Elephant Point:	18.0 feet
Salween River at Amherst:	19.0 feet
Tavoy River at Reef Island:	15.5 feet
Great Tenasserim River at Mergui:	16.8 feet

9 KTA; Vol. I, p. 37.

Of the estimated 5,000 miles of the inland waterways of Burma under use commercially, about 4,000 miles lie within the tidal influence.

As regards navigation on the rivers, the conditions vary from stream to stream in relation to the geographical aspects of surface, rainfall and total drainage. The division of drainage in Burma by watersheds of the main river systems expressed in percentage is as follows:[10]

Drainage	Percent
Irrawaddy and Chindwin Rivers	55.03
Salween River and Tributaries	18.42
Sittang River	5.37
Kaladan River and Tributaries	3.75
Rangoon River and Tributaries	2.95
Great Tenasserim River	2.69
Other Coastal Streams	11.79
	100.00

On the Irrawaddy, craft generally dock alongside the river bank. There are usually two different landing points,one for the high water period and the other for the dry season. These landing places often have no proper road connection with the town. Cargo storage facilities are generally poor. Fairly large cargo-passenger-steamer type vessels are used and they pull two barges in tow, one on each side. Some of the old paddle steamers are still in use. At any rate, large steamers are not adaptable to the tidal sections of Burma's rivers with their shallow and curving courses. The barges are usually 250 feet by 34 feet.

Vessel draft requirements on the Irrawaddy are generally as follows; Rangoon to Prome, 1.5 meters (5 feet); Prome to Yenangyaung, 1.45 to 1.5 meters;Yenangyaung to Mandalay, 1.3 to 1.45 meters; Mandalay to Bhamo, 1.1 to 1.2 meters; and Bhamo to Myitkyina, 0.75 to 0.9 meters.

The Chindwin River is navigable by steam vessels as far as Homalin, a distance of about 400 miles upstream from its confluence with the Irrawaddy near Myingyan. During the rains, launches can reach Tamanthi, 57 miles above Homalin. Smaller craft can navigate another 120 miles. At Homalin the river is 1,500 feet wide. Since there is no railway and road into the Chindwin Valley north of Monywa, the water route is the main means of transportation. The chief localities served by the

[10] Ibid., p. 336.

steamers and larger craft up the Chindwin from its confluence with the Irrawaddy, in miles are: Monywa (54), Kalewa (195), Mawlaik (239), Sittaung (295), Paungbyin (317), Homalin (381), and Tamanthi (438). With the further development of the Kalewa Coal mining the Chindwin transportation will assume greater importance.

The Salween River affords very limited navigational facilities, due to rapids and cascades not far from its mouth. Launches about 100 feet in length can reach Shwegun, about 55 miles upstream from Moulmein. In dry weather, motor boats and other small craft can reach Meseik, about 28 miles above Shwegun.

The Sittang River below the Sittang Canal, is dangerous to navigation due to numerous sandbanks in the delta and a tidal bore which occurs daily between May and September. But above the canal, the river is navigable by launches of about 40 feet by 15 feet and 4.5 feet draft for about 25 miles to Madauk throughout the year and for another 130 miles to Toungoo during the rainy season. Therefore, this river is of little use for commercial navigation.

The Kaladan is a magnificent waterway. The Kaladan, Lemro, Mayu and other rivers, with their tributaries constitute the river system of the Arakan coast. These rivers are navigable at high tide for more than 400 miles. The tidal effects are felt as far upstream as Paletwa, a distance of 98 miles from the sea. In the rainy season the river swells enormously, with a flood level of about 45 feet above the normal dry-weather stage. The least depth at ordinary low levels is 6 feet and the least channel width is from about 1/2 mile at Paletwa to over 5 miles at the port of Akyab. Small steamers and powered craft navigate up to Paletwa. Due to a heavy rainfall of 200 inches or more, the stage differential experienced in the Kaladan River is very great. It reached a record of 71 feet during the monsoon season of 1929.

The Great Tenasserim River is navigable for launches and motor boats throughout the year for about 45 miles above Mergui, to the town of Tenasserim. Boat sizes are generally from 50 to 60 feet long to 20 feet wide. During the monsoon period the boats can go another 20 miles above Tenasserim to Tagu.

Sea Transportation

The commerce of Burma must necessarily rely heavily on the seaports and the supporting role of riverports. Overland commerce is restricted due to obvious geographical obstacles, historical reasons, and lack of transportation facilities already mentioned. In addition to the main seaport of Rangoon there are the subsidiary ports of Bassein, Akyab (now Sittwe), Moulmein, Tavoy, and Mergui; also the secondary ports of Kyaukpu, Sandoway and Victoria Point. The Burmese coast is well provided with navigational aids, the outstanding being the beacons on Diamond Island and the Alguada Reef.

Rangoon holds the pride of place among the seaports of Burma. Before World War II, the port had a capacity to handle 5 million tons of freight annually. From the hammering it received during the war years, the damage to its installations and facilities was extensive. But by 1953-54, it was handling about 85 percent of Burma's foreign trade and 44 percent of coastal commerce. In 1952-53, the port handled 2.1 million tons of cargo and in 1959-60 the facilities had been so improved that the total freight handled increased to 3.3 million tons.

Rangoon is situated on the left bank of the Rangoon River about 21 nautical miles from the gulf of Martaban. The width of the channel from the Elephant Point to the Port of Rangoon varies from 1,500 to 3,000 feet and depths vary from 22 to 500 feet. There are no particular navigational hazards and the channel is well lighted and marked, but pilotage is essential. The Dalla Dockyard of the Inland Water Transport Board is located opposite the city of Rangoon, on the right bank of the river. It has ample area for extension. The government dockyard is situated on the left bank of the Pazundaung Creek. Further south from the harbor the Kahn's Dry Dock is nearby on the right bank of the Pazundaung Creek about 2 miles from its mouth.

All jetties and floating pontoon landings are on the left bank of the river. The harbor begins in the south at Monkey Point and the port area extends thereafter for about 7 miles upstream. There are three main wharf sections where ships can be loaded directly. After repairing war damages, by 1953, ten berths had been put into use and three jetties could accommodate sea-going vessels. In addition, there are more than twenty free-swinging and fixed moorings in the Rangoon River for sea-going vessels where loading and unloading can be done by lighterage. Separate anchorage areas are provided for country craft, and cargo boats and moorings are set aside for petroleum vessels in both the Rangoon and Pegu Rivers.

Improvements in the facilities of the port of Rangoon were rapidly achieved during post-Independence years. Highly successful were new installations of mechanical loading equipment obtained under the United States Development Loan. By June 1961, three general cargo berths were reconstructed in Rangoon port, and the construction work on the new pontoon jetties at Lanmadaw, Botataung and Lower Pazundaung continued through 1961-62. The Port of Rangoon was being rapidly modernized by the development of both passenger- and cargo-handling facilities and improvement of lighthouses, installation of radio telephones and relay of weather forecasts. Some equipment and facilities are listed in Table XLIII.

Akyab, now called Sittwe, is the westernmost port of Burma. It is said to be the oldest rice-exporting seaport of Burma. It has the only harbor, other than Rangoon, where sea-going vessels can berth directly at a wharf. This port is the hub of an excellent water system in North Arakan which extends to over 350 miles through such steamer-served rivers as Lemro, Mayu, Kywede, and Kaladan. It is situated in the midst of a large rice-producing tract and is the center of the rice-milling industry. The principal deep water section is the Kaladan estuary fronted by the city, with the main port facilities on the foreshore. The deep water harbor is exposed to considerable wave action. The central section of the channel averages about 2,200 feet in width and has depths varying from about 19 to 27 feet MLWS (mean low water spring). This condition extends for over two miles up the river and provides suitable anchorage for vessels and lighterage of cargo. Recent dredging on the foreshore shoaling has improved the berthing facilities for ships on the main wharf. In 1933-34, Akyab handled a commercial cargo of 279,500 tonnage, but in 1951-52 the tonnage was only 123,400. The war damage to the port was extensive and it has slowly recovered from the losses. Before the war its iron pier was 324 feet long and was capable of accommodating vessels of 19 ft draft.

The city and port of Bassein are located on the Bassein River about 72 nautical miles upstream. The Bassein River is the westernmost stream of the delta of the Irrawaddy River. Bassein is the second largest port of Burma with an annual rice export exceeded only by Rangoon. It is situated in one of the best rice-producing tracts of Burma In the pre-war period, Bassein handled about 6 percent of the foreign trade of Burma. In the years since the War this share has risen to approximately 10 percent, but it handles only 1 percent of the coastal trade. Fortunately, the War damage to the port was small.

TABLE XLIII

PORT OF RANGOON: SOME EQUIPMENT AND FACILITIES
1961-62 to 1965-66

Particulars	1961-62	1964-65	1965-66
Buoys	31	31	31
Wharves for Trans-ocean vessels	10	13	13
Wharves for riverine vessels	63	65	65
Godowns	288	296	296
Transit Sheds	12	14	14
Immovable Cranes	60	66	72
Equipment for arranging goods	--	9	9
Tractors	52	57	77
Lorries	202	243	328
Trailers	308	331	427
25-tonner load carrier	--	--	1
Steamers	10	11	11
Motor Launches	29	32	34
Speed-boats	12	12	12
Tugs	9	9	9
Motor-boats for Engineers	16	16	16
Cargo barges	2	2	2

SOURCE: Union of Burma, Budget Estimates, 1966-67, Table 37, p. 30.

Passage up the river is not easy; especially south of Bassein there are sharp curves and shoals. The harbor area is about 3 miles long. The average usable width of the harbor area is about 1,000 ft., but due to heavy barge and country boat traffic it is reduced to about 700 feet. Depths are generally good in the harbor area, ranging from about 32 ft. to 85 ft. MLWD. But the main part of the waterfront, located on the inner river bend, is silting up. Therefore the loading of sea-going vessels is carried out in midstream one mile downstream from the center of the city. Sometimes only a partial loading of ships is possible and to complete the loading, the ships proceed to Rangoon. Bassein is primarily a rice-export port and very little import cargo is unloaded. In ten years averages before the war, the port handled 300,000 to 400,000 tons of cargo. In 1951-52 the tonnage was around 180,000.

Moulmein has been an active port for many generations and has formed a natural outlet for the vast Tenasserim area. The town and the port are located at the mouth of the mighty Salween River at a position

about 25 miles upstream from Goodwin Light where the river empties into the Gulf of Martaban. The immediate hinterland of Moulmein within a radius of about 70 miles is a rich rice-producing tract, promoting trade in that grain. There are also rubber plantations.

At Moulmein, the Salween River divides into two outlets: one flowing westward to the sea is called the Darebauk River and is navigable to country boats; the other flowing southward past Moulmein is known as the Moulmein River and forms the commercial gateway as a navigable channel for the port. The mean river level at Moulmein is the highest in September when it is about 8 feet above mean low water datum (MLWD) and lowest in March when it is only 3 feet above this datum.

The chief article of commerce for the port of Moulmein is rice and its products. For rice export, it is the third largest port of Burma. During the pre-war years, Moulmein handled about 4 percent of the foreign trade of Burma and since then there has been an appreciable rise in its importance and its share has risen above 5 percent. It also shares about 15 percent of Burma's coastal trade with the other ports. The war damage to the port was heavy and it took some time to repair the losses.

Up to about 10 miles above Goodwin Light the width of the channel varies from 1,700 ft. to 6,000 ft. and the depth varies from 20 to 57 feet. In the remaining 14 miles to the port of Moulmein depths vary from 20 to 60 ft. MLWD, and widths vary from 400 to 1,600 ft. except some bad sections were depths decrease to 11 ft. and widths are reduced to 200 ft.

The pre-War maximum export of rice from Moulmein was 168,000 tons in 1938-39. Rice exports picked up again after the independence to over 100,000 tons. Other cargo consists of teak, rubber, coal, petroleum and miscellaneous items.

The port of Tavoy is of minor importance commercially for Burma, but its usefulness is obvious for the Tenasserim area. It is situated about 35 miles up from the mouth of the North-South flowing Tavoy River. For sea-going vessels the river is navigable for about 8 miles from the sea at Reef Island. The river further upstream affords navigation only to launches and country boats and all the transfer of cargo is done by lightering. The port of Tavoy handles about 1 percent of the foreign trade and nearly 5 percent of the coastal commerce of Burma.

The principal commodities exported include rice, timber, charcoal, dried betelnut, tin and wolfram ore, dried fish and rubber. In 1951-52, Tavoy handled about 30,000 tons of cargo. The port serves a somewhat limited area. Agricultural products, mainly rice, will remain low in supply, but with developments in the future, it may handle more forest resources, particularly rubber, and minerals. Traffic at the town is limited entirely to shallow-draft and the local river traffic. Depths at Tavoy are variable and may be as little as 2 feet at low tide.

The port of Mergui is situated on a tidal cutoff connecting the mouths of the great Tenasserim and Kyaukpya Rivers. The northern entrance to the channel serves as access to the sea-borne traffic. From the harbor to deep water is about 4 nautical miles. The deep water portion of the harbor and anchorage varies in width from 1,500 to 3,000 ft. and in depth from 18 to 60 feet. The number of sea-going vessels in the port at one times does not exceed 3 or 4. Tidal currents are strong in the area. The port is of little significance for foreign commerce and handles less than 1 percent of the national commerce. But for the coastal trade it has a position after only Rangoon, handling over 20 percent of that commerce. The principal export commerce of Mergui includes rubber, tin and ngapi. Other items are dried fish, dried prawns, rice, onion, chillies, tamarind, and salt. The Japanese used Mergui as a trans-shipment point after building a railway across the Kra Isthmus. They promoted coastal trade and navigation successfully, and built many ocean-going wooden vessels powered by outboard motors which operated with fair success.

After the war, Independent Burma was faced with the problem of not only rehabilitating its water transport, but also modernizing it. War losses were severe, and costs of replacement as well as new purchases had to be negotiated by the state after the nationalization of the main transport agencies. This put a heavy strain on the limited national resources and called for immediate planning for future programs.

The need for re-establishing regular coastal steamer services between Burma's seaports was urgent. The organization of overseas shipping services was essential for the restoration of the commerce of the country, chiefly valuable rice exports and the inflow of such indispensable commodities as petroleum, coal, and machinery and vehicle replacements. The Union of Burma Shipping Board was constituted in June 1952, and the Inland Water Transport Board had already come into existence in 1948. Under the UBSB program two ocean-going cargo ships of 8,000 tons each, two coastal vessels of 1,056 tons each, and other

smaller vessels needed for the Arakan Coast were acquired. The ocean-going vessels were employed in the main task of transporting the Indian coal from Calcutta to Burma and taking rice shipments back to India. Another commodity needing shipment to India was teakwood. Unfortunately, the time schedules of the unloading of incoming shipments of coal and the outbound loadings of rice and teak and other commodities did not function perfectly and there were many failures and frustrations. Eventually, in 1958 the government of Burma organized the Five-Star Shipping Line. But unfortunately suitable ships were not put into operation and losses were incurred. However, the Arakan fleet began to function more properly.

The reconstruction of the port of Rangoon was the most immediate task; it involved wharf reconstruction and provision of pontoons, jetties and fixed moorings. Repairs to the harbor and addition to its flotilla were other requirements. In this respect, the total outlays, partly financed by the World Bank Loan,[11] were about K 130 million between 1959 and 1960. The port rebuilding program functioned fairly well and the traffic handled at the port of Rangoon increased from 2.1 million tons in 1952-53 to 3.3 million tons in 1959-60, and 4.5 million tons in 1964-65 as compared with 5.4 million tons in the immediate pre-war period (1939-40).

A number of dredgers have been employed for several years both in the Rangoon port area as well as at various riverports up the Irrawaddy River. Dredging is also being done at Akyab, Mergui, Bassein and Tavoy.

Considerable progress was made in coastal shipping by the acquisition of two Japanese ships in 1960-61 out of the Reparations Fund. Two other passenger-and-cargo steamers were commissioned to make coastal runs between Chittagong and Singapore, calling at Akyab, Kyaukpyu, Sandoway and Rangoon. Two ships were put into tramp services in 1961 to carry loads of rice and other commodities to Korea, Ceylon and other places.

Roads

Both the topography and hydrography of Burma have profoundly influenced the building of roads, their alignment as well as development. The north-south trend of the main drainage enclosed by the horse-shoe mountain and hill framework has led to longitudinal development of road arteries. The difficulty in bridging the rivers at many places kept the

[11] Walinsky: Economic Development in Burma, 1951-60, p. 332.

roads on either side integrated into a local system rather than a larger whole. It is only rarely that Burma's highway system even now crosses a major waterway, except by ferry. The Ava and the Sittang bridges are exceptions. The Irrawaddy is bridged only at Ava, 12 miles south of Mandalay.

In 1966-67, there were only about 3,800 miles of gravelled roads and 6,800 miles of unimproved roads. The number of passenger cars rose from 10,900 to 21,900 between 1948 and 1962. In 1965-66 there were 16,193 lorries, 6,200 buses, 4,654 taxis, 25,511 private cars and 5,379 motorcycles.[12]

The history of roads in Burma dates back to the early mining activity in the Northern part of the country. The Burmese kings used river transport as well as unpaved roads. But it was the advent of the motor vehicle and the heavy truck for commercial haul that diverted attention to road building. Until the eve of the War, the volume of mechanized transport on the roads in Burma was small.

Due to the paucity of the faster means of transportation on the roads, the existing highways were merely integrated into the railways and waterways systems of the country. In 1938 there were only 6,000 miles of all-weather roads. The others were either dry-weather roads or tracks. But in the period immediately before World War II, by force of circumstances the roads received more attention. Many improvements were made and several new sections were constructed by the British. One of the great developments was the revival of interest in the famous Burma Road.

The Burma Road is approximately 1,150 miles long between either Lashio or Bhamo and Kunming in the Yunnan Province of South-Western China. It has four sections: (1) Lashio to Hsenwi to Na Ti to Man-K'a in Burma and, on the Chinese side of the border, Yun-hsien to Kunming: (2) Lashio to Hsenwi to Wanting in Burma and Lungling to Kunming in China; (3) Bhamo to Namhkam to Mu-se to Wanting, thence continuing onward as in route (2) above; and (4) Bhamo to Manyun in Burma and, in China, from T'eng ch'ung to Pao-Shan and then merging with routes (2) and (3) above. The first section follows the proposed Burma-China railroad grade. The third section is sometimes considered the main Burma Road connection.

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[12] Trueblood: Burma: A Study in Political Geography (Unpublished), 1953, p. 155. And Ann. Supplement, Quart. Econ. Rev. EIU, London, 1967, p. 6.

The Burma Road traverses some of the most rugged and difficult mountainous areas in the world, and the deep inaccessible trenches of three mighty rivers of Asia, the Salween, Mekong and Yangtze-Kiang which eventually carry their waters into distantly separated seas from the Andaman Sea to the China Sea. In an area somewhat north of the main line of the Burma-Yunnan highway, these three rivers are in close proximity to each other, within a distance of only about 50 miles, but separated by their tremendous canyons and towering peaks. In the past, the route followed by the Burma Road was the famous route known as the "Ambassadors Road" from Bhamo to Yunnanfu (Kunming). This had been a trade highway between Burma and China for several centuries.

The Chinese engineers worked on the construction and modernization of the road between December 1937 and May 1938 in order to provide connection to Rangoon. It is said that between 150,000 to 350,000 workers were employed. The highway was officially opened[13] on January 10, 1939 to traffic for 750 miles between Lashio, the Burmese railhead, and Kunming. Steel cable suspension bridges spanned the Salween and Mekong Rivers. Indeed, the completion of this road in view of the physical, technical and financial impediments was a near miracle. The Kuomintang government of China, harassed by the Japanese juggernaut in 1937, quickly turned its attention to the Burma Road and its successful completion, so that in case the Japanese blocked off the coast, China could find an outlet through the port of Rangoon.

In June 1939, it was reported that a fleet of several thousand American trucks carrying munitions into China moved eastward; while commodities like tung oil, bristles, hides and skins came from China into Burma destined for the world markets.[14] During 1939-40, other war material of Russian and American origin was directed through the road into China after being transported by steamer to Rangoon and by railroad through Burma. The Chinese authorities estimated 30,000 tons per month as the maximum capacity of the highway if used round the clock. In 1940 only about 3,000 tons of material reached Chungking. One-way motor journeys in 1939-40 were possible in five days, though there were instances of urgent individual travel in three days. In October 1940, the Japanese destroyed the Mekong and Salween bridges by air attacks.

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[13] Christian: Modern Burma, 1941, p. 213.

[14] Ibid., p. 227.

In February 1941, the Chinese government formed a Burma Highway Commission with an American chairman and Burmese and Chinese representatives, to improve the use of the road. But events quickly overtook plans. The capture and occupation of Burma by the Japanese in 1942 and the consequent destruction and disruption followed by post-war development completely changed the picture. The Chinese sector of the road is now firmly under their control, and the Burmese are masters of their own section. The Burma - Yunnan Railway project, undertaken under the stress of war, got only as far as raising embankment and grading and was then abandoned. The length of the road between Lashio and the Chinese frontier was 110 miles and the Chinese section to Kunming was 530 miles. At any rate, the road-rail connection between Lashio or Bhamo and Kunming is the shortest route into the interior of South-West China from the direction of the Indian Ocean through the gateway of Rangoon. For the inland commerce of Burma and China the road deserves attention.

During World War II, the roads received the heaviest pounding of all modes of transportation in Burma and continued to suffer damages as the pendulum of fighting swung one way or the other. But the road links and transportation on them were of vital importance to the conduct of the war on either side and internal traffic had to be kept going to maintain the economic life of the country. The Japanese improved many existing roads and constructed several new links. Due to their own war needs as well as to promote economic activity, they undertook quite an impressive program of road building; this will remain their abiding contribution to the development of Burma. They improved and modernized the famous Taungup Pass road between Prome and Taungup on the Arakan Coast. They also built other roads on the Arakan Coast and several military roads in Upper and Lower Chindwin Districts.[15]

The needs of war resulted in the construction of a good system of border roads by all the belligerents. Roads were built in Burma on the Indian, Chinese and Thai border areas. The Allies constructed some of the most remarkable roads and road links between India and Burma e.g., the Ledo Road through the Hukawng Valley and eventually up to Myitkyina; the Manipur - Kalemyo road via Tiddim and Falam; the Manipur-Kalewa Road via Tamu, Sittoung, and Maulaik, and the well-known Arakan Road from Cox's Bazar and Ramu in East Pakistan to Buthidaung and Akyab. These roads linked Burma with the Assam, Manipur, and Bengal areas in India.

[15] Andrus: Economic Life of Burma, 1947, pp. 229-30.

After the War, there were about 6,000 miles of main roads of fair quality and nearly half of them were passable in all seasons. Due to the unsettled conditions inside the country and the formative period of the new State, much attention could not be given to the improvement of the war-damaged roads. Numerous bridges had been destroyed, embankments eroded, and maintenance reduced to nil and the insurgent activity prevented repairs and improvement. Ultimately the Highway Department was created. It rebuilt and improved the roads, including the Taungup Road across the Arakan Yomas to break up the isolation of that area.

The KTA consultants reported that in 1951 there were 8,056 miles of main roads and district roads of which the better-surfaced bituminous and gravelled roads extended only 2,666 miles. In 1961, Burma had 15,442 miles of roads of all types of which the superior paved roads were 4,205 miles, gravel surface 4,683 miles, graded earth roads 5,748 miles and unimproved portions 806 miles.[16]

The major roads or highways could be divided as follows:

(1) Rangoon - Pegu - Toungoo - Pyinmana - Meiktila - Mandalay

(2) Rangoon - Prome - Alanmyo - Magwe - Kyaukpadaung - Myingyan-Meiktila

(3) Mandalay - Maymyo - Lashio - Hsenwi - Mu-se

(4) Meiktila - Kalaw - Taunggyi - Ho-Pong - Loilem - Takaw (on Salween) - KengTung - Haung Luk

(5) Toungoo - Bawlake - Loikaw - Ho-Pong

(6) Myitkyina - Mogaung - Hukawng Valley - Pangsau Pass, Ledo in Assam

(7) Sagaing - Shwebo - Kalewa (across the Chindwin) - Mawlaik - Tamu - Imphal in Manipur, India

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16 ECAFE Transport and Communication Bull. No. 35, New York, 1962, Table 3, p. 6.

The road from Toungoo to Ho-Pong (5) links the Sittang Valley with the western Shan States through the Karenni area. The road from Myitkyina to Ledo, in Assam (6) also called the Stilwell Road, was the great highway used by the American Army for supplies from India into North Burma and China during World War II. It has another important section from Mu-se and in the east it connects the Hukawng Valley and Myitkyina with the Chinese border. The Sagaing-Imphal highway (7) was one of the most used during the war. It was used first by over half a million evacuees and refugees in 1942, and the retreating British Army and then by the Allied advance in 1944-45. The armed forces of the Japanese, as well as the Allies, kept the western section in good condition, but soon after the end of the war it fell into bad repair and parts have been overgrown with vegetation close to the Indian-Burmese border.

It is essential that physical and structural gaps in the road system of Burma receive attention. The central and eastern Shan State areas should be opened by secondary links to the existing system as well as by well-chosen arterial construction. Cross connections between highways (1) and (2) are necessary; the links with Arakan should be adequately developed; and North Burma should have more roads. Elimination of as many ferries as possible is an essential task.

In the pre-war days, there was no continuous road connection between Pegu and the Tenasserim Coast. But the Japanese created and improved some of the links. A pre-war road joined Kyaikto with Mergui via Moulmein over a distance of 425 miles. The Thanbyuzayat - Ye section was almost a cart track. The Japanese converted it into a good surfaced road and thus Burma eventually came to have a road running from Mergui to the Pangsau Pass on the Ledo Road, a distance of over a thousand miles. Due to the wear and tear of climate and difficulties of topography, it is not easy to maintain this road, particularly in the southern section. It was as a subsidiary to this highway that the Japanese built the Thanbyuzayat - Thailand road link in 1942-43 to run along the notorious "Death Railway" through the Three Pagoda Pass to Sai Yok and onward via Nakhon Pathom to Bangkok in Thailand.

In addition to the major roads listed above, there are also two well-known subsidiary routes: Magwe - Sittwe, through the An Valley Pass, and Prome - Taungup, through the Taungup Pass. These may become highways in the future.

According to the KTA report[17] in 1953, officially the roads were mainly classified into four categories: (a) main roads; lying in more than one district and those connecting the township or sub-divisional headquarters with the district headquarters; (b) district roads, in only one district though occasionally connecting adjacent districts; (c) municipal roads or town roads, serving urban areas; and (d) village roads, generally unpaved roads or tracks connecting villages.

The first three classes are suitable for year-round movement. The unpaved roads churn up storms of dust in dry weather and become sticky clay slush in wet weather. The cart, jeep and pack-tracks are not usable for heavier mechanized transport and are extremely unreliable, often without bridges over streams, are narrow with ruts, and highly dangerous, when wet, for even light vehicular traffic. Ever the somewhat better hard-surface roads, though capable of carrying heavy vehicular and motor traffic are often unbridged at large streams and unpowered ferries are in operation under primitive conditions. These features are often not shown on available maps.

Transport on the rural roads in Burma is still largely by bullock- or buffalo-drawn carts. Due to the poor quality of roads in the countryside, mechanized transport faces many difficulties. During the War and under the Japanese occupation, the Burmese showed remarkable ingenuity in keeping vehicles going.[18] Vehicles were put together with a Ford and a Chevrolet chassis and a Dodge radiator grille, with springs from any car at all, the instrument panel of a Buick, picked up from the scrap heap. The tank, about ten feet high, was placed on the roof, and the synthetic petrol (gas) allowed to rush down into the carburetor with a direct feed pipe. Water and Japanese rice wine (Sake) served as hydraulic brake fluid.

For a long time it has been felt that to make Burma's highway system more integrated, the Irrawaddy River should be bridged at more points. Even in 1953, KTA consultants suggested[19] bridging the river at Henzada and between Magwe and Minbu. Other bridge links have also been suggested near Myingyan, Prome, and Bhamo or Katha. The Chindwin River would need bridging at Kalewa.

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[17]KTA, 1953, Vol. 1, p. 388.

[18]U Hla Pe's Narrative, Cornell Univ., 1961, pp. 60-61.

[19]KTA, 1953, V. 1, p. 378.

The road system is not connected with the highways of the neighboring countries, i.e., India, Pakistan, China and Thailand, except by secondary war-time roads in a few isolated spots. The Burma Road to China is the only exception, but little commercial or other traffic moves on it.

The present eight major highways and their connections and adjuncts are extremely important, especially for the south-to-north movement. The area of the oilfields can be reached on the one hand and Mandalay and northern,western and southern parts of the Shan States are approached on the other. The road, rail and Irrawaddy routes trend into North Burma in a similar orientation not far from each other. The road links appear weakest in the frontier and border area, but many old jungle-devoured hard surface raods can be made to function again. Internally, key road points are Rangoon, Pegu, Toungoo, Prome, Pwinmana, Taungdwingyi, Kyaukpadaung, Meiktila, Myingyan, Mandalay, Sagaing, Monywa, Kalewa, Shwebo, Katha, Mogaung, Myitkyina, Bhamo, Lashio, Taunggyi, Keng Tung, Loi-Kaw, Mong Ton, Myawadi and Thanbyuzayat.

The role of the Ledo Road is most significant in the internal transportation in North Burma especially in the west as a link between India and China (from Ledo Bazar across the Patkoi Range, through the Hukawng Valley, Mogaung and Myitkyina to Bhamo or Lashio). The road was built under the most difficult conditions in 1943 and 1944. Today, it is faced with the problem of maintenance and the generation of enough transport to make it economically worthwhile.

The great Asian Highway[20] is being built into a superior paved surface highway from Ankara in Turkey to Bangkok in Thailand, passing through such countries as Iran, Afghanistan, West Pakistan, India, Nepal, East Pakistan and Burma. The route may be extended from Bangkok to Singapore and Saigon. A part of this system, Burma Route A-1, enters the country at Tamu from Imphal in Manipur (India) and thereafter proceeds to Kalewa, Shwebo, Mandalay, Meiktila, Taunggyi and Keng Tung (Eastern Shan States). Then via Kawng Luk, it crosses the border into Thailand to reach Chieng Mai and thence to Bangkok.

Route A-2 enters Burma from Ramu (East Pakistan) and reaching Kyauktaw and Minbya crosses the Arakan Yomas via the An Valley Pass, and then goes to Minbu, Prome and Rangoon. From Rangoon it proceeds via Pegu to Myawadi on the Thai border and, crossing over to Tak, joins with Route A-1 coming down from Chieng Mai.

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[20] Tajammul H. Hashmi: The Asia Europe Highway, Transport and Communications Bulletin for Asia and the Far East, U.N.O., No. 35, New York, 1962, pp. 1-6.

Air Transportation

Due to its elongated kite shape and the physical features consisting of encircling highlands and a vast plateau, mighty unbridged rivers and an enormous delta with numerous streams, Burma's answer to many problems of transport and communication in distant and isolated areas seems to be air transportation. A combination of conventional aircraft, amphibian planes, and helicopters could help cope with its transportation needs.

Commercial aviation in Burma began in 1931 when the Royal Dutch Airlines (KLM) started the Holland - Java service with Rangoon as an overnight stop. Before World War II, there were six airfields in Burma and of these, only three, namely, Rangoon (Mingaladon), Akyab and Lashio could accommodate the big commercial planes of those days. The lengths of runways varied between 2,000 and 4,200 feet. Moulmein, Tavoy and Mergui had small airfields for emergency use by commercial planes. Tavoy and Mergui had also military airfields. During the war, both the Japanese and the Allies constructed many additional airfields in different parts of Burma. This proved to be a blessing in disguise for independent Burma, as the airstrips repaired and renovated at small cost, helped the country in the internal development of aviation in the post-war years.

At the end of the war, there was immediate need for the development of internal air services as surface transportation had been badly damaged. The Burma National Airways was given a contract in 1946 and managed services for about a year. But, due to their inability to run the services efficiently, the monopoly was broken in August 1947. The Union of Burma Airways Board was constituted on March 23, 1948, soon after Independence, and the State-operated air services commenced in September 1948. In the beginning, both flying and maintenance and technical personnel were British, South African and Australian. The aircraft were obtained on charter. On November 3, 1950 the first extern service was inaugurated linking Rangoon and Bangkok.

The Union of Burma Airways Board was reorganized in March, 1950, and it functioned under the Ministry of Transport and Communications. Both internal and external air services were reorganized, and the latter established connections with Calcutta (India), Chittagong (East Pakistan), Signapore and Penang (Malaya and Bangkok (Thailand). The UBA started internal services from Rangoon to 32 airports with some daily and some weekly and even fortnightly services (See Map No. 16). Rangoon became the chief hub of these services and Mandalay developed

into a secondary inland center. Of the 32 airstrips shown in the map, at least 22 could be called the main airfields. But only Mingaladon (Rangoon) has the status of an International Airport. Of all the airfields in 1953, only seven were usable in all weather conditions.[21] In 1960-61 several other airfields were made usable all year round[22] and included Kyaukpyu, Nyaung-U, Putao, and Mazin (Sandoway).

In 1949-50 the Mingaladon (Rangoon) Airport was reconstructed and a new main airstrip of concrete 8,200 feet by 200 feet and an adjacent parallel taxi-way 8,200 feet by 100 feet was also laid out. Improvements of airstrips at Akyab and Mergui was also begun at the same time. Forty-three flights weekly into and out of Burma were started with Dakota (DC-3) and Dove aircraft. The UBA acquired Viscount aircraft in 1959 and two of these planes were employed in 1961 in running Rangoon-Calcutta and Rangoon-Bangkok services.

After several years of extremely useful operations, in 1955-56 it was found that the UBS was running at a loss of about K 100,000. Some foreign advisers believed that it was due to poor management, frustrating red tape, and lack of complete autonomy for the Board.[23] The situation has been improving in recent years. The passenger traffic carried by the scheduled airline services rose from 46.6 million passenger - kilometers in 1958 to 57.6 million in 1963, while the cargo carried rose from 0.8 million ton - kilometers to 1.2 million ton - kilometers over the same period.[24]

In 1963-64, the UBA listed 27 air stations of which only 7 had branch offices and the remaining 20 had agents only for bookings. The branch offices existed at Akyab, Bhamo, Bassein, Monywa, Mandalay, Myitkyina, and Sandoway. There were also a number of non-operating stations. The most used commercial air routes were: (1) Rangoon-Mandalay-Momeik-Bhamo-Myitkyina-Potao and (2) Rangoon-Magwe. The UBS international air routes connect Rangoon with Bangkok, Calcutta and Chittagong.

The distribution of the airstrips, airfields and airports, (see Map No. 16) is indicative of the need for aerial transportation in relation to the physical structure and economic pattern in the country.

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[21] KTA, 1953, Vol. 1, p. 470.

[22] Econ. Surv. Burma, Rangoon, 1961, p. 90.

[23] Walinsky: Economic Development in Burma (1951-60) pp. 453-54.

[24] Ann. Supplement, Quart. Econ. Rev., EIU, London, 1967, p. 6.

The density of air traffic and airfields is most pronounced in the Delta Region and the Dry Zone of Burma. The largest number of people live in these areas, and also they are foremost in economic development. Therefore, both passenger traffic and transport of cargo influence the number and frequency of services.

Nonetheless, there are certain gaps in the air transportation which need attention. For over 200 miles between Mandalay and Bhamo there is no airfield [25] and for 300 miles between Kalemyo (Upper Chindwin) and Singkaling - Hkamti (Naga Hills) there are no airstrips. The Shan State area has only 3 Or 4 airfields i.e., Lashio (North), Heho (West), and Keng Tung (East). The Delta Region is well served by waterways, and partly by railroads and highways. But helicopter and amphibian craft services could promote time-saving traffic between important as well as isolated places. East Pakistan has been operating such services for several years in its delta and other isolated areas.

The relationship between various modes of transportation including the air services, until a few years ago, is shown in Table XLIV.

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25 The number of aerodromes given by the Budget Estimates of the Union of Burma in 1966-67 was 41. The planes used by Union of Burma Airways in 1965-66 were: Dakota (8), Viscount (3) and Fokker Friendship (3).

TABLE XLIV

BURMA: FREIGHT TRAFFIC OF THE PRINCIPAL CARRIERS, 1937 to 1961

(in millions)

Year	Union of Burma Railway Board		Inland Water+ Transport Board		Union of Burma Board Airways	
	Tons*	Ton-miles*	Tons	Ton-miles	Ton	Ton-miles
1937-41	3.06	579.03	n.a.	n.a.	n.a.	n.a.
1947-48	1.33	238.66	0.38	60.51	n.a.	n.a.
1950-51	1.07	104.59	0.64	134.43	.0045	1.04
1951-52	1.26	151.86	0.66	130.04	.0031	0.88
1952-53	1.55	218.98	0.69	124.39	.0037	1.01
1953-54	1.78	271.75	0.73	132.21	.0038	1.02
1954-55	1.94	322.26	0.76	n.a.	.0032	0.86
1955-56	1.82	324.28	0.74	n.a.	.0029	0.78
1956-57	2.07	344.33	0.78	n.a.	.0017	0.48
1957-58	2.19	339.75	0.72	n.a.	.0016	0.75
1958-59	2.44	389.77	0.83	n.a.	.0019	0.47
1959-60	2.57	442.91	0.95	n.a.	.0023	0.57
1960-61+	2.37	415.49	0.93	n.a.	.0028	0.66

*Excludes Departmental traffic
+Estimates based on first six months data.

SOURCE: Economic Survey of Burma, 1961, Table 31, p. 39.

X. TRADE AND COMMERCE

Before the advent of the British, trade and commerce of Burma was more inward looking than outward looking The heart of the kingdom and the core of its power was in the Dry Zone of the Middle Irrawaddy Valley. The river provided an excellent system of water transport into the Delta Region and thence to the sea. But on the one hand the Burmese Monarchy was not eager to open this door from the south to foreign contact and on the other, before the late 19th century development of the rice economy of the fertile delta or Lower Burma, there was no economic attraction in expanding commercial activity to the loosely held southern domains of the Kingdom. The further development of this geographically favorable direction of trade and commerce had to wait for the historical events of the 19th Century and the evolution of a new economic activity in the wet lands of the great delta, based on the extensive cultivation of rice and its export.

The small amount of trade with Lower Burma consisted of a downstream movement of commodities such as sugar, cooking oils, cotton, and woven materials and some crude oil from the primitive oil wells of the Yenangyaung area in the Middle Irrawaddy Valley. Upstream, cargo boats brought some rice, fish and fish paste, salt and goods brought in by Europeans and Arabs from the outside world.

The Arakanese traded with the Indian and neighboring areas, and the Mons were active in Lower Burma and coastal regions. From England and Europe came textiles, hardware, glassware, and some weapons. The Arab ships brought woolen goods, velvets, metal goods, opium and perfumes. Foreign traders also brought spices from the East Indies and procelains and luxury items from China and India. Eventually, the outgoing trade by sea consisted of silver, gold, rubies, amber, precious stones, ivory, tin,lead, copper, sugar, and forest products including beeswax, tanning material and woods.

In spite of hill and mountain barriers and periodic wars and conflicts, contacts across the Chinese border embraced both cultural and commercial activity. The overland caravans from Southwestern China brought raw silk and floss, satins, velvet, silk robes, gold leaf, paper, tea, spirits, honey, drief fruits, walnuts, preserves, and arsenic. The Chinese traders took back raw cotton, amber, jade, precious stones, ivory, betel nuts, drugs, and edible birds' nests. Trade with Thailand and India was negligible. However, the Shans actively traded with the Burmese of Central Burma and the Irrawaddy Valley.

As has been recounted already in the introductory chapter, the advent of the British and the establishment of their rule over the whole of Burma heralded the beginnings of a different economic system in the country. The first impact of the change was felt in the evolution of a new pattern of trade and commerce.

Before the middle of the 19th Century, the production of rice was a part of the subsistence economy and the grain mainly satisfied local needs. Most of it was produced in the Dry Zone. Four years after the First Burmese War, in 1830, the area under paddy cultivation was said to be about 993,000 acres. Within a few years, people moved into the Delta Region to cultivate rice. The politically stable conditions in the south, along with the shipping facilities and the investment of capital, made it possible for surplus rice to be exported. From the end of the 19th Century to the eve of World War II (1939), Burma showed a favorable balance of trade, chiefly on the basis of large and steady exports of her surplus rice. The exports of rice had been almost insignificant in 1826 after the First Burmese War;but after the opening of the Suez Canal in 1876, over half a million tons of rice was exported, and by 1940-41 nearly three and a half million tons of rice made up the exports.

The composition of the export and import trade in pre-war decades is given in Tables XLV and XLVI. They show the predominant position of rice, mineral oil, other minerals, and timber as outward going commodities and manufactured goods, luxury items and clothing as imports.

Most exports went to India, United Kingdom, Germany, Japan, France, and Holland. Imports came from India, United Kingdom, Japan, and Germany. The export as well as import trade with the United States was a very small proportion of the whole.

There was a rapid growth of Burma's trade during the British period. Between 1868 and 1926, Burma's exports increased twenty times, i.e., from Rs 32.2 million ($7 million) to Rs 654.7 million ($145 million) and imports advanced from Rs 27.5 million ($6.5 million) to RS 386.5 million ($85 million). Burma's main exports were based upon her raw material production. These were derived from agriculture, mining, and forestry. Except in odd years, Burma always enjoyed a favorable balance of trade. Rangoon developed into the leading port, handling about 85 percent of Burma's foreign trade and the rest was shared between the ports of Bassein, Akyab, Moulmein, Tavoy, and Mergui. Just before the Japanese invasion in 1941, Rangoon had handled about 5 million tons of cargo per year or the average for the preceding decade. Eighty percent of Burma's exports of rice went out through Rangoon and only nine, six and five percent were handled by Bassein, Akyab, and Moulmein respectively. The amount of overland trade was insignificant.

TABLE XLV

BURMA: EXPORTS: 1868 to 1936 (million rupees)

	1868	1872	1904	1914	1926	1936
Rice Products	22.55	29.40	144.74	258.21	381.71	209.17
Raw Cotton	0.73	2.88	3.23	8.98	12.77	12.70
Tobacco	0.02	0.04	0.66	2.47	3.08	0.72
Vegetable Oils	0.01	0.02	0.01	0.06	0.04	0.28
Fruits & Vegetables	0.03	0.02	0.04	0.45	2.08	3.01
Spices	0.03	0.06	0.34	0.40	0.48	1.33
Tea	0.01	0.17	0.01	0.01	0.16	0.44
Rubber	----	----	0.12	1.65	11.88	6.99
Hides & Skins	0.18	0.80	2.73	8.77	4.01	2.11
Wood & Timber	6.87	6.98	16.55	22.02	47.75	37.81
Mineral Oil	0.13	0.27	20.08	44.07	91.79	173.44
Mineral Products	0.82	0.63	0.33	5.26	41.39	51.29

SOURCE: Furnivall: Colonial Policy and Practice, 1957 App. I, p. 551, (adjusted).

TABLE XLVI

BURMA: IMPORTS: 1868 to 1936 (million rupees)

	1868	1872	1904	1914	1926	1936
Food Staples	1.41	1.59	19.65	24.80	43.18	23.67
Food Luxuries	5.20	5.03	27.78	48.07	70.49	36.91
Clothing	14.60	16.54	45.85	83.98	109.69	56.16
Household Goods	0.74	1.08	10.23	16.95	22.23	9.23
Transport Goods	0.44	1.16	7.15	13.16	26.58	18.13
Manufactures	3.35	5.15	26.48	88.42	90.50	54.87

SOURCE: Various reports and publications of the Government of Burma.

Burma exported about 3.5 million tons of rice in 1942; this was about one third of the total international trade in rice. The major proportion of this rice went to India. But the best qualities of rice always went to the European countries. Normally, India imported one half of Burma's exported rice. Thailand and the Indo-China area (Vietnam, Cambodia, and Laos) were Burma's close competitors in rice exports. It is only in recent years that rice exports from Thailand have exceeded those of Burma.

Burma's trade fluctuated widely. It was extremely responsive to variations in rice prices. During the pre-war period most of Burma's trade was in the hands of non-Burmese, i.e., Europeans, Indians, and others. Trade with India was vital to Burmese economy and normally it took 60 percent of the Burmese exports (including all surplus petrol, kerosene, 3/4 of timber and 1/2 of rice). Only the mineral items (lead, tin, tungsten, and silver) did not go to India.

On the whole, Burma developed a flourishing trade in the era before the last war. Burma was the leading exporter of timber in Asia, excluding the Union of Soviet Socialist Republics. She was also producing more oil than any Southeast Asian country. She was the largest producer of lead and silver. Her output of tungsten and tin was sizeable. She had low-grade iron ore, but no developed coal mining. Burma still retained some importance as a producer of jade and amber.

The special and active trade relationship with India was conditioned partly by geographical proximity and India's demand for Burmese surplus commodities. This relationship was partly born out of political and administrative ties under the British rule, providing the same currency and benefits of free trade and Indian enterprise.

There was a considerable excess of exports over imports in each five-year period between 1901 and 1941, but the benefits of these substantial surpluses was not fully realized in the country. Most of it was paid abroad in the form of profits and remittances, for depreciation reserves and capital repatriation and for charges on shipping, insurance and other services belonging to non-Burmese interests.

Certain outstanding features of Burma's foreign trade pattern during the pre-war years are easily discernable, and these characteristics may be summed up as: (1) the economy was greatly dependent on foreign trade; (2) there was usually a favorable balance of trade; (3) rice and oil predominated among the exports; (4) India was the most important trading partner, both as regards exports and imports; (5) the United Kingdom and various parts of the British Empire had a large share in Burma's foreign trade, while the share of the Western Hemisphere and the United States was insignificant; and (6) foreign trade was dominated by foreigners and foreign interests, both in terms of shipping and financial and commercial activity.

In the post-war years up to 1953 the total receipts on foreign trade and non-trade accounts exceeded the total of foreign payments and the foreign exchange position improved steadily. In June 1953, reserves reached a peak of K 1,269 million. Thereafter there was a deterioration caused by the lower export prices for rice and the continuing need for imports for development programs.

In view of unstable world prices and their rapid fluctuations in 1953, Burma developed a policy of long-term contracts for exports of rice to some of the principal importing countries, i.e., Ceylon, India, Japan, Soviet Union, and Yugoslavia. Agreement with the last two was on the basis of barter deals The next few years after 1953 witnessed a steady increase in the export of rice; 1956 was the peak year with exports amounting to almost 2 million metric tons. But even this was below the pre-war level,[1] and in 1957 only 1.36 million metric tons of rice was exported, with a value of K 814,385.

In the early years of independence, the majority of imports were obtained from the sterling area with which Burma's trade ties remained strong. In fact,up to 1953 about 60 percent of Burma's trade was with that area, but in the post-war world old alignments were rapidly crumbling. British textiles were the first to receive the impact of these changes. Japanese cottons, after 1951, made heavy dents into the British sector. Other changes occurred. Due to war damage, political changes and internal disorder, the links between internal trade and the movement of goods and materials to the ports became weak, and foreign firms were reluctant to spread further inland. Moreover, foreign merchants and traders were looked at with disfavor by the Burmese.

Oil products were the second largest item of the Burmese export list before the war; but in the post-Independence period oil contributed little to foreign trade. Indeed, after Independence, Burma began to import nearly 2/3 of its own requirements from the Middle East. Minerals suffered a similar fate, though with rises in world prices and rehabilitation of Burmese mines, this part of the trade has been revived considerably.

The salient features of the foreign trade of Burma, both as regards the value of exports and imports, the position of different items and commodities, and the direction of trade, may be examined briefly. Table XLVII reveals that between 1955-56 and 1964-65, there were certain ups and downs in the balance of trade. Up to 1959-60, the position was somewhat unfavorable to Burma; the imports were generally ahead of the exports in value Then an upward trend in exports maintained itself for several years up to 1963-64. Once again the period 1964-65 to 1966-67 was one of difficulty in keeping a favorable balance of trade due to bad weather affecting rice harvests and reducing rice export. There has

[1] "Food and Agriculture Price Policies in Asia and Far East, FAO, Bangkok, 1958, Table 9. p 21.

TABLE XLVII

BURMA: FOREIGN TRADE, 1955-56 to 1964-65 (Value in million Kyat)

Year	Exports	Imports	Difference between Exports and Imports
1955-56	1,178.9	872.4	306.5
1956-57	1,190.2	1,322.55	-132.3
1957-58	902.7	1,108.5	-205.8
1958-59	1,008.8	956.6	52.2
1959-60	1,188.2	1,259.2	-71.0
1960-61	1,015.0	1,080.4	65.4
1961-62	1,271.8	1,046.6	225.2
1962-63	1,269.0	1,097.7	71.3
1963-64	1,142.6	1,086.0	56.6
1964-65	1,087.8	1,413.1	-325.3

SOURCE: Monthly Economic Indicators, C.S. v. E.D. Govt. Burma, Rangoon, June 1967, Table 7, p. 8

also been adverse impact on the prices desired by Burma for its rice exports due to the availability of the United States (PL 480) aid for financing rice shipments to Asian countries.[2]

This was not a very encouraging economic situation, and the Government's reaction was to reduce the imports drastically. This applied to both capital goods and consumer goods. One adverse result was the shortage of spare parts of machinery for many industries. This in turn had its impact on manufacturing, which showed lower output in certain cases. Imports of machinery remained at a lower level, though the decline in sugar imports and refined petroleum products was partly due to the rising home production. There was also a decline in the imports of edible oils and milk products, but informed observers did not connect it with the

[2]Quart. Econ, Rev. EUI, London, No. 3, Aug. 1966, p. 4.

increase of home production in these commodities.[3] Other items among imports showing decline included pharmaceutical goods, cotton yarn, paper products, and rubber goods.

The position with regard to the main commodities traded as imports and exports by Burma from 1961-62 to 1963-65, is given in Table XLVIII, and the prominent trading partners with their proportionate share as a percent of the total value are shown in Table XLIX. The direction of foreign trade is shown in Table L.

Some important changes were announced in the Government's trade policy[4] for agricultural products in 1963-64. The sale and export of eleven specified crops was to become a government monopoly These included rice jute, kapok, cotton and wheat. For thirteen other crops, private traders were allowed to undertake buying and selling within the country but not to export the commodities. These crops included maize, grains, soya-beans, groundnuts and sugar cane Both the internal and external trade in other crops was left in private hands; these crops included tobacco, sesame and rubber. However, the last-named came under nationalization soon afterwards.

One of the intersting developments in the chain of nationalization of trading and commercial activity took place on March 18, 1964, when the Revolutionary Government of General New Win announced the nationalization[5] of all wholesalers, brokers, department stores and shops, and cooperative stores in Rangoon together with their goods and stocks The order was also extended to factories producing tinned biscuits, hardware, cloth and clothing It was only operative within the Rangoon City limits, at first, but was extended to the rest of the country in April 1964. It was said that these measures were taken due to the shortages and the development of a black market in many consumer goods of foreign origin. The order did not include fresh food shops, dealers in tobacco, leather and leather goods, umbrellas, shoes and hats, or hotels and teashops

Reviewing the position with regard to the pattern of foreign trade of the developing countries of the ECAFE[6] region, which includes Burma, an official report indicated the somewhat difficult position in which

[3] Quart. Econ. Rev. EIU, London, No 1, March 1967, p 5

[4] Quart Econ. Rev., EIU, London, No. 43, Oct. 1963, p. 4.

[5] Quart. Econ. Rev , EIU, London, No. 45, April 1964, p. 4.

[6] The United Nations Economic Commission for Asia and the Far East.

TABLE XLVIII

BURMA: MAIN COMMODITIES TRADED, 1961-62 through 1963-64 (million Kyat)

Imports	1961-1962	1962-1963	1963-1964	Exports	1961-1962	1962-1963	1963-1964
Machinery and Vehicles	187	256	213	Rice and Rice Products	825	784	761
Base Metals and Manufactures	133	126	122	Timber (Teak)	125	157	150
Cotton Piece Goods	94	129	103	Oilcakes	76	87	66
Milk and Milk Products	50	69	68	Metals and Ores	41	43	49
Cotton Thread and Yarn	78	71	81	Pulses	60	72	45
Capital Goods	330	415	376	Raw Rubber	28	26	17
Consumer Goods	713	682	710	Raw Cotton	41	37	22
Edible Vegetable Oils	7	6	55	Other Agricultural Products	218	246	159

SOURCE: Economic Survey of Burma, Rangoon, 1964, and Monthly Economic Indicators, June 1967.

TABLE XLIX

BURMA: MAIN TRADING PARTNERS

Percent of total value 1962 and 1963

Exports to:	1962	1963	Imports from:	1962	1963
Indonesia	12	12	Japan	23	26
Ceylon	11	12	United Kingdom	14	14
United Kingdom	10	10	China	13	11
Pakistan	9	9	United States	4	7
India	10	8	India	5	4
Japan	5	6	Australia	3	4

SOURCE: IMF Direction of International Trade, 1964

TABLE L

BURMA: DIRECTION OF FOREIGN TRADE, 1959 to 1961 (millions of dollars)

Country	IMPORTS			EXPORTS		
	1959	1960	1961	1959	1960	1961
Japan	50.5	58.5	45.6	8.3	11.3	8.8
United Kingdom	42.8	37.5	33.9	19 9	20.5	23.9
India	29.7	20.3	13.1	35.1	34.4	18.9
Mainland China	16.4	24.9	20.6	0.4	6.6	37.7
W. Germany	9.8	12.9	9.4	5.5	7 2	3.9
United States	9.9	9.8	8.2	1.9	0.7	1.1
Pakistan	7.0	12.6	12.1	19.9	18.1	16.9
Netherlands	6.5	9.9	6.1	4 2	2.0	2.3
Malaya and Singapore	5.5	3.6	3.3	21.2	13.7	18.3
U S.S.R.	3.9	2.8	4.5	0.9	4.0	---
Indonesia	1.0	3.2	1.0	37.4	42.8	31.5
Czechoslovakia	3.9	3.6	2.3	1.3	0.5	3.1
Ceylon	0.3	0.9	2.1	25.0	25.4	22.0
All other Countries	35.6	59.7	53.3	37.2	36.5	75.3
Total	222.8	260.2	215.5	218.7	223.4	263.7

SOURCE: Govt. Burma Central statistical and Economics Department Bull. of Export Trade and Bull. of Import Trade, 1959, 1960, 1961.

most of these countries found themselves.[7] Their earnings from exports remained stagnant, on the one hand as a result of the weakness in world demand especially of the industrialized countries for their principal primary exports, and on the other hand, from the ECAFE countries' inability to increase exportable surpluses of their raw materials. Due to the unfavorable prices of the primary products in developed countries, the developing a[illegible] feared adverse terms of trade. The dependence on foreign supplies, especially in capital goods and industrial materials, continued undiminished in the face of high rates of domestic capital formation to carry on the development programs. In spite of the realization that regional trade cooperation was desirable, the intra regional trade also decreased in its share in the foregin trade of these countries. Thus it appears that the development of foreign trade was considerably hindered, and this tended to slow down programs of economic development.

The report mentioned above made out a triple division of the world economic areas: (1) centrally planned economies, i.e., countries of the Socialist World; (2) developed countries, i.e., generally the capitalist world of Western Europe, the United States, Canada, Australia, and New Zealand; and (3) developing countries of Asia, Africa, and Latin America. A large segment of this area is the ECAFE region.

In 1962 about 7 percent of the exports from the developing ECAFE countries found their markets in the Centrally Planned Economies. In this aspect, particularly noteworthy was the share of Mainland China in the new trade directions that were emerging. Burma's proportion of imports from and exports to Centrally Planned Economies, i.e., the percentage of her total value of imports and exports, was as follows: 1955, imports 2.3 and exports, 17.6; 1962, imports, 19.2, and exports, 13.3.

Foll[illegible]g the close of the Korean War, Burma faced difficulty in disposing [illegible] its large surplus of rice accumulated from 1953 through 1955. Both storage problems and risks of quality deterioration had to be faced. The government decided to enter into negotiation for trade with the Socialist countries. Thus, Burmese exports to the Centrally Planned Economies, which had been previously negligible, became significant from 1955 onward. About 97 percent of exports to the Centrally Planned Economies, in that year consisted of rice, which formed 25 percent of Burma's rice exports to all countries.

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7 Economic Bulletin for Asia and the Far East (ECAFE), UNO, New York, 1964, Vol. XV, p. 15.

As the world rice market improved, Burma tended to increase its cash sales as opposed to barrering, and thus the proportion shipped to the Centrally Planned Economies was reduced. (See Table LI). The reduction was partly compensated for by shipments of other commodities, consisting mainly of rubber and raw cotton. Later, due to the conclusion of a new trade agreement with Mainland China, rice shipments to the Centrally Planned Economies rose sharply again in 1961, but once again fell in 1962. In fact, the quantities of rice to be exported to these countries were determined each year by mutual agreement.

By 1961 all of Burma s trade with Centrally Planned Economies, except that with Mainland China, in commodities other than rice, was conducted on a cash basis There were some other problems in Burma's trading with the Centrally Planned Economies during the early stages of their commercial intercourse. These were mostly related to delays in delivery, quality, prices and packing of imported goods.

Since 1956 Burma obtained from Mainland China and the Soviet Union long-term credit and grants, which were meant to contribute to the increased flow of trade between Burma and these countries.[8] Burma was to repay these loans in goods or in convertible currencies from 1971 to 1980. Many other long-term arrangements of development programs with the assistance of the Soviet Union are currently in operation.

Rice trade is a government monopoly in Burma; the Union of Burma Agricultural Marketing Board formerly called SAMB (State Agricultural Marketing Board), conducts negotiations for the sales of rice to all foreign buyers and is the sole exporter. Rubber and timber are also government monopolies. Timber is exported solely by the State Timber Board. All exports of rubber were formerly handled by the Rubber Export Corporation which was established in 1954, but was liquidated in 1961 and replaced by the Rubber Export and Development Corporation.

Before 1957 imports from all sources, including the Centrally Planned Economies, were handled by both government and private organizations. From 1957, Joint Venture Trading Corporations with some private interests were established for the purpose of bringing down the cost of living and encouraging Burmese nationals in both foreign and domestic trade. The majority of the shares was held by the Burmese Government. From October 1, 1963, the Government nationalized most of the export and import trade and established the Myanma Export-Import Corporation for this purpose. Effective from April 1964, the Government took over the entire export trade of the country. Import

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[8] Ibid., p. 31.

TABLE LI

BURMA: DIRECTION OF RICE EXPORTS, 1958-59 to 1963-64

COUNTRY	By Value (K million)							By Tonnage (Thousand tons)						
						Oct.--June							Oct.--June	
	1958-59	1959-60	1960-61	1961-62	1962-63	1962-63*	1963-64*	1958-59	1959-60	1960-61	1961-62	1962-63	1962-63*	1963-64*
India	118	166	65	95	74	69	72	266	391	151	214	160	150	148
Pakistan	57	110	69	91	103	78	38	127	256	158	204	227	171	82
Japan	14	24	5	11	16	16	21	26	46	10	21	28	28	37
Malaya	31	20	11	32	41	36	16	71	52	28	62	72	64	31
Singapore	41	30	23	41	27	20	8	130	102	72	93	56	41	20
Ceylon	118	86	86	125	111	89	75	240	213	201	280	242	195	155
China	...	3	164	89	52	38	27	...	12	355	183	97	70	51
UK	12	118	11	7	6	5	5	45	72	42	16	24	18	22
Indonesia	181	238	143	160	144	120	144	388	573	330	366	318	264	300
Mauritius	25	23	24	27	30	21	23	49	47	52	57	61	44	45
USSR	16	24	...	38	54	54	62	30	45	...	64	90	90	103
Ryukyu Islands	17	15	10	5	2	2	...	32	31	20	10	5	5	...
European Countries	39	40	22	53	29	24	56	97	131	52	113	58	52	99
Other Countries	47	38	32	78	95	33	50	113	109	70	159	182	65	104
TOTAL	716	835	665	852	784	605	597	1,614	2,080	1,541	1,842	1,620	1,257	1,197

*Provisional.

SOURCE: Economic Survey Burma, Rangoon, 1964, Table 70, p. 101, (Quoting Union of Burma Agricultural Marketing Board.)

licenses are required for all goods except imports on Government account. All foreign exchange[9] has been declared the property of the state, and foreign exchange transactions can be made only through the Burma Central Bank. At present, imports are subject to an ad valorem tariff, generally higher on non-essentials and on goods likely to compete with Burmese industry and a sales tax varying from 5 to 15 percent on goods imported for sale.

Inadequate procurement and faulty supplies may adversely affect future exports of rice. Teak production is likely to maintain an upward trend. Some other traditional agricultural and forestry exports may show less optimistic results. Though the output of minerals as a whole was somewhat lower in 1965-66, better prospects are visualized in the coming years. The establishment of a Geology, Petroleum, and Mining Advisory Council in January 1967 is likely to provide a stimulus to mineral production. It is widely recognized that Burma has very substantial reserves of such minerals as copper, iron, coal and nickel as well as lead and zinc, and these can be exported in increasing quantities.

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[9] Exchange rates.

The Kyat replaced the Burmese rupee as official currency in July 1952, and the exchange rates are:

1 Kyat = 21 cents (U.S.) or U.S $1 0 = K 4.805
1 Kyat = 1 S. 6d (English)
1 Kyat = DMO 83 (West Germany)
1 Kyat = 75 44 Yen (Chinese)
1 Kyat = 1.03 New French Francs (France)
1 Kyat = RC 1.0 (Ceylon and Pakistan)
1 Kyat = RS 1.58 (India)
1 Kyat = $0.64 (Malaysia)
1 Kyat = Bahts 4.32 (Thailand)
1 Kyat = Piastres 16 65 (Vietnam)
1 Kyat = Riels 7.35 (Cambodia)

Weights and Measures:

Viss = 3.6 lbs. or 100 ticals
Basket = 1.125 bushels
Bag = 3 Baskets

Imperial Weights and measures are in general use in foreign trade.

General Ne Win's travels in the summer of 1966 were for both political and economic matters. He wanted to assure the Western powers of Burma's strict neutrality and desire for improving economic cooperation. In Britain, his chief interest was to advocate an increased export of Burmese teak to the United Kingdom. These exports had dropped to about 154,000 tons in 1964 as compared with the pre war figure of 200,000 tons. In return it was said Burma could increase the imports of certain items of British manufacture. In Eastern Europe, as a result of his visit, the export of tractors from Czechoslovakia and railway cars from East Germany was negotiated. His visit to the United States in September 1966, was meant to "shop around a bit for methods and techniques which might ease Burma's economic and social problems."[10] Burma, according to Ne Win, should manage its own affairs, run its own business, and put its house in order. It appears that from the United States' point of view, Ne Win has brought stability to the Burmese scene.

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[10] New York Times, Sunday, Sept 11, 1967, p. 4E.

XI. RESOURCES AND ECONOMIC DEVELOPMENT

The objective of the present Chapter is to review, analyze and evaluate economic development in Burma during the past half-century. The path of progress is dotted with a series of historical landmarks from the establishment of colonial rule under the British to the agony and destruction of World War II and the consequent emergence of Independent Burma and its aspirations toward economic progress and the establishment of a modern welfare state.

In the preceding pages an outline of the main events in Burma's modern history and the background of physical and economic forces has been presented A full inventory[1] and understanding of the country's natural and human resources is an essentail prerequisite to plans for development which are likely to yield maximum results in minimum time.

The British conquest of Burma and its development under Colonial rule from 1826 to 1942 (when the Japanese conquered the country) produced many changes in the economy of Burma. The development of rail and water transportation, the commercial production of rice in the delta, the oil wells of Central Burma and the exploitation of forests and minerals gave the economic activity an aura of modernity. Rangoon grew into a large city, and a few other towns developed into ports handling foreign commerce. Some extractive and processing industries also made their appearance.

The teak industry became a British preserve; Indian merchants took over the rice trade; British firms operated the mills and factories and British civil servants formed the top hierarchy of bureaucracy. Most of the profitable commercial and industrial operations in the country were owned, controlled and directed by non-Burmese (Europeans, Indians, Chinese, etc.,) and this tended to enlist nationalist sentiment behind the opposition to vested property interests. In 1938-39, the total

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[1] Burmese official statistics suffer from both inadequacy and irregularity. Most production figures in budget reports are given value terms without any price indices The agricultural data are not always available in quantity terms. The stage at which statistics are collected is not well organized There is also a certain arbitrariness in the use of statistics by authorities, and even statistics for a given year are altered from year to year with little explanation Most authentic figures on national economy are published with the Annual Budget Estimates by the Ministry of Finance The population statistics are out of date, as is the last Census (only a partial one), which was conducted in 1953. Figures are based in most cases on annual estimates.

output of the Burmese economy (measured in 1947-48 prices converted to dollars) was estimated to have been a little over $1 billion. This represented a per capita output of only $63. More than half of the total was made up by agriculture and fisheries. Industry, including cottage industry, contributed less than 10 percent. The economy was largely extractive in nature.[2]

The war ravages in Burma were fearful. It is no exaggeration to say that "No British possession has suffered so much damage from World War II as Burma"[3] and that "the war destroyed a larger share of the nation's physical wealth than was destroyed in any other country of the world except perhaps Greece".[4] In terms of monetary estimates of these catastrophic losses, computations and estimates vary, but it may be reasonably assumed that the total damages at post-War prices were no less than K 20 billion.[5]

At the end of the War, the British returned and planned to restore the old economy with a greater measure of government control. To this end, a number of project Boards were created, each charged with responsibility for the revival of a particular major industry. The policy of the Boards was to be controlled by Whitehall through the Governor; finance was provided by the British Government. The Boards were comprised of officials and nonofficials, in approximately equal numbers. The non-official element consisted of representatives of the British, Burman and Indian Communities who were skilled in the particular industry concerned. The actual operations were entrusted, under the control of the Boards, largely to the organizations which formerly conducted them.[6] On May 5, 1947, there was also announced the setting up of a National Planning Board.

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[2] Walinsky: Economic Developments in Burma, 1951-1960, p. 31.

[3] Hauris Collis: Last and First in Burma, London, 1956, p. 253.

[4] Hagen: The Economic Development of Burma, National Planning Association, Washington, D.C., 1956, p. 31.

[5] The story of the destruction of the so-called denial operations, is sometimes related as a spectacular fireworks show. On their return in 1945, the British found Burma utterly destroyed.

[6] Hughes. The British Contribution to the Industrial Development of Burma, Asiatic Rev , London, Vol. 46, No. 166, April 1950, p. 930.

At the end of 1946-47, the second full year after the war, the output was down approximately 40 percent[7] from the level of 1938-39. Two million acres of paddy land had gone out of cultivation; agricultural output, as a whole, was down by 2/5; and mining, oil production and exports had almost ceased.[8]

Even before Independence in 1948, the Burmese leadership was committed to plans of reconstruction and rehabilitation and planning the economic development of the country. In January 1947, General Aung San who had been appointed Deputy Chairman of the British Governor's Executive Council convened the first Rehabilitation Conference in the history of Postwar Burma held at the Sorrento Villa, at Prome Road in Rangoon. The political and intellectual elite of the country were invited to discuss and frame recommendations for economic development. But in the later part of 1947, soon after the tragic assassination of Aung San, an expert body under the name of the Economic Planning Board was set up superseding the National Board which had been set up in May of that year. The Economic Planning Board was entrusted with the formulation of a restricted Two-Year Plan of Economic Development. The Plan was announced on April 1, 1948. But unfortunately, soon after the announcement countrywide insurrections broke out and the execution of the Plan was delayed.

The idea of nationalization of large enterprises emerged strongly after Independence. The Constitution of the Union of Burma provided in Section 41 that "the economic life of the Union shall be planned with the aim of increasing the public wealth, of improving the material conditions of the people and raising their cultural level, of consolidating the Independence of the Union "[9] This basic law of the State was reinforced by among others provisions for the nationalization or acquisition of individual branches of national economy or single enterprises by the State if the public interest so required, with safeguards for compensation.[10] Thus, the ideas laid down in the Two-Year Plan both for agricultural and industrial planning remained the basis of national economic development for at least the next ten years. The

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[7] Econ. Surv Burma Rangoon, 1951, Table III, p. 3

[8] Walinsky. Economic Development in Burma, 1951-60, p. 59

[9] Two-Year Plan, 1948, p 1

[10] Ibid

main recommendations in agriculture were:

1) to redistribute land[11] with a view to eliminating landlordism;

2) to promote the cultivation of land on modern lines; and

3) to set immediate targets to increase agricultural production of all crops including rice.

The exploitation of forests was to be directed towards optimum economic development consistent with proper and scientific conservation. State Control was to be extended over both milling and exports of timber.

For industrial development, the Plan recommended a complete survey of natural resources. Firstly, steps were to be taken to rehabilitate existing industries and also to set up such new industries as might be feasible on the basis of raw materials already known to exist in economic quantities. But all basic industries were to be established and developed as state enterprises. However, a considerable sector of the consumer goods industries was to be left in private hands. Cottage industries were to be encouraged. The Plan also called for the restoration of prewar capacities of means of transportation and communications. In the industrial development, as a whole, the Plan advocated a strong Socialist policy.

The Burmese economy, however, from 1948 to 1953, underwent socio economic change in only a limited sense through the formulation of schemes and goals rather than substantive implementation of these proposals. The chief reason of this stalling was the breaking out of internal strife among the political parties in the country.

Further efforts at economic planning may be recounted briefly. In the first half of 1951, the Planning Ministry received a group of economists from the University of Oxford and some United Nations experts to advise in the formulation of a Socialist economy. The planning went a stage further when the Burmese Government, late in 1951, with the help of the United States Economic Cooperation Administration (ECA) engaged a group of American engineers and economists to conduct a 2-year economic and engineering survey of Burma. ECA recommended an engineering firm from New York, Knappen, Tippetts, Abbot, known in short as KTA. The KTA engineers and economists arrived in late 1951 and, after a few months of study, submitted a Preliminary Report on Economic and Engineering Survey on 31st January, 1952. Their Comprehensive Report was submitted

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[11] The Land Nationalization Act, 1948, Govt. Print Press, Rangoon, 1948, p. 39.

to the Government in August 1953 Most of the recommendations of the preliminary report were later endorsed by the Government at the All-Burma Pyidawtha Conference[12] held in August 1952 in Rangoon. A condensed popular version of the report was issued by the Economic and Social Board in September 1954 under the title--Pyidawtha, the New Burma. Hence, came the various names of the KTA Plan which was to cover the investment period January 1952 to September 1959.

Changes in the recommendations were made within a few months after the KTA[13] Comprehensive Report was presented The first step was to expand the list of 45 recommended industries to a list of 65 industries. Of the KTA s priority group of 14 projects, only the steel mill and jute mill were undertaken during the program period. The actual programs adopted in the manufacturing industry and electric power were virtually independent of KTA recommendations. The agricultural program was in essence the Five Year Agricultural Plan adopted by the Pyidawtha Conference, and it included the Land Nationalization Program The KTA Survey and its recommendations served primarily to indicate goals and demonstrate the feasibility of an approach to planned economic development. The report helped to stimulate ideas and indicate the possible path of progress.

A mission of the World Bank, consisting of a team of economists, visited Burma after the formulation of the Eight-Year Plan by the KTA. It was critical of all planning in Burma and criticized the KTA in particular. Its view was that without proper administrative, managerial

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12 It was called by the Union Government for the discussion of major programs for the creation of a new state ushering in a new era for the poeple. The Conference was held in Rangoon for 14 days from August 4 to 27, 1952. The Conference was a major effort by the government to mobilize its key officials and mass organizations in support of the forthcoming development programs. KTA preliminary report was presented to the Conference.

13 The Comprehensive Report on Economic and Engineering Survey of Burma for the Ministry of National Planning, Rangoon, 1953 (mimeo) Vol. I, Introduction: Economics, Agriculture, Irrigation; Vol II, Transport and Communications; Vol III Minerals; pp 2,000. The program of development was to be achieved by 1960. It included recommendations for the development of a modest-size heavy industry also.

and technical personnel no program of individual projects could be handled. Experienced indigneous management was a prerequisite. Of course, it did not suggest when the beginnings should be made. The mission also recommended employment of foreign firms and managing agency systems. An Englishman who knows Burma well commented, somewhat critically, on such unqualified approaches to the problem of economic development in the new context of Burmese ideology.[14] The Burmese Government considered these recommendations of the World Bank team to be rather time-worn approaches made by orthodox economists. Hugh Tinker says, "Such an analysis, couched in the pragmatic, unemotional language of banking and capitalist economics naturally seemed a little unsympathetic to the government of Burma and they took no action on its proposals "[15]

The United States Government signed a technical aid agreement[16] with the Government of Burma in September 1950. An expanded pilot mission worked on the projects agreed upon until 1953. After the request of the Burmese Government in the spring of 1953 that the aid be terminated, the mission carried out committed projects until their termination a year or two later. Projects agreed upon, but to which funds had not formally been committed, were immediately cancelled. Thirty-one million dollars had been allocated to Burma during 1950-53, of which about $20 million had been committed and spent before aid was terminated.

Burma also entered the Colombo Plan organization in 1952 and went on receiving various kinds of technical assistance and economic aid from Australia, United Kingdom, Canada and New Zealand. Economic aid through reparations from Japan followed in 1954; and rice-barter agreements and other assistance was forthcoming from the Soviet Union in 1956.

The welfare program of the government began to swing from planning towards actual practice during 1954. The most ambitious group of projects was that under the direction of the Government's Special Projects Implementation Board, which was a planning body set up to initiate projects. By the end of 1954, estimated government investment had risen to L 68 million or K 910 million and by 1955 it was raised to K 1,300 million. Of this sum, K 790 million was public investment and K 510 million was

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[14] Tinker: Union of Burma, 1959, p. 112.

[15] Ibid.

[16] Hagen: Economic Development of Burma, Pamphlet No 96. National Planning Association, Washington, D.C., 1956, pp. 76-77.

come from the private sector [17]

According to the 1952 Pyidawtha Program in agriculture, it was proposed that all previously cultivated lands should return to active production and, in addition, some cultivable lands not previously cultivated should also be brought under the plow. An increase in per acre yields was to be achieved through improved farm practices, the use of better seeds and chemical fertilizers and by undertaking of large irrigation projects and introduction of new crops and new plant varieties

The program recommended that there should be improved marketing and storage facilities, extension of farm facilities, expansion of government research into agricultural problems and expansion of educational and advisory services. It was pointed out that Burma had extensive flat plain areas, moderately fertile soils, ample water resources and suitable climate for agricultural production And, among countries of Asia, Burma was unique in having a small population in relation to potentially available land Thus, there was self sufficiency and surplus for export in the food sector of the economy.

It was quite clear that the rice exports brought the largest amount of the country s earnings of foreign exchange. The economy, as a whole, was predominantly agricultural. Therefore, in the development programs there was strong stress on agricultural improvements in spite of the desire to step up industrialization. About 2.5 million acres of land, formerly cultivated, were lying unused due to insurgency and other causes. Two thirds of the land was planted with a single crop, i e , rice. Current production in 1954 was still 1/5 below the prewar level. Land tenure reforms were an urgent task.

Reform of the land tenure system was carried out through four major acts of the Burmese Parliament. They provided for the restriction by the State of land acquisition in excess of specified limits and the distribution of land to cultivators and laborers to operate as state tenants. The Land Alienation Act prohibited transfers of agricultural land to non-agriculturists The Rent Control Act limited gross rents to reasonable levels. A companion act[18] provided for limitation of size of land holdings (to 25 and 50 acres, respectively, in different sets of circumstances) and for government purchase and redistribution of acreage in excess of these limits.

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[17] Tinker. Union of Burma, 1959, p 119

[18] Hagen: Economic Development of Burma, Pamphlet No 96, National Planning Association, Washington D C , 1956, p 35.

To bring about radical changes in Burmese agriculture, however, it is felt that structural changes in Burmese rural society would be needed. Application of modern technology including mechanization, chemical fertilizers, and extensive irrigation will not only be attendant on land reform and financial assistance by government, but change in attitude to farming will be of equal importance. A Burmese economist[19] had rightly remarked that, "in the agricultural sector, massive governmental support in the form of easy credit, fertilizers, far equipment and seeds has not only failed to change the cultural patterns of Burmese traditional life but has not even succeeded in solving the age-old problem of agricultural indebtedness. Most of the cultivators have assumed a passive role, receiving governmental aid in various forms. Another significant failure of socialist cooperation in Burma was that most of the agriculturists disliked cooperative marketing and collective farming as such."

The Four-Year Plan of 1957 succeeded the Five Year Agricultural Plan adopted by the Pyidawtha Conference. The more important agricultural programs laid down were: (1) crop expansion and improvement in production of paddy, cotton, groundnuts, jute, sugar cane, coconut, Virginia tobacco and rubber; (2) improvements in rice storage, milling, cleaning, grading, mechanical loading and handling; (3) development of irrigation; (4) use of mechanization; (5) organization of agricultural credit; (6) land nationalization; and (7) extension and research programs.

Among the specific targets were the restoration of prewar levels in the production of paddy and exports of rice. The responsibility for the execution of the paddy expansion program was given to the Land and Rural Development Corporation (LRDC). It was assumed that the contemplated programs of land nationalization and relief to peasantry would lead to better land use and new incentives in crop production. It was also hoped that the insurgency would gradually diminish and so create confidence and security in the rural areas.

All the above-mentioned tasks were vigorously tackled and the $25 million United States Development Loan provided the initial assistance needed. The International Cooperation Administration (ICA) played a useful role in the procurement and delivery of selected equipment. Most critics of Burmese planning agree the real headway was made. Farm income began to increase and though there was stress on expanding the paddy production, crop production was becoming more diversified and the

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19 Mya Maung: Socialism and Economic Development of Burma, Asian Survey, December 1964, Vol. IV, No. 12, pp. 1186-1187.

agricultural economy better balanced. To outside observers more significant was the change which seemed to have come about in the attitude of the political leadership towards the role of agriculture in the future economic development of Burma. According to their view, the earlier emphasis had been rather strong on industrialization and electrification.

Independent Burma has attached great importance to progress in the field of modern manufacturing and industry; and the belief is widely shared that industrialization is an essential road to economic development Indeed, this view is a common approach of many developing countries to problems of future development.

After the recommendations of the KTA consultants and the Pyidawtha decisions, in 1954 the manufacturing industries program was earnestly taken in hand by the government Responsibility for the execution of the State manufacturing industries program was vested mostly, though not exclusively, in the newly created Industrial Development Corporation (IDC). Industry in the private sector was also to be encouraged.

Industrial expansion soon came up against the familiar bottlenecks of foreign exchange difficulties, delayed agreements and tardy delivery dates of capital goods and appropriate machinery. The situation became so frustrating that the Prime Minister decided in June 1957 that no new industrial enterprises should be undertaken by the Government. Soon afterward, in 1958, the first military Government under General Ne Win continued this policy. Thus. industrial progress became slow and halting due not only to inexperience and lack of skilled training but also from many pressures and handicaps of internal as well as external forces beyond the control of the Government and people of Burma.

The position with regard to production from 1960-61 onward is indicated in Tables Nos LII, LIII, and LIV

The Ministry of National Planning prepared the Second Four-Year Plan[20] for 1961-62 to 1964-65, which was published in Rangoon in 1961. The Plan aimed at increasing the national income, speeding up the rate of growth of the more backward regions, increasing the production of certain crops and expanding the exports of agricultural products, extending and diversifying industry liberalizing the government's policy toward the private sector, and building the foundations of modern economy. This plan was intended to be the first of a series of four year

[20] Second Four-Year Plan. Govt. Burma, Rangoon, 1961.

TABLE LII

BURMA: PRODUCTION BY VALUE, 1961-62 to 1965-66 (million Kyat)

SECTORS	VALUE					PERCENTAGE INCREASE			
	61-62	62-63	63-64	64-65	65-66	62-63	63-64	64-65	65-66
Livestock and Fisheries	520	540	570	610	640	3.8	5.5	7.0	4.9
Forestry	340	360	350	350	420	5.8	-2.8	--	20.0
Mining	90	100	110	110	120	11.1	10.0	--	9.0
Manufacturing	3,600	4,030	3,660	4,250	4,350	11.9	-9.2	16.1	2.4
Agriculture	1,990	2,450	2,228	2,420	2,310	23.1	-7.0	6.1	-4.6
Total	6,540	7,480	6,970	7,740	7,840	14.4	-6.8	11.0	1.3

SOURCE: Revised Govt. Budget Estimates 1966-67, Table 3, p. 4.

TABLE LIII

BURMA: PERCENTAGE CHANGES IN DIFFERENT SECTORS OF PRODUCTION

SECTORS	PERCENTAGE OF TOTAL VALUE OF PRODUCTION				
	1961-62	1962-63	1963-64	1964-65	1965
Agriculture	30.43	32.75	32.71	31.27	29.46
Livestock and Fisheries	7.95	7.22	8.18	7.88	8.16
Forestry	5.20	4.81	5.02	4.52	5.36
Mining	1.38	1.34	1.58	1.42	8.53
Manufacturing	55.04	53.88	52.51	54.91	55.49

SOURCE: Revised Govt. Budget Estimates, 1966-67, Table 4, p. 4.

TABLE LIV

BURMA NATIONAL PRODUCTION BY VALUE

SECTORS	NATIONAL PRODUCTION[a] 1965-66	1966-67[b]	1967-68[c]	1965-66 Percentage	1966-67[b] Change on Previous	1967-68[c] Year
		(million Kyat)				
Agriculture	2,330	2,110	2,580	-9	-9	+22
Meat & Fish	660	660	710	+16	0	+7
Forests	380	410	450	+10	+8	+10
Mining	110	140	180	-6	+27	+29
Industry	4,040	4,050	4,940	-4	0	+22
Power	60	80	80	+1	+33	0
Construction	630	630	610	+25	0	-3
Trade	2,930	2,880	3,260	-11	-2	+13
Other Services	3,060	3,120	3,300	+2	+2	+6
TOTAL	14,200	14,080	16,110	-3	-1	+1

[a]on double counting basis [b]Preliminary estimates [c]Official forecast

SOURCE: Quarterly Economic Review (EIU), London, December 1967, No. 4, p. 3.

plans which would have the long-term aim of doubling real income per head in 16 years. This would mean raising the national income three-fold between 1961 and 1977.

Between 1959-60 and early 1962 the political conditions in Burma were somewhat in a flux. Though the Parliament and the democratic regime had been restored in the country, political instability and economic uncertainties continued to prevail. Then in March 1962, power was once again assumed by General Ne Win, the Commander-in Chief of the Burmese Army and its Revolutionary Council, of which be became the Chairman. Parliament was dissolved and the political parties were suppressed.

The four-year plan 1961-62 to 1964-65 was superseded when the Revolutionary regime came to power in March 1962. A new plan announced for 1966-67 to 1969-70 envisaged an average 8 percent growth in the national production. Investments in agriculture, industry and transport were to be given priority. The total investment was planned to rise by 15 percent per annum.

Exercising the powers conferred by the Enterprises Nationalization Law of October 19, 1963, Ne Win's Revolutionary Government nationalized all cigarette companies in the Union in October 1963, with immediate effect; the Pearl Fishing and Culture Syndicate with retroactive effect from August 1963, the Burma Industrial Development Corporation and its 42 subsidiary firms from September 1963; and the Defense Services Institute and its 5 firms also from September 1963. This was followed by the nationalization of all private wholesale shops; brokerage houses; department stores, general stores and cooperative shops dealing in foodstuffs, textiles, and 14 categories of general merchandise. This became effective first in Rangoon in March 1964, and later in the rest of the Union by the order of 9 April 1964. Under the same order the Socialist Economy Construction Committee was formed, which among other functions was charged with the management of the business of the nationalized firms. Effective from April 1964, the government took over the entire export trade of the country. The size of the national budget[21] of 1964-65 was almost doubled as the government took up an increasingly large portion of the economic activity

The new Revolutionary Government also embarked on a large agricultural credit program and in 1963-64 loans and advances committed to agriculture amounted to K 891 million and the figure touched K 1,000 million the next year. The efforts of the State Timber Board during 1963-64 resulted in further increase in the production and export of teak by approximately 9 percent and 3 percent respectively over the previous year. But production of timber as a whole showed a decline of nearly 15 percent due to the fact that hardwoods other than teak were handled for the first time by the Board after nationalization. (For timber production, see Table XX, in section V on Vegetation, Forests and Soils).

Most of the manufacturing industry includes the processing of primary products like rice, sugar, teak, cotton, jute, and tobacco. The production of cement bricks and tiles, steel products, matches, pharmaceutical and distilled products is tuned to the growing demand of home consumption. The quantity and value of production of the main industries is shown in Tables LV and LVI.

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21 Quart. Econ. Rev. EIU., London, No. 48, Dec. 1964, p. 2.

TABLE LV

BURMA: MANUFACTURING PRODUCTION, QUANTITY AND VALUE

INDUSTRY	Quantity 1964-65	Quantity 1965-66	Value (Million Kyat) 1964-65	Value (Million Kyat) 1965-66
Rice & Rice products (thousand tons)	6,280	6,197	1,613	1,592
Cooking oils (thousand tons)	270	223	190	155
Preserved fish and meat (million Viss)*	70.3	70.3	194	194
Cotton Fabrics	---	---	215	174
Shirting Grey (million yds)	12	15	16	19
Longyis (Million)	28.7	20.1	142	98
Slippers (million pairs)	38.2	38.9	93	95
Cotton Hosiery (million)	16.0	16.6	32	33
Cement (thousand tons)	136	140	20	15
Saw Milling	---	---	167	206
Petroleum Refining (million gallons)	174	196	168	184

*One Viss = 3.601 lb. All figures are approximate.

SOURCE: Quart. Econ Rev., EIU, London, No. 1. March 1967, p. 3.

TABLE LVI

BURMA: INDUSTRIAL PRODUCTION OF CHIEF COMMODITIES, 1960-61 to 1962-63

COMMODITY	UNIT	1960-61	1961-62	1962-63
Motor Fuel	Thousand Imp. gal.	45,364	43,892	45,200
Kerosene	"	28,793	24,373	24,538
Diesel Oil	"	27,300	32,175	42,991
Cement	Long tons	44,192	38,945	52,440
Sugar	"	40,397	42,030	58,391
Brine Salt	"	145,840	123,245	151,955
Cigarettes	Million	1,327	1,189	1,072
Gunny Bags	Thousands	11,716	8,622	15,378
Bricks	"	11,230	11,058	13,054
Cotton Yarn	Thousand lbs.	8,358	8,456	10,498

SOURCE: Govt., Burma, Central Statistical and Economics Department, Quarterly Bulletin of Statistics Second quarter, 1962.

With the aim of promoting local dairy industry and farming, the Milk and Fruit Product Factory at Maymyo resumed operations in November 1963 after having been closed down for the previous four or five years. Plans were made to produce 438,640 lbs. of condensed milk, 105,156 lbs of bottled milk and 3,600 lbs of cream Alterations were made in the production processes of the jute mill near Rangoon the steel rolling mill at Ywamba close to Rangoon started production; the brick and tile factory was expanded; and the silk reeling factory at Maymyo was modernized. Among the establishment of other industrial units, the construction of a fertilizer plant was taken in hand by the Industrial Development Corporation

The Burmah Oil Company was nationalized on 1 January 1963 and became the Peoples' Oil Industry (POI). They struck oil at Myanaung in 1963 and the production of the well was 11 gallons a minute; this was nothing spectacular, but significant The government did not further the exploration for oil due to cost and insecurity factors The imports of mineral oils in 1963 formed just over 1 percent of the total imports. Oil exploration in 1964-65 was improved with the help of the Rumanian experts under an aid agreement in 1962 Successful oil strikes were made near Inma, producing at the rate of 50 barrels a day. Crude oil production during the year 1964-65 increased by nearly 15 percent; and with the operation of the new distillation unit at Syriam, the total combined capacity of the Chauk and Syriam Petroleum Refineries was more than doubled to a level of 920,000 imperial gallons per stream day.

In the industrial sector, the extension of nationalization[22] had increased the share of the public sector in the value of production to 62 percent in 1965-66. Textile manufacturing and some of the smaller industries were the only spheres left in which government ownership was not yet predominant.

Modern manufacturing industry is geographically concentrated in Rangoon and the region around it. Plants processing various kinds of agricultural and associated raw materials are situated in other parts of the country; but there are no industrial concentrations either on port sites or in the interior Of course, most modern industry with few exceptions is found in the Middle and Lower Irrawaddy Valley.

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[22] Quart Econ. Rev. EIU, London, Ann, Supp 1967, p. 5.

TABLE LVII

BURMA: GROSS DOMESTIC PRODUCT 1960-61 through 1963-64 (in 1961-62 prices)

Millions of Kyats

SECTORS	1960-61	1961-62	1962-63	1963-64 (Provisional)
Agriculture	1,647	1,767	1,969	1,862
Livestock & Fishery	355	341	364	381
Forestry	363	371	388	361
Mining	61	67	68	70
Manufacturing	1,021	1,134	1,299	1,159
Power	34	27	29	28
Construction	217	231	236	230
Transportation	273	286	295	296
Trade	2,079	2,042	1,986	2,061
Banking & Insurance	95	106	90	85
General Government	638	663	703	750
Services & Rental Value	660	676	684	679
Total GDP	7,443	7,711	8,111	7,962
Percentage Change		+3.6	+5.2	-1.8

SOURCE: Econ. Surv. Burma, Rangoon, 1964, Table 2, p. 5.

The development of the harbor facilities of Rangoon was continued and the port improvement schemes included building of new jetties, more electric wharf cranes, storage godowns and cargo handling equipment. The administration of outports was taken over by the Board of Management for the Port of Rangoon in August 1962, and a development program was undertaken by the Board commencing in the finanacial year 1962-63. Major works completed at the port of Sittwe consisted of repairs to the main wharf, hydrographic and land surveys, and laying of light buoys in the port area. At the port of Mergui, a new pontoon jetty was constructed at Naukle Quarter

The Gross Domestic Product[23] at constant (1961-62) price declined from K 8,111 million in 1962-63 to K 7,962 million in 1963-64, a decrease of about 1.8 percent as against 6.2 percent in current prices. This was largely due to the reduced trading margins consequent upon the nationalization of an overwhelming portion of the country's trade. The Gross Domestic Product in the early 1960's at current prices is shown in Table LVII

The consumption and output per capita for this same period are given below:

TABLE LVIII

BURMA: CONSUMPTION AND OUTPUT, PER CAPITA

(In 1961-62 Prices)

	1960-61	1961-62	1962-63	1963-64 (estimate)
	KYATS			
Per Capita Consumption	234	227	228	224
Per Capita Output	327	332	342	329

SOURCE: Econ. Surv Burma, Rangoon, 1964, Chart No. 3, p. 8.

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23 GDP (GNP plus net income payments abroad equals GDP. Though there is no significant difference between GDP and GNP aggregates for Burma).

Exports and imports in 1963-64 were down from 1962-63. The decline in the output of the trade sector was due to the recent nationalization of the private wholesale trading business and its new handling by the People's Stores Corporation which took a smaller profit margin than the private traders. Among the exports, rice held the leading position and the trade had a diversified direction indicating a world-wide demand for Burma's rice

As mentioned earlier,[24] in 1963, the export of rice by private firms was entirely terminated and the Union of Burma Agricultural Marketing Board (UBAMB) became the sole purchaser and exporter of rice. Later, a government organization named Myanma Export and Import Corporation, began to handle all exports to overseas private buyers while UBAMB was responsible for all rice sold under inter-governmental contracts.

The largest gains in exports of agricultural products have been registered for pulses, oilcakes, maize, potatoes, chillies, jute, hides and skins. The major portion of oilcake exports consists of groundnut cake which is imported into United Kingdom, Singapore and Netherlands.

The export of timber[25] has been improving, particularly with the rising world demand for teak-wood. The State Timber Board (STB) has maintained a mounting drive for exports Countries which have increased their import of Burmese teak by 50 percent include Denmark, Hong Kong, Japan, Sweden and West Germany.

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[24] Supra Chap. Trade and Commerce.

[25] Timber is the designation of a group of raw materials, usually not for an individual raw material. (See yearbook of World Timber Trade.) Round logs are converted into square logs, usually at the request of foreign buyers. The principal processes preparing logs for manufactu[illegible] uses are their reduction either to planks or boards by sawing, or to sheets, called veneers by peeling. The tools used range from primitive pitsaws to intricate modern machinery.
See Charlotte Leubuscher: The Processing of Colonial Raw Material, London, 1951, p. 136.

Basic to the material needs and the economic development of Burma are a variety of capital goods including machinery parts, vehicles and tractors and farm machinery. Other imports include low-cost fabrics, cement, cooking oil and canned and dried milk. With the nationalization of import trade, the handling of all imports, except departmental imports of the government, is done by the People's Stores Corporation. Burma maintains its policy of finding trading partners without political implications (See Tables No.LIX and LX for imports and exports.)

Basic to planning for economic development in Independent Socialist Burma, in the beginning, was the belief that in a few years rice production would be restored to the prewar level or very near it. This would enable the country to sell its rice in the world market at 1951 prices and thereby acquire the means of improving economic conditions at home and obtaining capital goods and technical know-how from outside to support a program of accelerated industrialization and developing transportation in the country. The development of varied economic resources for export, namely, teak and other woods, minerals and other raw materials was expected to augment the planned programs of envisaged economic development

Unfortunately Burma encountered ill luck on both the political and economic fronts simultaneously; her chances of realizing this dream were drastically minimized At home, the political dissent of communists and minorities developed into a destructive and lingering insurgency; ever since its birth the new state has been chasing the mirage of peace. Several thousand armed men, politically motivated, bitter in mind, rebelling against the government, lurk in the forests, hills and swamps. Their physical presence in many places and their psychological impact in other areas is a deterrent to the most effective exploitation of Burma's forest and mineral wealth, the raising of agricultural productivity, and the expansion of transportation facilities.

War still crackles and flickers through the hills and erupts suddenly in quiet villages in the plains and challenges the authority of the Burmese Government.[26] Bands of Shans, Kachins, Karens and Red Flag and white Flag Communists are in the field fighting independently against the government. Police stations are attacked, cattle are stolen, arms are seized and women are abducted Supplies in many of these areas are convoyed from one town to the next Ethnic and religious rivalries, idealogy and plunder are the motivations for these acts.

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26 New York Times, Saturday May 6, 1967, dispatch date lined Maymyo, May 1, 1967 Also, Quart. Econ Rev EIU, London, No 1, March 1967, p 1

TABLE LIX

BURMA: IMPORTS OF PRINCIPAL COMMODITIES

(K million)

	1937-1941	57-58	58-59	59-60	60-61	61-62	62-63	Oct. to June 62-63	Oct. to June 63-64*
Capital Goods	...	483	332	353	276	331	415	308	265
Consumer Goods	...	625	625	906	804	713	683	494	495
Total	...	1108	957	1259	1080	1044	1098	802	760
Machinery & Transport equipment	27	309	217	212	173	188	256	187	172
Metal & Metal Products	27	145	106	132	100	133	126	102	87
Textiles	67	168	186	380	282	227	240	180	163
Cotton & Yarn & Thread	15	45	71	125	70	79	71	54	58
Artificial and Synthetic yarn	+	6	5	1	15	19	11	10	7
Cotton fabrics	37	70	83	175	139	94	129	96	84
Gunnies & sacks	15	21	19	31	45	28	26	16	11
Silk fabrics	+	26	8	36	13	7	3	4	3
Foodstuff and tobacco	22	110	87	108	89	74	91	63	61
Milk canned and dried	5	44	48	53	49	50	70	50	47
Fish & fish products	3	29	18	20	24	18	16	9	5
Groundnut oil	4	33	20	33	14	4	4	4	9
Tobacco	10	4	1	2	2	2	1	+	+
Raw materials	15	61	56	44	55	47	46	32	28
Mineral oil, refined	6	16	19	18	23	18	23	16	13
Coal and coke	9	28	26	19	23	19	19	13	10
Cement	+	17	11	7	9	10	4	3	5
Pharmaceutical products	3	33	30	38	31	38	36	27	16
Rubber manufactures	3	9	12	16	34	22	15	12	9
Paper & paper products	5	20	24	26	30	34	25	18	31

*Provisional
+ Less than K 1 million

SOURCE: Economic Survey of Burma, Rangoon, 1964, Table 71, p. 105, (Figs., from Commissioner of Customs).

TABLE LX

BURMA EXPORTS
(Selected Data)

	38-39	56-57	57-58	58-59	59-60	60-61	61-62	62-63
Exports By Value (K million)								
Rice & Rice products	223	895	663	716	835	664	852	784
Other Agric Produce	33	158	117	154	196	184	221	251
Cotton	8	32	17	18	33	26	41	37
Pulses	7	50	42	51	42	45	60	72
Rubber	6	38	26	34	44	31	28	26
Oilcakes	5	30	26	39	55	69	76	90
Others	7	8	6	12	22	13	16	26
Metals & Ores	57	49	37	40	40	35	36	34
Timber	33	66	61	72	89	94	132	165
All others	132	15	17	20	19	25	26	32
Total	478	1,183	895	1,002	1,179	1,002	1,267	1,266
Exports by volume (000 tons)								
Rice & Rice products	3,303	2,005	1,463	1,614	2,080	1,541	1,842	1,620
Other Agric. Produce	255	232	216	287	327	392	421	480
Cotton	17	13	8	9	15	10	19	18
Pulses	93	98	75	110	100	106	108	132
Rubber	9	13	10	111	11	10	11	10
Oilcakes	80	83	96	124	163	225	244	272
Others	56	25	27	33	38	41	39	48
Metals & Ores	168	51	58	57	44	30	35	38
Timber	251	86	82	99	101	102	138	168

SOURCE: UBAMB for rice, STB for timber and Office of the Commissioner of Customs for other commodities. From Econ. Surv. Burma, Rangoon, 1964, Table 69, p 99.

Other ethnic minorities, the Nagas, the Chins and Mons are also restive under the rule of the Union and are demanding more autonomy. General Ne Win, the Head of the Government, estimated in 1967 that his forces controlled no more than 65 percent of the country.[27] Defense was the biggest item in the budget, and at least 165,000 troops and police were arrayed against the insurgents.

Economically, the adverse situation centers primarily around rice production and export Due to a variety of causes from war damage, insurgency, and uncultivated lands to persistence of time-worn agricultural methods, the yields have not been substantially raised. Both acreage of paddy and its production reached the prewar levels only by 1959-60, and in 1964-65 the position was only slightly improved. See figures below:

BURMA: PRODUCTION OF PADDY (In thousand tons)

	1936-37 to 1940-41 average	1952-53	1959-60	1961-62	1962-63	1963-64	1964-65
Paddy:	7,426	5,740	6,916	6,799	7,544	7,720	8,151

BURMA: PADDY YIELD PER ACRE

	1936-37 to 1940-41 average	1961-62	1962-63	1963-64 (estimated)
Baskets per acre	28.17	28.63	30.76	30.23
Pounds per acre	1,296.00	1,317.00	1,415 00	1,391.00
Percentage of Prewar Average	100.00	102.00	109.00	107.00

[27] Ibid.

The rice prices also fell below expectations during the period 1952-53 to 1959-60. When the KTA recommendations were made, it was assumed that the export prices would decline only moderately and stay around L 50 per ton by 1959-60. And it was also the expectation that the rice production would increase progressively, and in a few years make it possible to export about 2 3 to 3 million tons. On the basis of this assumption it was hoped to finance projects and schemes amounting to K 7.500 million in terms of investments envisaged in the KTA proposals

Since 1957, economic planning in Burma has become more flexible[28] in the light of experience in development in the preceding years. The estimates are generally revised annually on the basis of the available resources The present policy of the Government is to shift its investments as far as possible from social overheads to directly productive projects that are likely to yield quick returns and either promote exports or limit exports, depending on circumstances However, the main objectives of planning are still being followed and include the promotion of State enterprises, social welfare, removal of foreign control over the economy, and stimulation of Burmese enterprises

Some of the problems to be solved by planned economic development in Burma may be summarized Real progress would be made only by improvement of farming, development of transportation, provision of marketing facilities, better rice milling liberal settlement of land tenure problems, use of fertilizers, better irrigation and necessary adjustments in farm techniques including limited mechanization. There are other problems such as the need for more cattle and also the need to establish a system of readily available agricultural credit, better than the oppressive loans of the past. The breeding of more cattle in Upper Burma and the Shan States is one of the future possibilities. Production of more and better rice would also be the keynote to economic prosperity Burma's trade needs to be made more international and diversified, with exports of rice, timber, minerals and other raw materials. Oil production to satisfy domestic requirements is essential

Normalization of Burmese-Chinese relations is important For the first time in several centuries China has undisputed possession of her eastern seaboard But for her remote southwestern provinces, Rangoon could well be a suitable outlet; this had been demonstrated during the early phase of the previous war China gave Burma economic aid

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[28] Cho: Economic Development of Burma and Thailand, 1963 p. 140.

amounting to 84 million dollars and has apparently settled the boundary problems. Yet this rapprochement between China and Burma was rudely disturbed by violent anti-Chinese riots in many Burmese towns in June-July 1967. A severe strain in Burmese-Chinese relations followed the riots in Rangoon and elsewhere in October-November 1967.

Growth and development of industries is indispensable to economic advance. It involves planning and foresight. Whether the methods are based on socialist thinking or spring from controlled capitalist initiative, growth of industries is essential. Some of the old industries in Burma have to be modernized and enlarged; some new ones have to be established in relation to existing resources and industrial needs. In investment and organization, the leadership and initiative of Burmese is desirable. The growth of population and rising educational and economic levels lend support to industrial development as a means of national prosperity. Development of power and energy is essential to meet the requirements of growing industry and developing transportation, as well as for supplying energy for domestic needs. Burma is poor in coal resources since coal from the Kalewa fields is not only distantly located, but is also limited in quantity. Obviously, Burma's future lies with the development of suitable hydroelectric schemes. Nature seems generous in these possibilities.[29]

The exploitation of all her resources by Burma has not reached the goals which were aimed at, though increased output and higher prices have certainly been achieved. After Independence, foreign aid and technical assistance was available from several quarters, including Japan (along with reparations); United States Special Technical and Economic Assistance Program (and PL 480 Program, $25 million Development Loan, Special Assistance Grants, ECA and AID funds, etc.); the Union of Soviet Socialist Republic (economic and and barter deals); the Colombo Plan; World Bank and assistance from China and India. But on the whole, Burma felt that the outside aid had not succeeded in giving her the desired sense of "lift" and she was unable to derive the expected economic and commercial advantage. With the advent of General Ne Win's first administration in 1958-60, most of the regular sources of aid were terminated and as the years have rolled by the situation with regard to foreign economic assistance remains somewhat undefined. It may be said that most of the Burmese failures in expected economic growth cannot be laid entirely at the door of Socialist economic programs and nationalization, as is often charged, but the reasons appear to be a complex combination of social, political, ideological and historical

[29] See Chapter on industry and power and energy.

circumstances The country has to enter a period of "take off"[30] and attain a reasonable degree of self-sustained growth in order to achieve economic stability

Countries like Burma moving from the colonial to independent status and beset by internal turmoils and outside pressures have a long road to traverse to tranquility and prosperity But Burma's travel along this road may be shorter and less hazardous because she has neither an empty land nor hungry people. Nor is she devoid of nature's bounties to give her the basis for modern economic development. Her rich agriculture, valuable mines, lush forests and shimmering navigable waterways are a guarantee of opportunity and prosperity for her people.

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[30] "Take off" may be defined as the interval during which the rate of investment increases in such a way that the real output per capita rises and this initial increase carries with it radical changes in production techniques and the disposition of income flows which perpetuate the new scale of investment and perpetuate thereby the rising trend in per capita output See Cho, Byung-Tack. Economic Development of Burma and Thailand 1963, op cit , p. 10.

G L O S S A R Y

GEOGRAPHICAL, SOCIOLOGICAL, ECONOMICAL TERMS

AING, also KWIN	: Large block of cultivated area
APINTHAUNG	: Tidal flat
AW	: Bay, cove
BAN, also (DAW, KAMPONG, MAN, MAR, MONG, WAN)	: Village, settlement
BUM, also (KYAW, MUAL, YOMA, etc.)	: Mountain range
CHAUNG, also (CHAUNGGYI, CHAUK, LAW, HKA, LAWGALE, HTO, HWI, MYAUNG, GALET, MAE NAM, OM, SAN, YO, YU, YEGYAW, SU, etc.)	: River or stream
DAH	: Long Burmese kinfe. Similar to Bengali DAO
DUWAH	: Kachin Chief
GAYET	: Isolated pools in depressions of the plain
GIN	: Ginger
GOK	: Hollows in stream beds
IN, INMA also (AING, ET, KWIN, LWIN, NAWNG, etc.)	: Lake, marsh swamp
INN	: Seasonally flooded low-lying areas
JHUM	: Slash and burn cultivation
KAING	: Alluvial islands in a river
KAING LANDS	: River inundated alluvial lands (or species of coarse, tall grass)
KAN, KANMA	: Tank, pond
KAPAS	: Cotton
KASUN-U	: Sweet potatoes
KAWNG, also (KYO, KU, KHO, TAUGYYI YE, HUAING, HSAN, etc.)	: Hill
KAYAN	: Eggplant (brinjal)
KAYAN-KYIN	: Tomatoes
KAZIN	: Embankments (bunds) around paddy fields

KWET-THIT	: Hutments, Shanty town
KYAT	: Burmese rupee (approx. 21 cents US)
KYAUNG	: Buddhist monastry
KYAWDAN, also (DAUNG, GYAUNG, LE, LOI, SHAN, TAUNG HTA HKU, HSAUNG, HKAW, PUNG, YUNG, ZUNG, etc)	: Mountain
KYET-THUN	: Onions
KYET-THUN-BYU	: Garlic
KYIN	: Teak (Tectona grandis)
KYUN	: Island
LE	: Paddy field
LET-PET-CHOUK	: Green tea
LET-PET-SO	: Pickled tea
LU	: Man
LUDU	: Masses
MA	: Young women
MANAO	: Kachin annual feast
MAW	: Point, rocks
MIN	: Prince or official
MOHNYIN	: Mustard
MOULA-U SAT	: Radish
MYO	: Land or domain
NAN-NAN	. Coriander
PONGYI	: Buddhist monk
PWE	: Festival, show
SAKAN	: Camping ground
SAWBWA	: Shan ruler or chief
SHWE	Gold or golden
SUBAN	: Safflower
TAGU	: Name of month corresponding with July-August
TALIN	: Threshing floor
TAWTHALIN	. Name of month corresponding with September-October
TAUNG	. Forest
TAUNGYA	: Slash and burn Shifting cultivation (see Jhum)

TE	: Hut
THINGYAN	: Burmese New Year (3-day ceremony including April 12. This is also called the Water Festival.)
TON	: A narrow stretch of estaurine water
TU	: Some hollows in stream bed (same as Gok)
WAGAUNG	: Name of month corresponding with July-August
YA	: Land (hence Taungya - Shifting cultivation in the forest).

GENRAL TERMS

APIPADI or NAINGANDAW	: Head of Independent Burmese State established by the Japanese on August 1, 1943. This was official title of Dr. Baw Maw the "Head" (the biggest among the big).
A.F.P.F.L.	: Anti-Fascist Peoples Freedom League (the major political party which won independence for Burma)
ANASHIN	: Dictator
A-THE	: Business enterprise
AZAD HIND	: Free India Government proclaimed by Subhas Chandra Bose on October 21, 1943. Later it established headquarters in Rangoon.
BAMA	: Burman or Burmese
B.D.A.	: Burma Defence Army, created August 26, 1942 after Japanese occupation after disbandment of BIA.
B.I.A.	: Burma Independence Army created in December 1941 and disbanded on July 24, 1942
B.N.A.	: Burma National Army created in August 1945
BO	: Captain in the Army
BOGYOKE	: Commander-in-Chief, the Great General, title for Aung San.
BURMA BAHO GOVERNMENT	: First Burma administration formed by the Japanese on March 23, 1942.

CHETTYAR	: Indian money lender from South India settled in Burma Sometimes land-owner
CHINDITS	: Chin troops under Major General Wingate in Burma during World War II.
CHWE TAT	: 'Sweat Army' or labor contingents recruited by the Burmese for work in the Thailand-Burma railroad construction
DOBAMA	: 'We Burmese . Patriotic slogan of the nationalist party Dobama Asiayone formed during World War II. The Dobama party's song later on became the Burmese National Anthem.
DOKKA	: Suffering
EINGYE	: Ladies blouse
G S.B.A	: General Council of Buddhist Associations
HLA	: Beautiful
I.N A.	: Indian National Army, also called Azad Hind Fauj which operated under Subhas Chandra Bose from Burma, but was created earlier in Singapore in 1941. 'Jai Hind' (Victory to India) was their slogan and 'Jan Baz' was the name of their suicide squads.
JAPAN-KHIT	: Japanese order
KHIT-THIT PWE-SA	: The Nouveau Riche (new rich) in War-time Burma
KEMPETAI	: Japanese Military Police
KIN	: Home Guard
LOBA	: Greed
LONGYI	: Cotton or silk skirt worn by both men and women

MAHABAMA	: The Greater Burma Movement
MYOCHIT	: Lovers of land, political party of U. Saw.
MYOCK	: Township officer
NI	: Red Communist
P.V.O.	: Peoples' Volunteer Organization
PYIDAWTHA	: Royal pleasant country - a welfare state. Also the conference held in Rangoon in August 1952.
SANGHA	: Monks
SINYETHA PARTY	: Proletarian party of Dr. Baw Maw who later became the Head of the Burmese Government during Japanese occupation.
TAT	: Army or force
THAKIN PARTY	: One of the major pre-war political parties of Burma.
THWE THAUK	: Blood drinking ceremony - an ancient Burmese warriors' oath and communion.
U	: Prefix used before the names of older or respected men.
WUNDAUK	: Sub-divisional officer
WUT-LIT-SA-LIT	: Stark naked (the Japanese soldiers used to hurt public feeling by bathing stark naked.
Y.M.B.A.	: Young Men's Buddhist Association formed after the pattern of YMCA. This later became a full-fledged nationalist movement.

FISH TERMS
(NGA for fish in general)

NGA-MAN-GAUNG-WAING	: Ground shark of the rivers (Carcharhinus gangeticus - M.H.)
NGA-MAN-SWETHI	: Sawfish
NGA-MAN-KA	: Plough-fish or skate
NGA-YOK	: Cat fish
NGA-BAT	: Block and fresh water shark
NGA-ATPON or NGA-GONGREE (Arakan)	: The Indian mackerel
KA-KADIT	: Becktie or Cock-up
NGA-TAUK-TU	: Rock cods
NGA-THANSHE MINGYA	: The cutlass or ribbon fish or hair tails
NGA-YUZANA	: The Silver pomfret, White pomfret, Black pomfret
NGA-KIN	: Mullet
NGA-LET-KWA	: Indian salmon
NGA-PONNA	: Mango fish or taps.
NGA-WE-YAUNG	: Jew fish
NGA-MYIT-CHIN	: Rohu (from Carp group)
NGA-GYIN	: Mrigala "
NGA-DAUK	: Mahaseer " (Barbustor)
NGA-LAWA	: Indian trout "
NGA-PYAN	: Flying fish
NGA-TIN-TON	: Gobi
NGA-KHWE-SHA	: Sole
NGA-THALAUK	: Herrings (Hilsa or Ilisha)
NGA-PA	: Indian Anchovy
LEIL-KYAUK TIN-KUN	: Sting Ray

NGAPI	: Fish preserved by the salting process (generally fish paste)
NGAPI-GAUNG	: Fish salted whole
SEINSA-NGAPI	: Fish paste made from shrimps
PAZUNKIN	: Smoked prawns or Cray fish
DAMIN-NGAPI	: Salted fish paste made from the mixed catch in a certain kind of bag net

HTAUNT-THA NGAPI	: Fish paste made by pounding salted fish
NGA-NOK-NGAPI	: Salted fish made from smaller kinds of fish
NGA-GYI-CHAUK	: Dry-smoked mud fish
NGA-CHAUK	: Dried fish
KAUNG-GYI-DAUNG	: Superior quality of fish paste made from bigger kind of fish.

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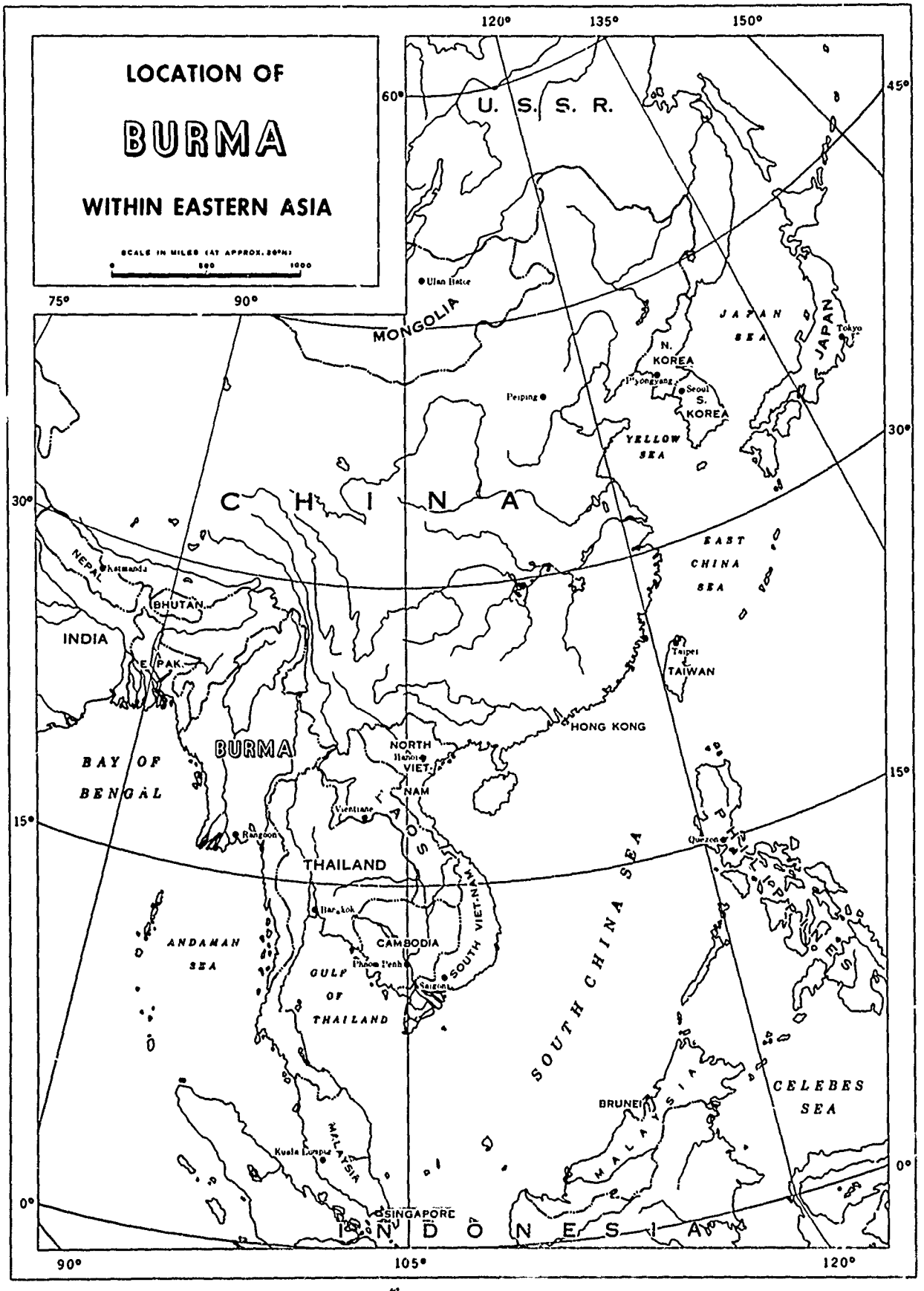
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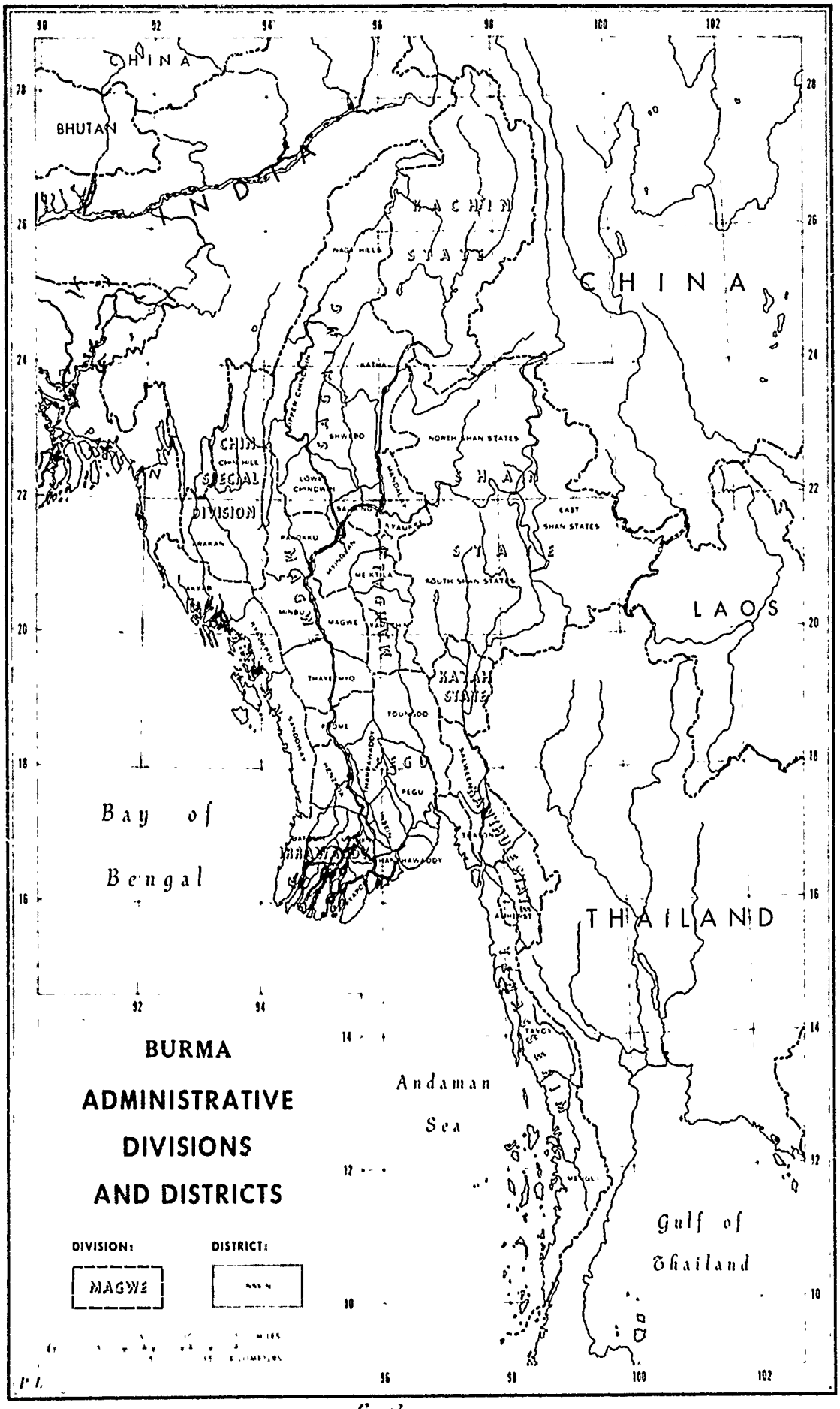
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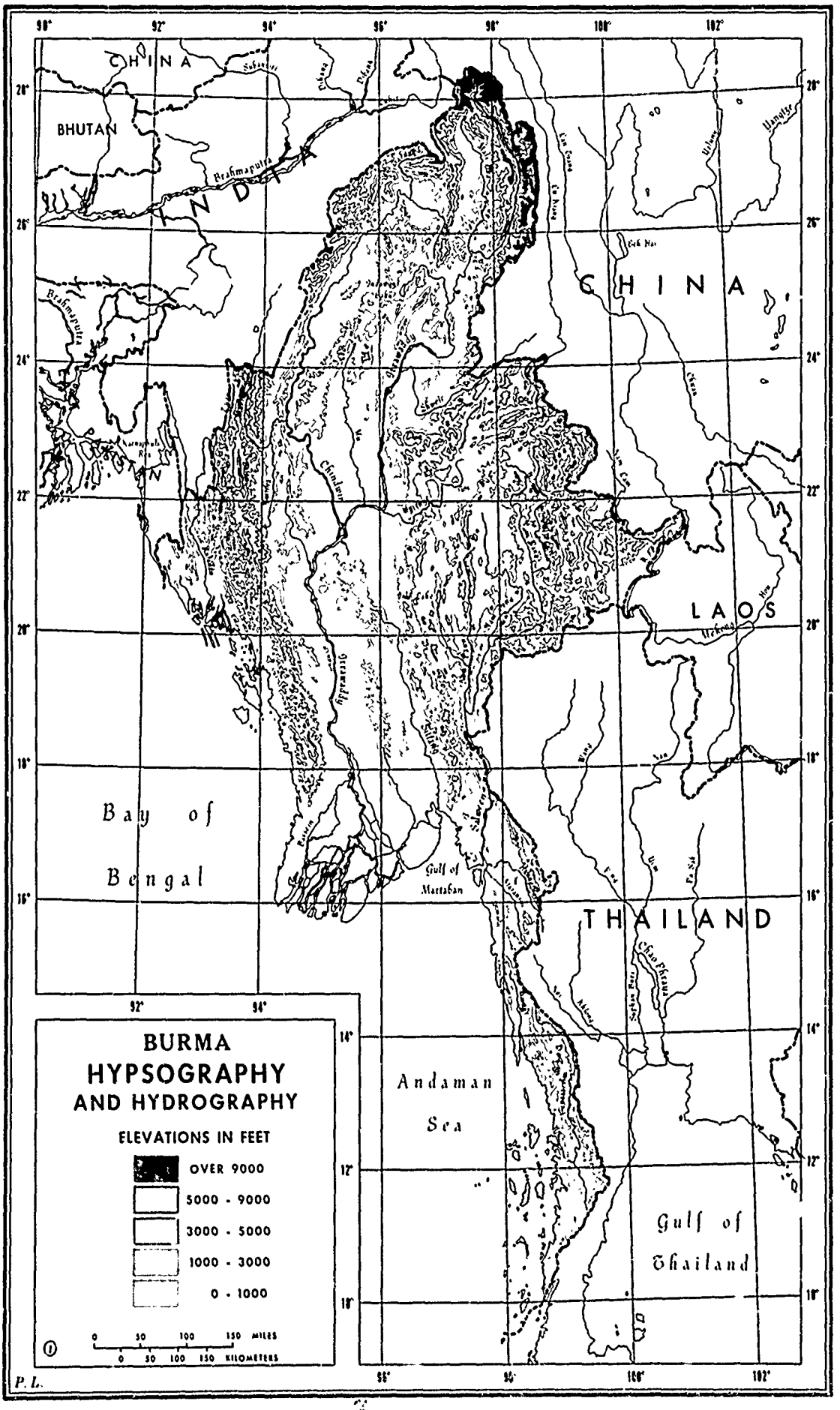
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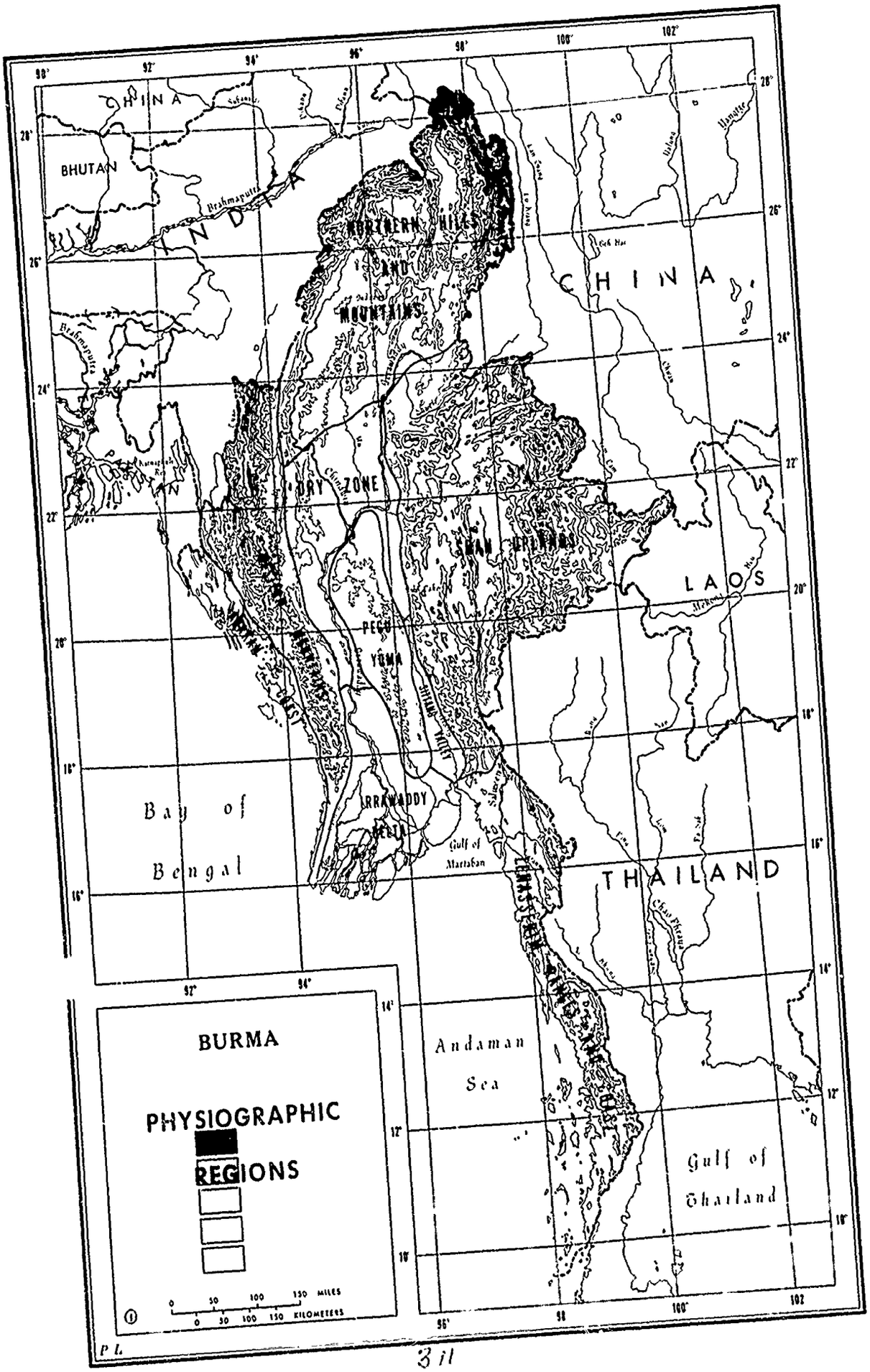
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LOCATION OF
BURMA
WITHIN EASTERN ASIA
SCALE IN MILES (AT APPROX. 20°N)
0
500
1000
120°
135°
150°
60°
45°
75°
90°
30°
15°
0°
105°
U. S. S. R.
Ulan Bator
MONGOLIA
JAPAN SEA
JAPAN
Tokyo
N. KOREA
Pyongyang
Seoul
S. KOREA
Peiping
YELLOW SEA
C H I N A
EAST CHINA SEA
NEPAL
Katmandu
BHUTAN
INDIA
E. PAK.
Taipei
TAIWAN
HONG KONG
BURMA
NORTH VIET-NAM
Hanoi
BAY OF BENGAL
Vientiane
LAOS
Rangoon
THAILAND
Quezon
Bangkok
CAMBODIA
Phnom Penh
SOUTH VIET-NAM
Saigon
ANDAMAN SEA
GULF OF THAILAND
SOUTH CHINA SEA
BRUNEI
MALAYSIA
CELEBES SEA
Kuala Lumpur
SINGAPORE
INDONESIA

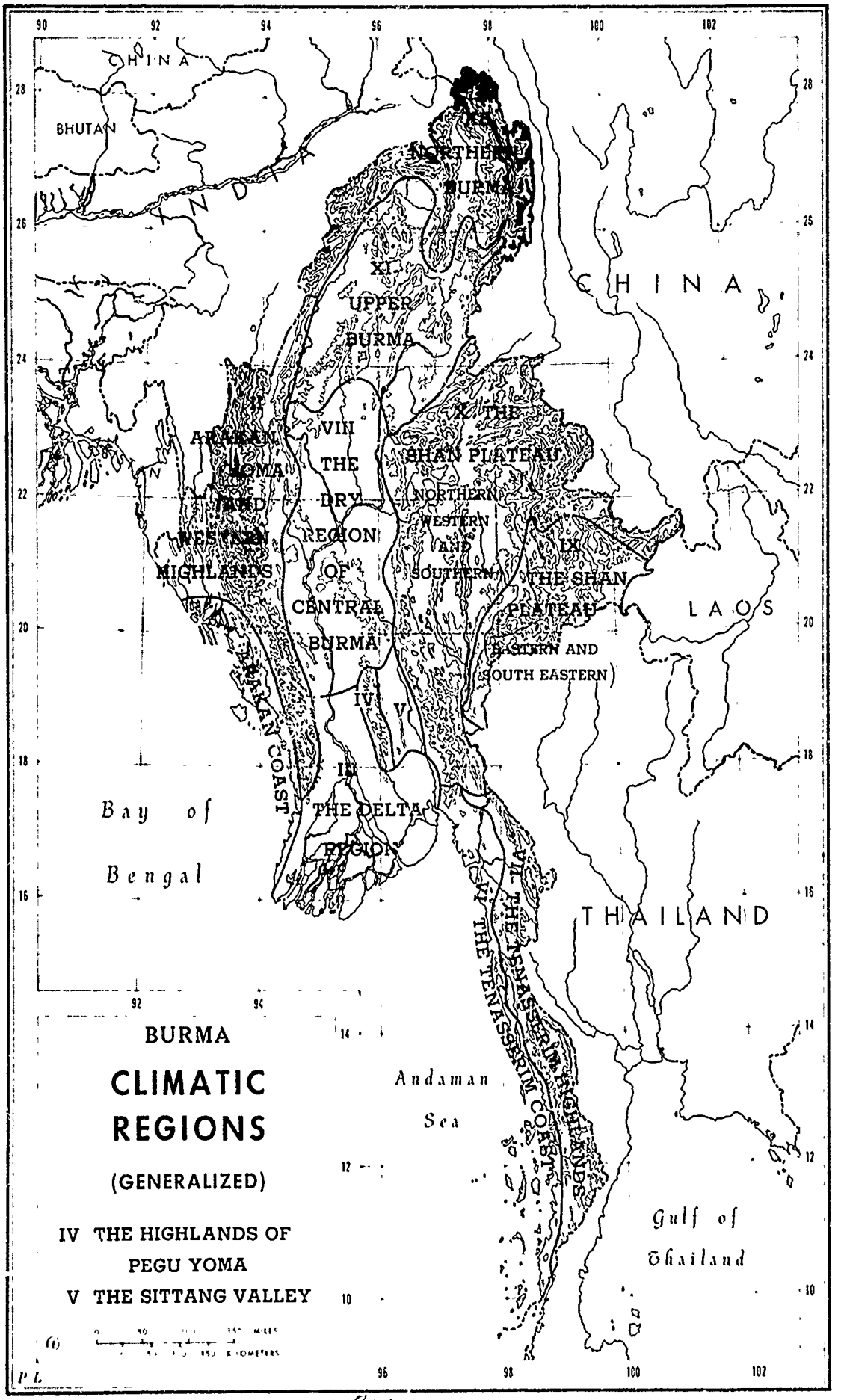

CHINA
BHUTAN
INDIA
KACHIN STATE
CHINA
CHIN SPECIAL DIVISION
NORTH SHAN STATES
EAST SHAN STATES
SHAN STATE
SOUTH SHAN STATES
LAOS
KAYAH STATE
Bay of Bengal
THAILAND
Andaman Sea
Gulf of Thailand
BURMA
ADMINISTRATIVE DIVISIONS AND DISTRICTS
DIVISION:
DISTRICT:
MAGWE

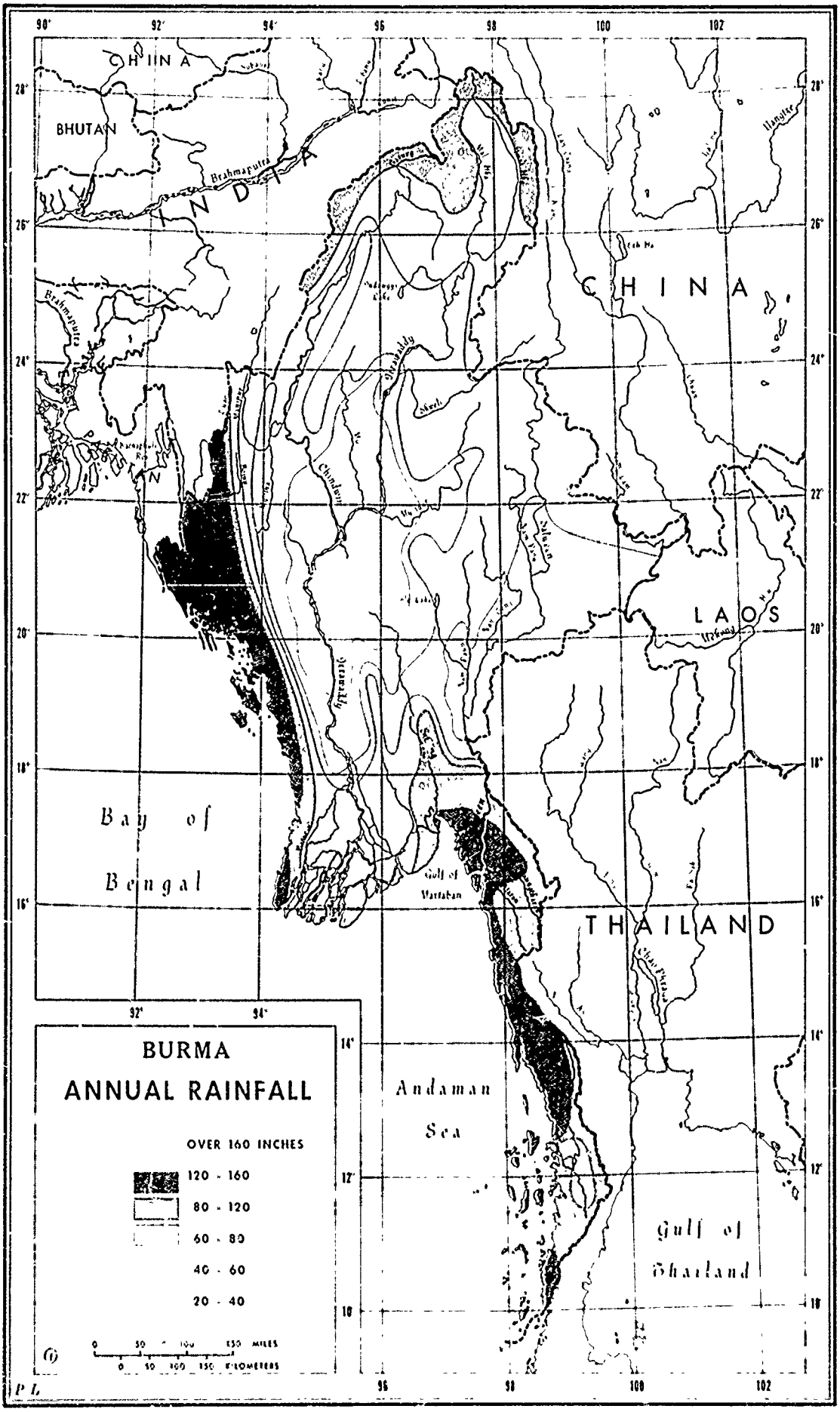
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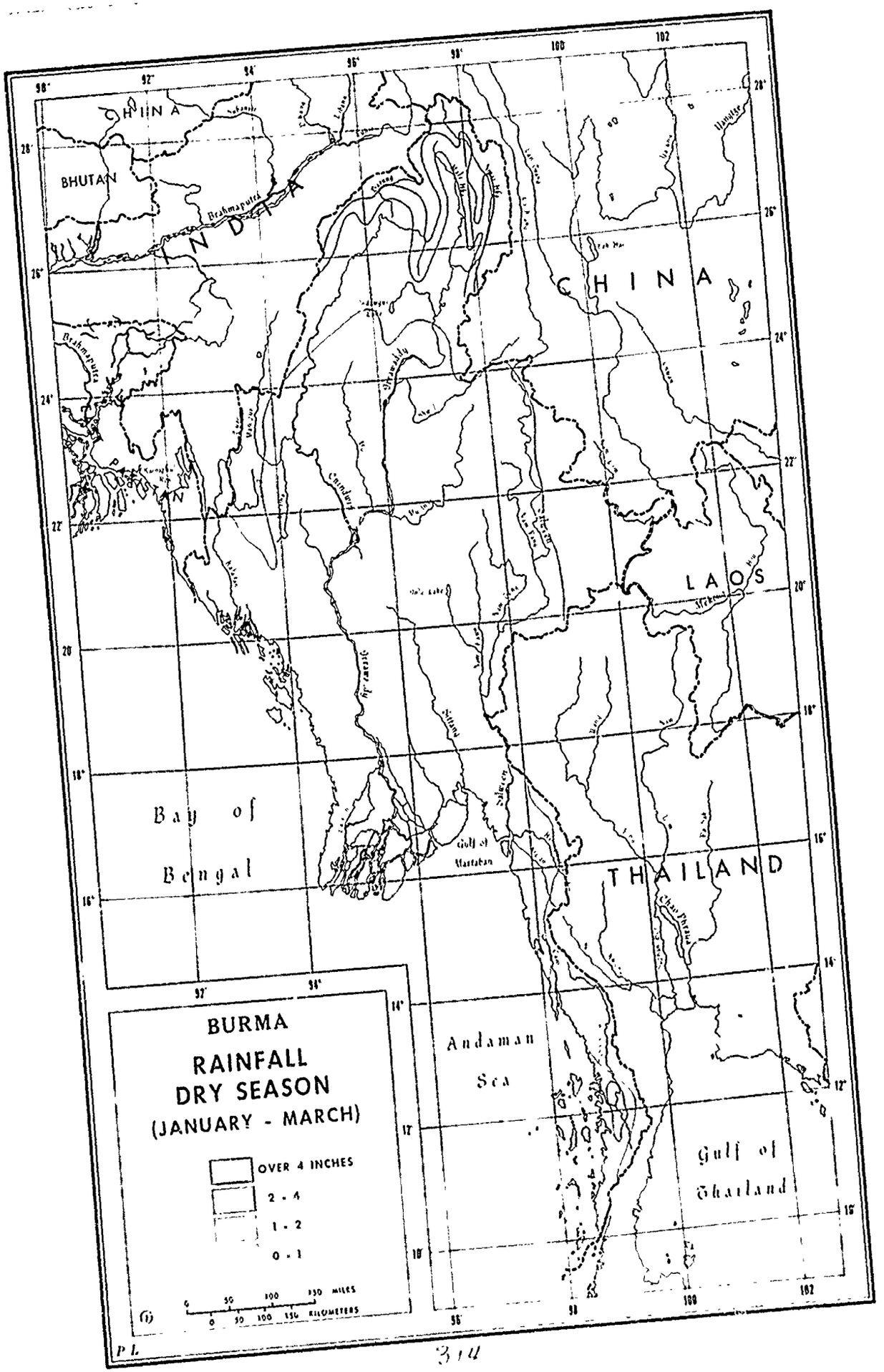

CHINA
BHUTAN
INDIA
CHINA
LAOS
THAILAND
Bay of Bengal
Andaman Sea
Gulf of Martaban
Gulf of Thailand
BURMA
HYPSOGRAPHY
AND HYDROGRAPHY
ELEVATIONS IN FEET
OVER 9000
5000 - 9000
3000 - 5000
1000 - 3000
0 - 1000
0 50 100 150 MILES
0 50 100 150 KILOMETERS
P.L.

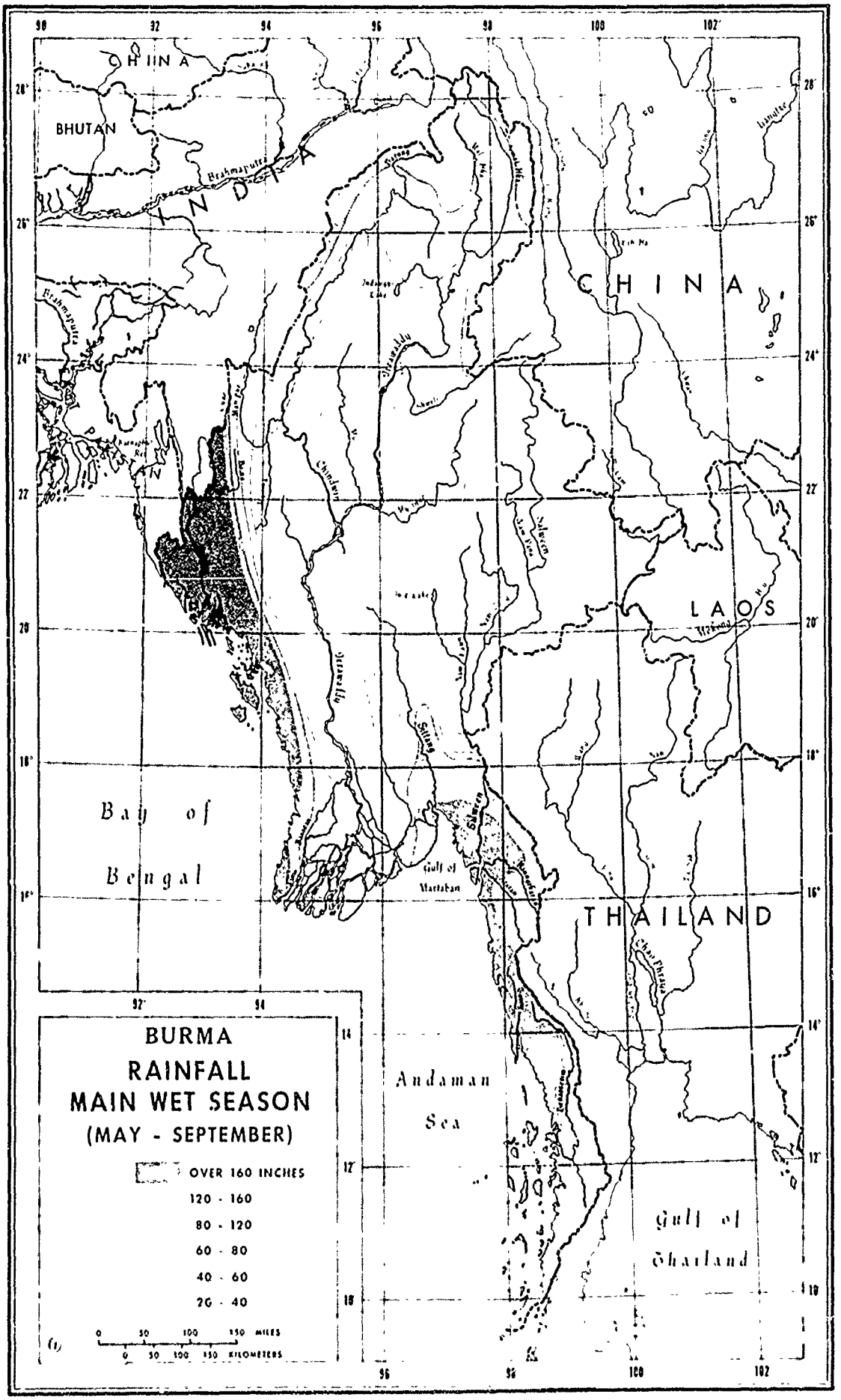

CHINA
BHUTAN
INDIA
NORTHERN HILLS AND MOUNTAINS
CHINA
DRY ZONE
SHAN HIGHLANDS
LAOS
PEGU YOMA
IRRAWADDY DELTA
Bay of Bengal
Gulf of Martaban
THAILAND
Andaman Sea
Gulf of Thailand
BURMA
PHYSIOGRAPHIC REGIONS
0 50 100 150 MILES
0 50 100 150 KILOMETERS

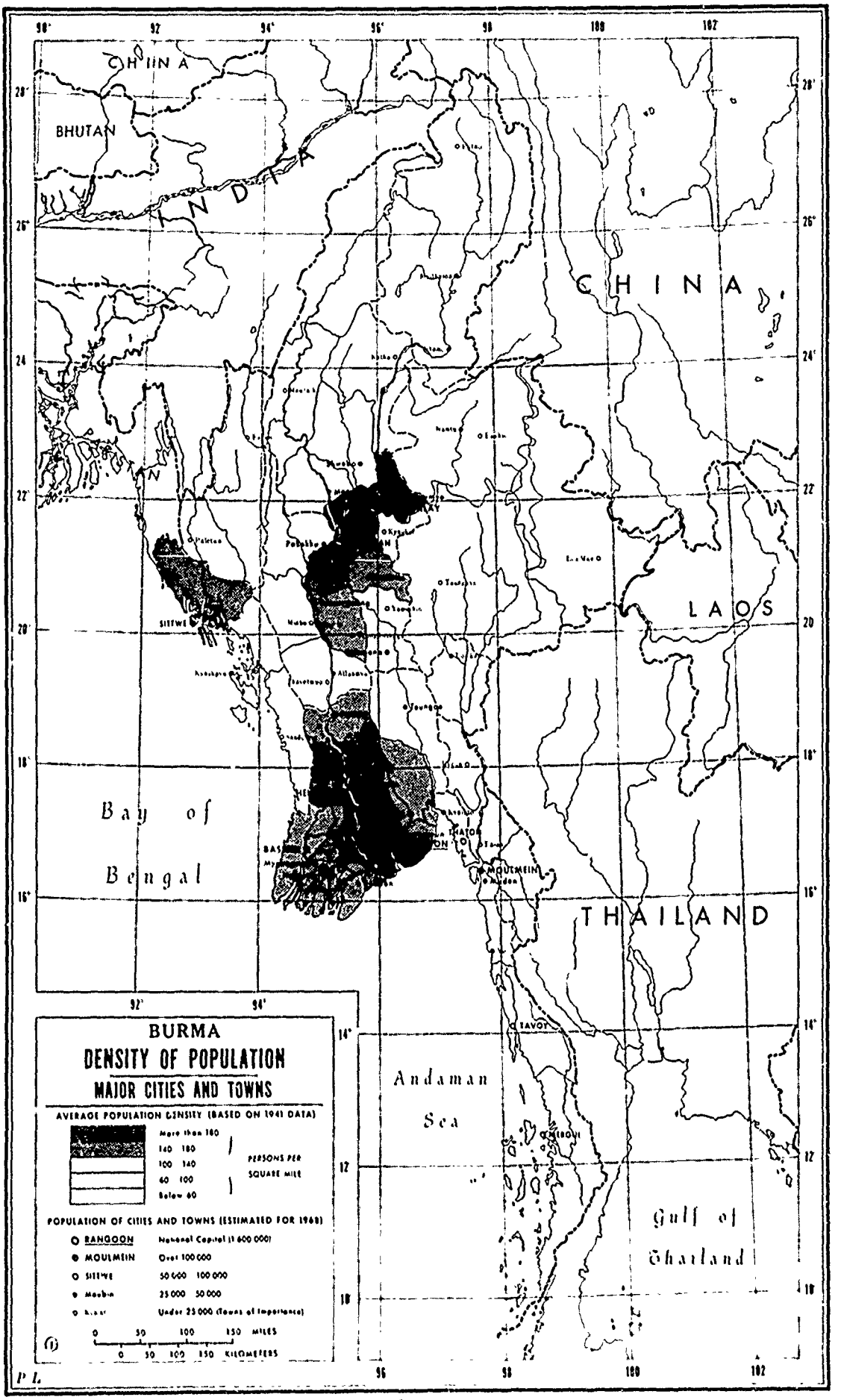
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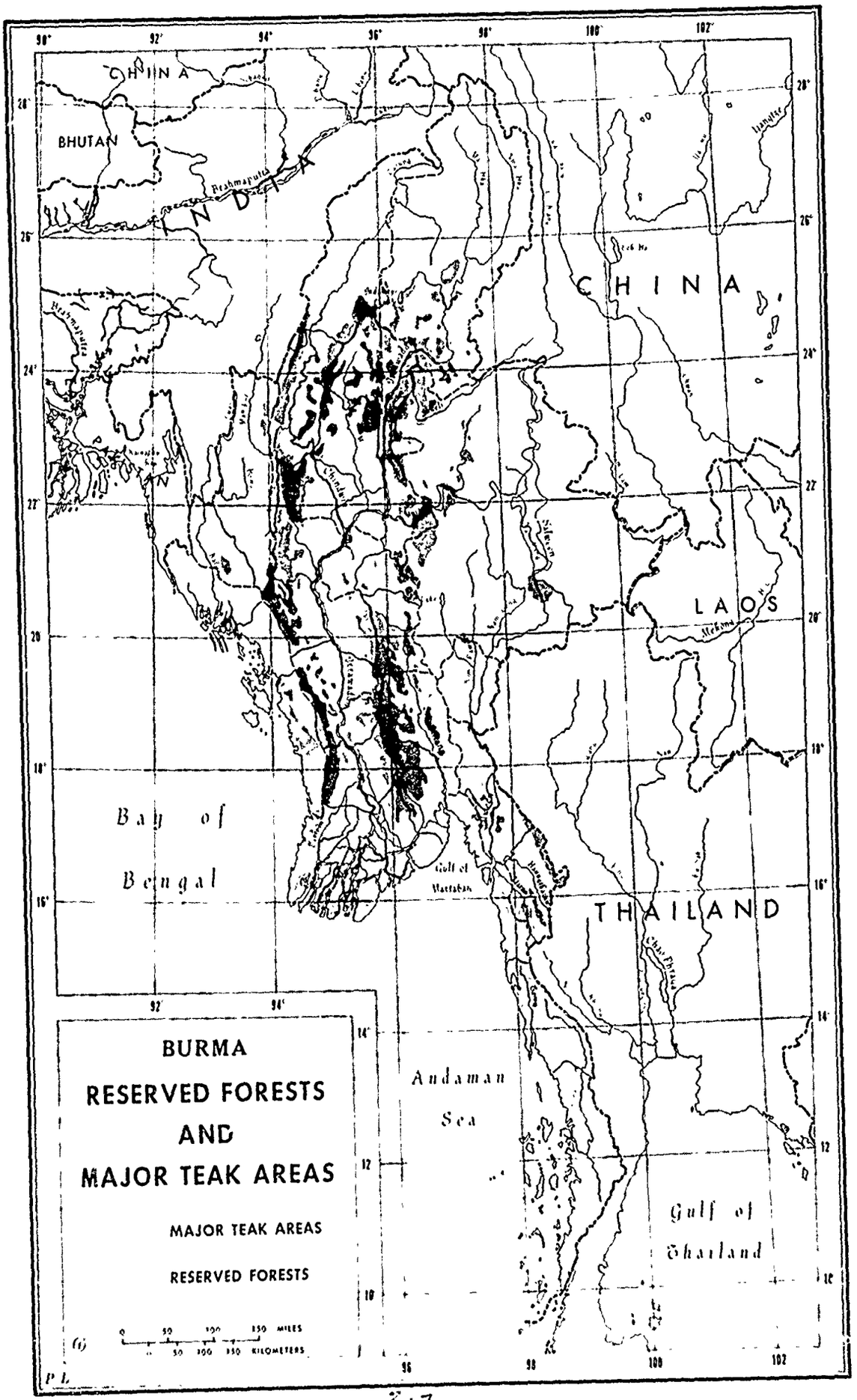

CHINA
BHUTAN
INDIA
NORTHERN BURMA
XI UPPER BURMA
CHINA
X THE SHAN PLATEAU
VIII THE DRY REGION OF CENTRAL BURMA
ARAKAN YOMA AND WESTERN HIGHLANDS
NORTHERN WESTERN AND SOUTHERN
IX THE SHAN PLATEAU (EASTERN AND SOUTH EASTERN)
LAOS
ARAKAN COAST
IV V
III THE DELTA REGION
Bay of Bengal
VI THE TENASSERIM COAST
VII THE TENASSERIM HIGHLANDS
THAILAND
Andaman Sea
Gulf of Thailand
BURMA
CLIMATIC REGIONS
(GENERALIZED)
IV THE HIGHLANDS OF PEGU YOMA
V THE SITTANG VALLEY
90
92
94
96
98
100
102
28
26
24
22
20
18
16
14
12
10

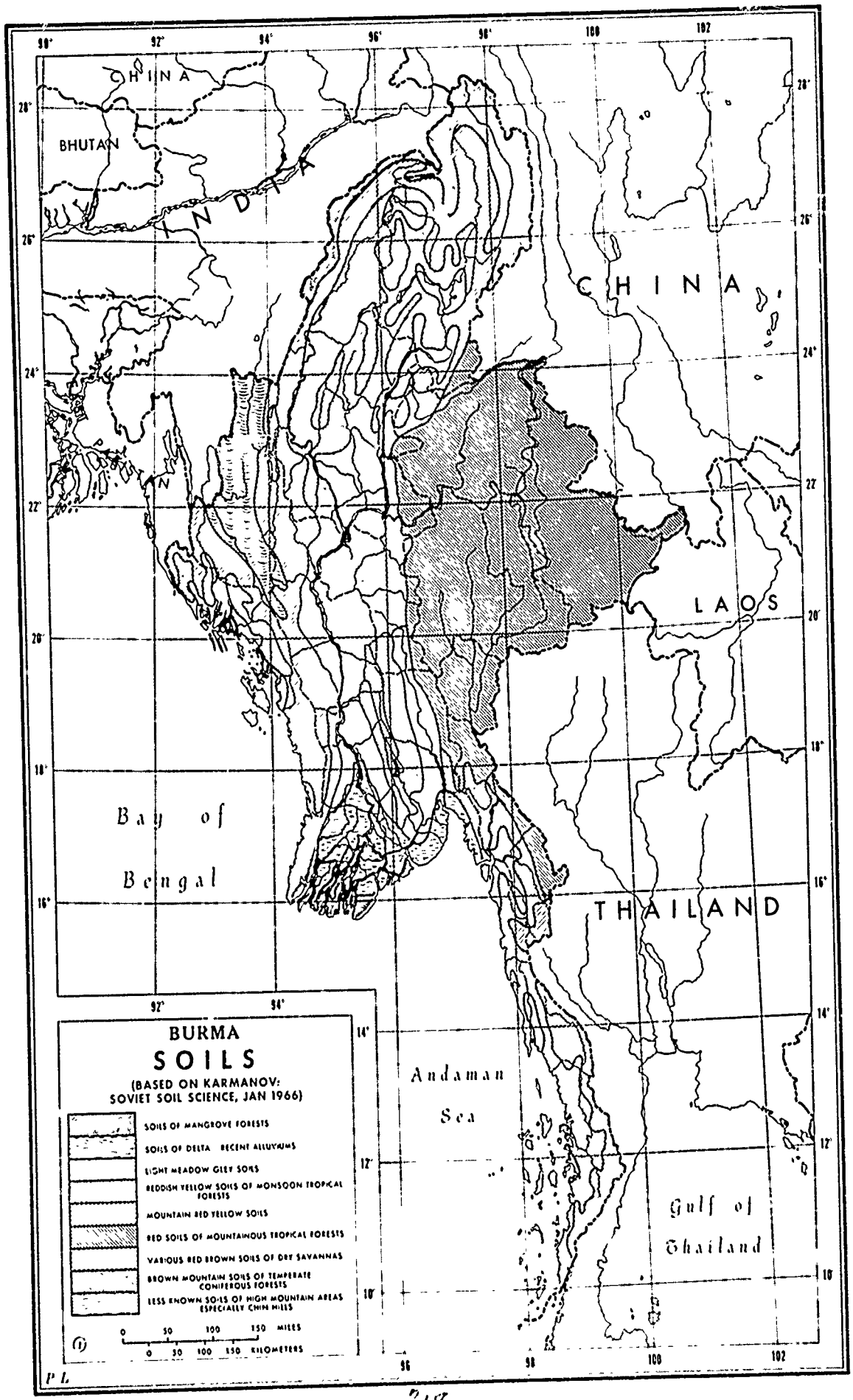

BURMA
ANNUAL RAINFALL
OVER 160 INCHES
120 - 160
80 - 120
60 - 80
40 - 60
20 - 40
0 50 100 150 MILES
0 50 100 150 KILOMETERS
CHINA
BHUTAN
INDIA
CHINA
LAOS
THAILAND
Bay of Bengal
Andaman Sea
Gulf of Martaban
Gulf of Thailand
Brahmaputra
Irrawaddy
Chindwin
Salween
Mekong
Red R.
90°
92°
94°
96
98
100
102
28°
26°
24°
22°
20°
18°
16°
14°
12°
10°


CHINA
BHUTAN
INDIA
CHINA
LAOS
THAILAND
Bay of Bengal
Andaman Sea
Gulf of Martaban
Gulf of Thailand
BURMA
RAINFALL
DRY SEASON
(JANUARY - MARCH)
OVER 4 INCHES
2 - 4
1 - 2
0 - 1
0 50 100 150 MILES
0 50 100 150 KILOMETERS

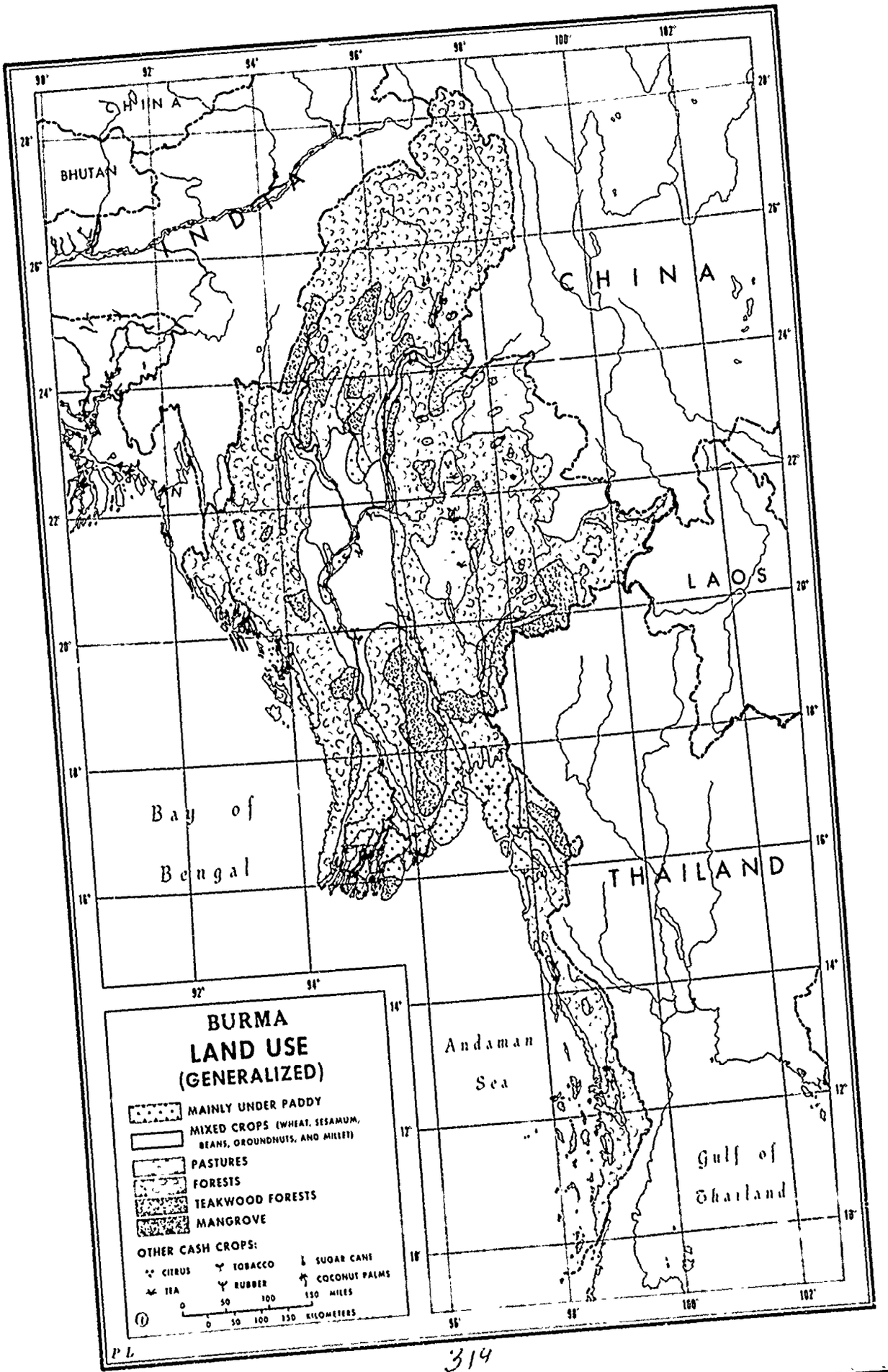

CHINA
BHUTAN
INDIA
Brahmaputra
CHINA
LAOS
THAILAND
Bay of Bengal
Gulf of Martaban
Andaman Sea
Gulf of Thailand
Irrawaddy
Chindwin
Salween
Sittang
BURMA
RAINFALL
MAIN WET SEASON
(MAY - SEPTEMBER)
OVER 160 INCHES
120 - 160
80 - 120
60 - 80
40 - 60
20 - 40
0 50 100 150 MILES
0 50 100 150 KILOMETERS

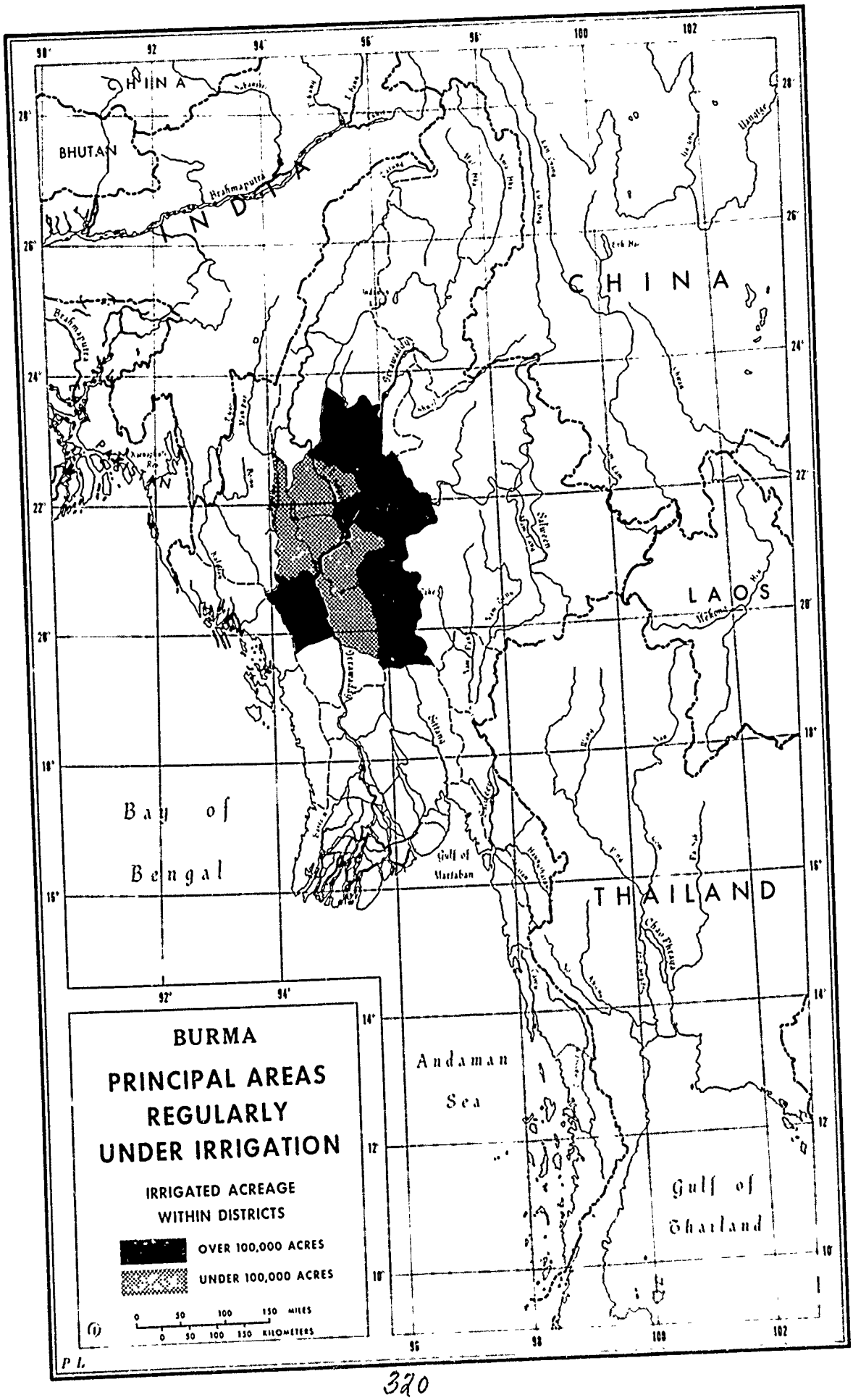

CHINA
BHUTAN
INDIA
CHINA
LAOS
THAILAND
Bay of Bengal
Andaman Sea
Gulf of Thailand
BURMA
DENSITY OF POPULATION
MAJOR CITIES AND TOWNS
AVERAGE POPULATION DENSITY (BASED ON 1941 DATA)
More than 180
140 180
100 140
60 100
Below 60
PERSONS PER SQUARE MILE
POPULATION OF CITIES AND TOWNS (ESTIMATED FOR 1960)
RANGOON National Capital (1 600 000)
MOULMEIN Over 100 000
SITTWE 50 000 100 000
25 000 50 000
Under 25 000 (Towns of Importance)
0 50 100 150 MILES
0 50 100 150 KILOMETERS
6
PL.


CHINA
BHUTAN
INDIA
Brahmaputra
CHINA
LAOS
Bay of Bengal
THAILAND
Andaman Sea
Gulf of Thailand
BURMA
RESERVED FORESTS
AND
MAJOR TEAK AREAS
MAJOR TEAK AREAS
RESERVED FORESTS
0 50 100 150 MILES
0 50 100 150 KILOMETERS

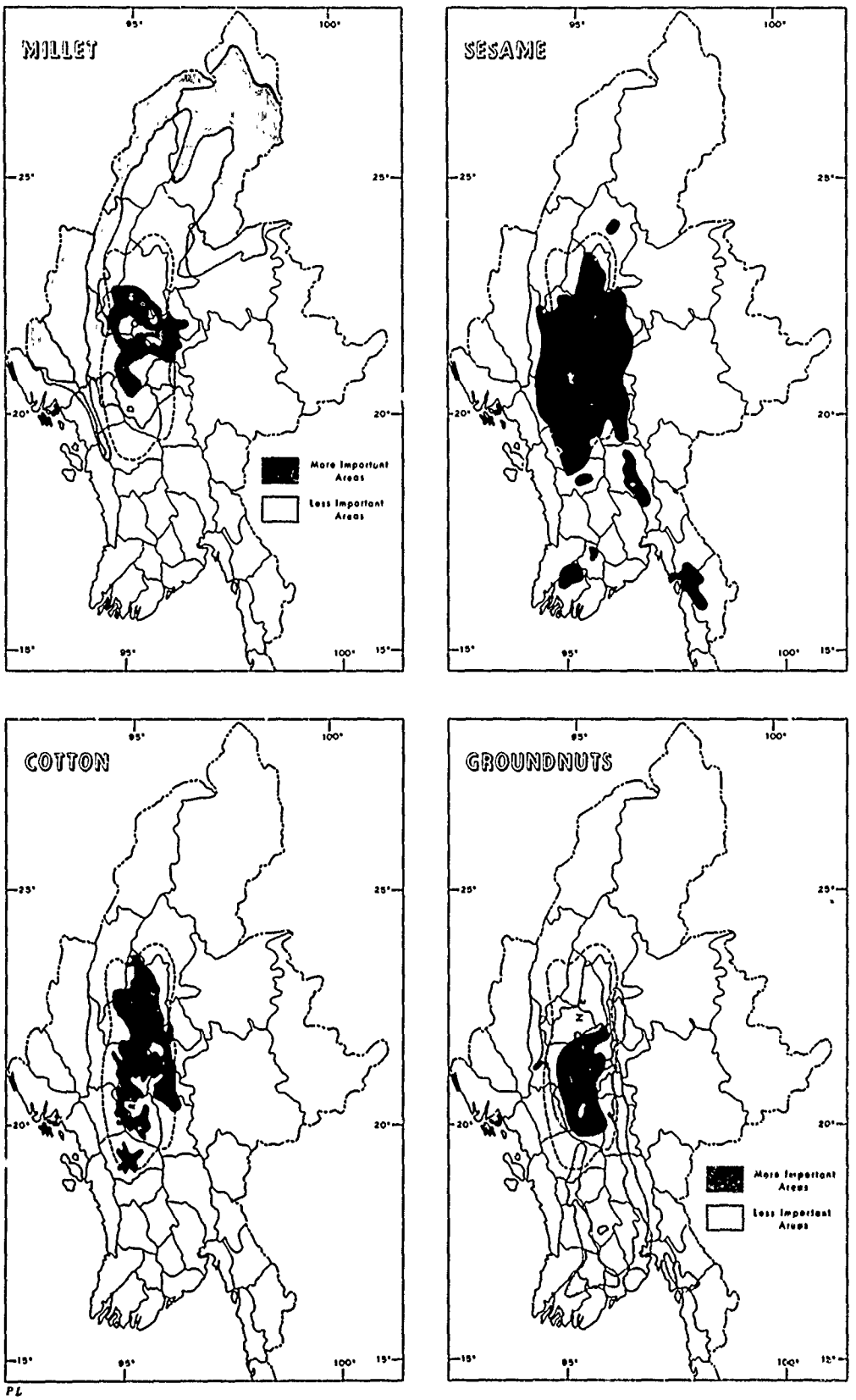

CHINA
BHUTAN
INDIA
CHINA
LAOS
THAILAND
Bay of Bengal
Andaman Sea
Gulf of Thailand
BURMA
SOILS
(BASED ON KARMANOV:
SOVIET SOIL SCIENCE, JAN 1966)
SOILS OF MANGROVE FORESTS
SOILS OF DELTA RECENT ALLUVIUMS
LIGHT MEADOW GLEY SOILS
REDDISH YELLOW SOILS OF MONSOON TROPICAL FORESTS
MOUNTAIN RED YELLOW SOILS
RED SOILS OF MOUNTAINOUS TROPICAL FORESTS
VARIOUS RED BROWN SOILS OF DRY SAVANNAS
BROWN MOUNTAIN SOILS OF TEMPERATE CONIFEROUS FORESTS
LESS KNOWN SOILS OF HIGH MOUNTAIN AREAS ESPECIALLY CHIN HILLS
0 50 100 150 MILES
0 50 100 150 KILOMETERS
92° 94° 96° 98° 100° 102°
28° 26° 24° 22° 20° 18° 16° 14° 12° 10°

PL

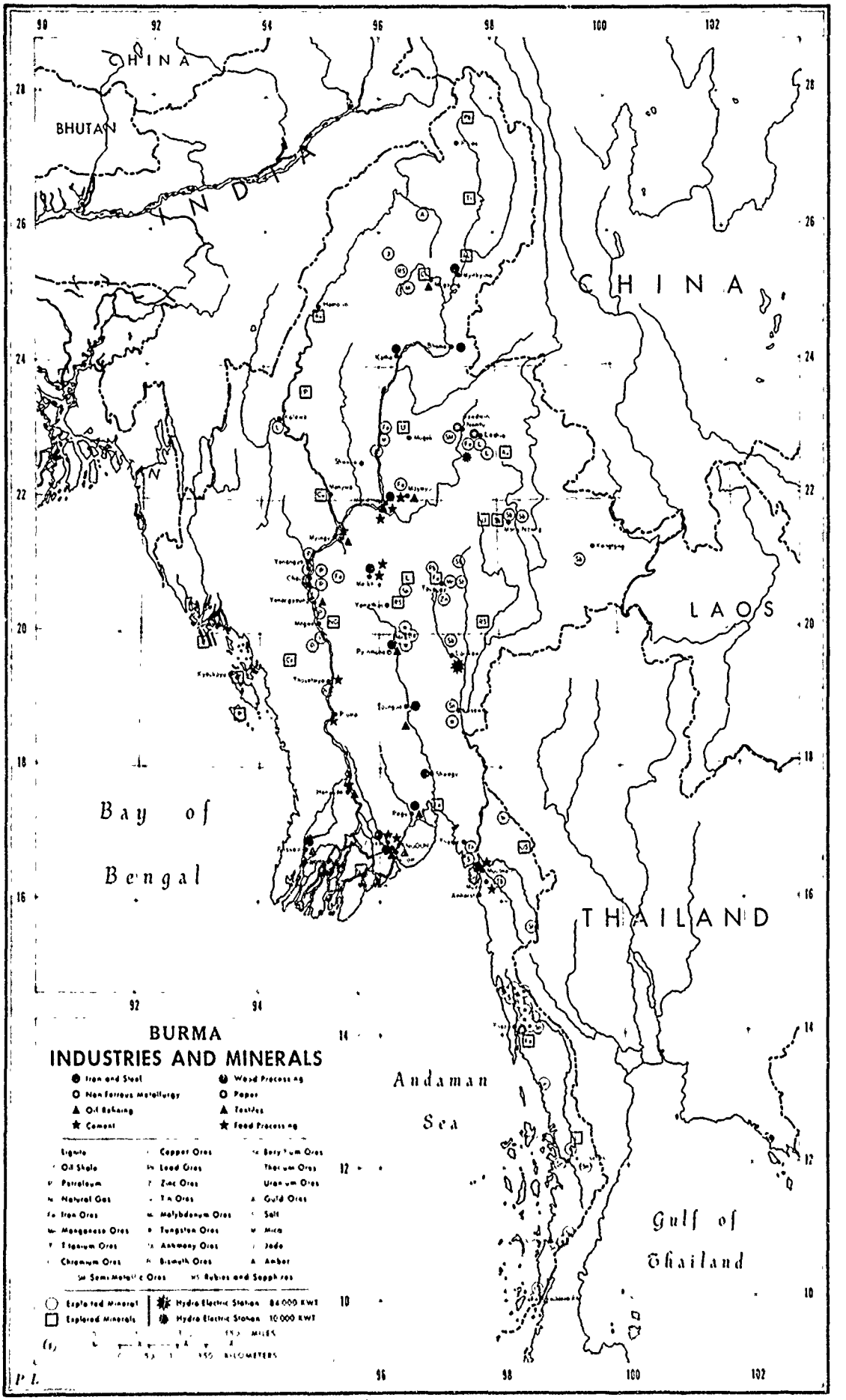

CHINA
BHUTAN
INDIA
CHINA
LAOS
Bay of Bengal
THAILAND
Andaman Sea
Gulf of Thailand
BURMA
LAND USE
(GENERALIZED)
MAINLY UNDER PADDY
MIXED CROPS (WHEAT, SESAMUM, BEANS, GROUNDNUTS, AND MILLET)
PASTURES
FORESTS
TEAKWOOD FORESTS
MANGROVE
OTHER CASH CROPS:
CITRUS
TOBACCO
SUGAR CANE
TEA
RUBBER
COCONUT PALMS
0 50 100 150 MILES
0 50 100 150 KILOMETERS

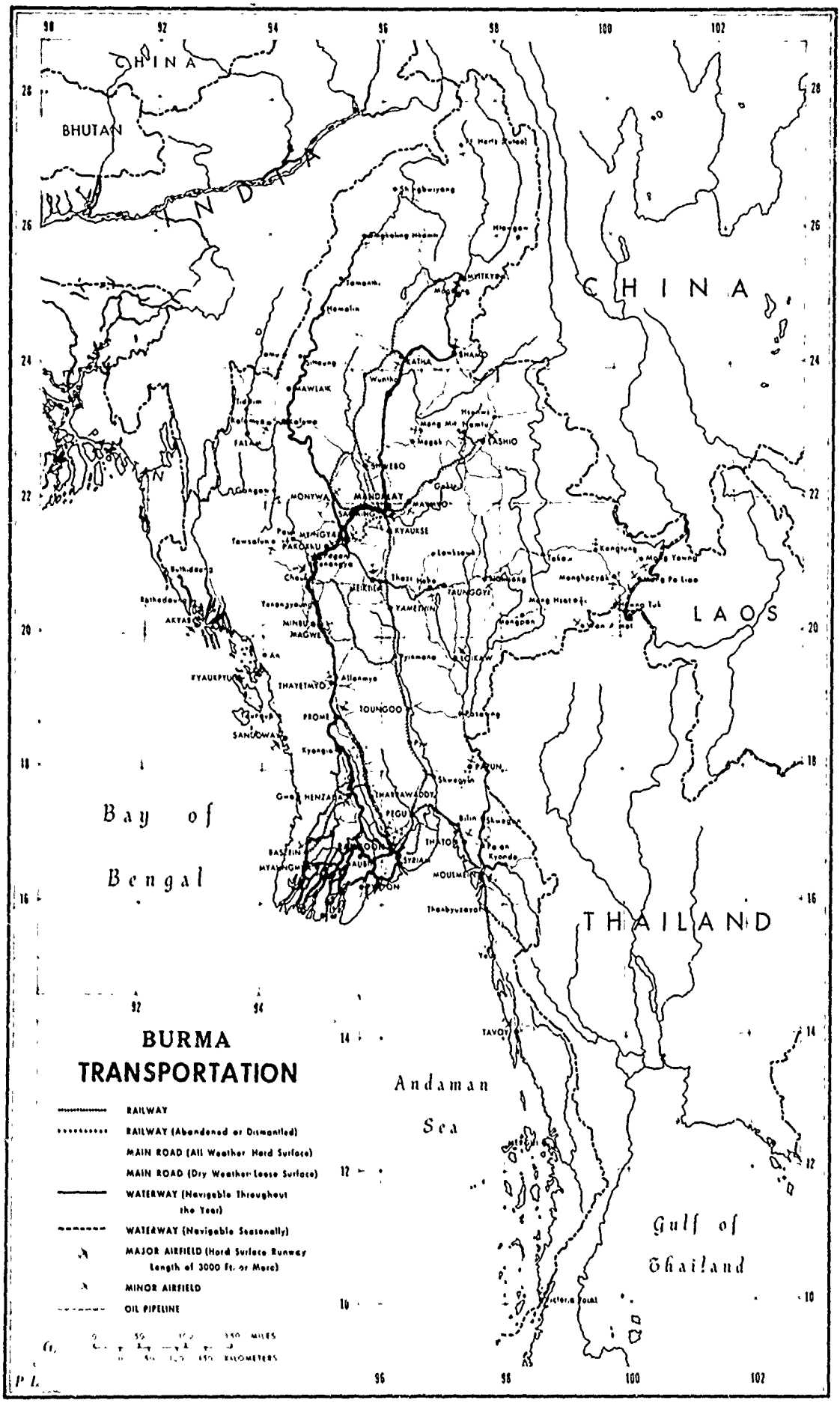

CHINA
BHUTAN
INDIA
Brahmaputra
CHINA
Bay of Bengal
Gulf of Martaban
LAOS
THAILAND
Andaman Sea
Gulf of Thailand
BURMA
PRINCIPAL AREAS REGULARLY UNDER IRRIGATION
IRRIGATED ACREAGE WITHIN DISTRICTS
OVER 100,000 ACRES
UNDER 100,000 ACRES
0 50 100 150 MILES
0 50 100 150 KILOMETERS

PRINCIPAL CROPS OF THE DRY ZONE OF BURMA



PL


CHINA
BHUTAN
INDIA
CHINA
LAOS
THAILAND
Bay of Bengal
Andaman Sea
Gulf of Thailand
BURMA
INDUSTRIES AND MINERALS
Iron and Steel
Non Ferrous Metallurgy
Oil Refining
Cement
Wood Processing
Paper
Textiles
Food Processing
Lignite
Oil Shale
Petroleum
Natural Gas
Iron Ores
Manganese Ores
Titanium Ores
Chromium Ores
Copper Ores
Lead Ores
Zinc Ores
Tin Ores
Molybdenum Ores
Tungsten Ores
Antimony Ores
Bismuth Ores
Beryllium Ores
Thorium Ores
Uranium Ores
Gold Ores
Salt
Mica
Jade
Amber
Semi-Metallic Ores
Rubies and Sapphires
Exploited Mineral
Explored Minerals
Hydro Electric Station 84,000 KWT
Hydro Electric Station 10,000 KWT
MILES
KILOMETERS


CHINA
BHUTAN
INDIA
CHINA
LAOS
THAILAND
Bay of Bengal
Andaman Sea
Gulf of Thailand
BURMA
TRANSPORTATION
RAILWAY
RAILWAY (Abandoned or Dismantled)
MAIN ROAD (All Weather Hard Surface)
MAIN ROAD (Dry Weather Loose Surface)
WATERWAY (Navigable Throughout the Year)
WATERWAY (Navigable Seasonally)
MAJOR AIRFIELD (Hard Surface Runway Length of 3000 Ft. or More)
MINOR AIRFIELD
OIL PIPELINE
MILES
KILOMETERS
MANDALAY
PEGU
TAUNGGYI
TOUNGOO
PROME
MYITKYINA
LASHIO
KYAUKPYU
AKYAB
TAVOY
MOULMEIN