CONFIDENTIAL
99/GS/MG

Philippines

December 1973

Military Geography

NATIONAL INTELLIGENCE SURVEY

CONFIDENTIAL

28

NATIONAL INTELLIGENCE SURVEY PUBLICATIONS

The basic unit of the NIS is the *General Survey*, which is now published in a bound-by-chapter format so that topics of greater perishability can be updated on an individual basis. These chapters—Country Profile, The Society, Government and Politics, The Economy, Military Geography, Transportation and Telecommunications, Armed Forces, Science, and Intelligence and Security, provide the primary NIS coverage. Some chapters, particularly Science and Intelligence and Security, that are not pertinent to all countries, are produced selectively. For small countries requiring only minimal NIS treatment, the *General Survey* coverage may be bound into one volume.

Supplementing the *General Survey* is the NIS *Basic Intelligence Factbook*, a ready reference publication that semiannually updates key statistical data found in the Survey. An unclassified edition of the factbook omits some details on the economy, the defense forces, and the intelligence and security organizations.

Although detailed sections on many topics were part of the NIS Program, production of these sections has been phased out. Those previously produced will continue to be available as long as the major portion of the study is considered valid.

A quarterly listing of all active NIS units is published in the *Inventory of Available NIS Publications*, which is also bound into the concurrent classified Factbook. The Inventory lists all NIS units by area name and number and includes classification and date of issue; it thus facilitates the ordering of NIS units as well as their filing, cataloging, and utilization.

Initial dissemination, additional copies of NIS units, or separate chapters of the *General Surveys* can be obtained directly or through liaison channels from the Central Intelligence Agency.

The *General Survey* is prepared for the NIS by the Central Intelligence Agency and the Defense Intelligence Agency under the general direction of the NIS Committee. It is coordinated, edited, published, and disseminated by the Central Intelligence Agency.

APPROVED FOR RELEASE: 2009/06/16: CIA-RDP01-00707R000200090004-2

WARNING

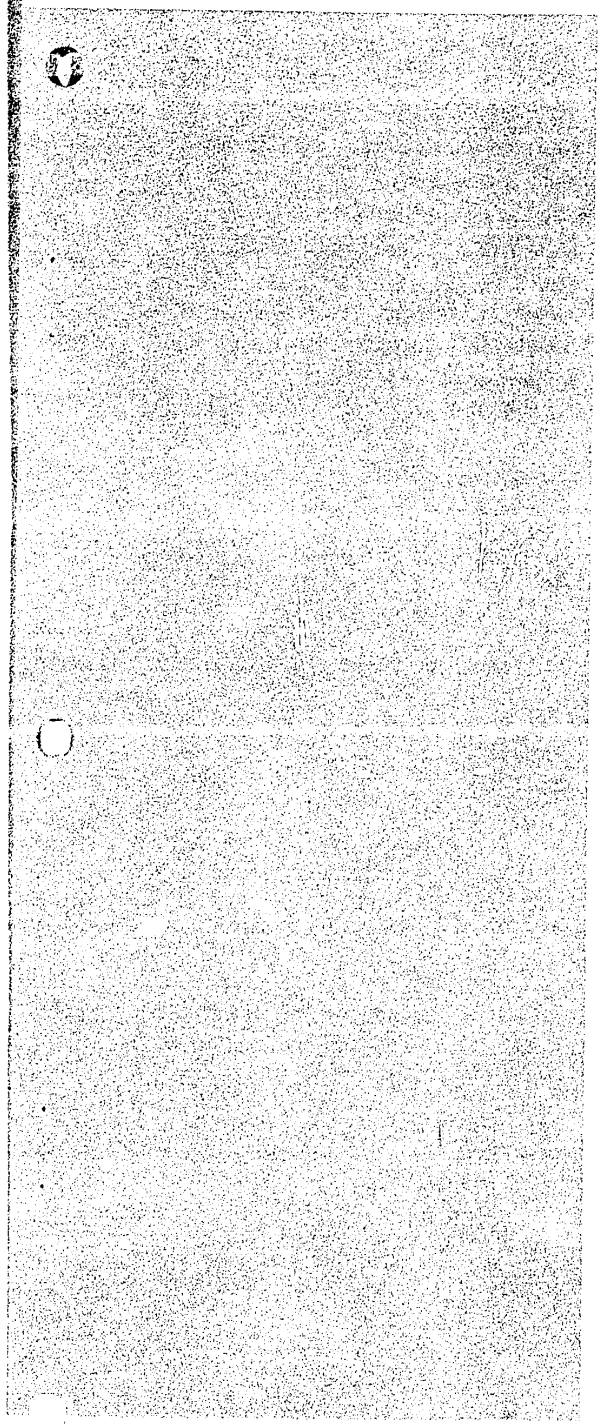
The NIS is National Intelligence and may not be released or shown to representatives of any foreign government or international body except by specific authorization of the Director of Central Intelligence in accordance with the provisions of National Security Council Intelligence Directive No. 1.

For NIS containing unclassified material, however, the portions so marked may be made available for official purposes to foreign nationals and nongovernment personnel provided no attribution is made to National Intelligence or the National Intelligence Survey.

Subsections and graphics are individually classified according to content. Classification/control designations are:

(U/OU) . . Unclassified/For Official Use Only
(C) . . . . . Confidential
(S) . . . . . Secret

This chapter was prepared for the NIS by the Defense Intelligence Agency. Research was substantially completed by June 1973.

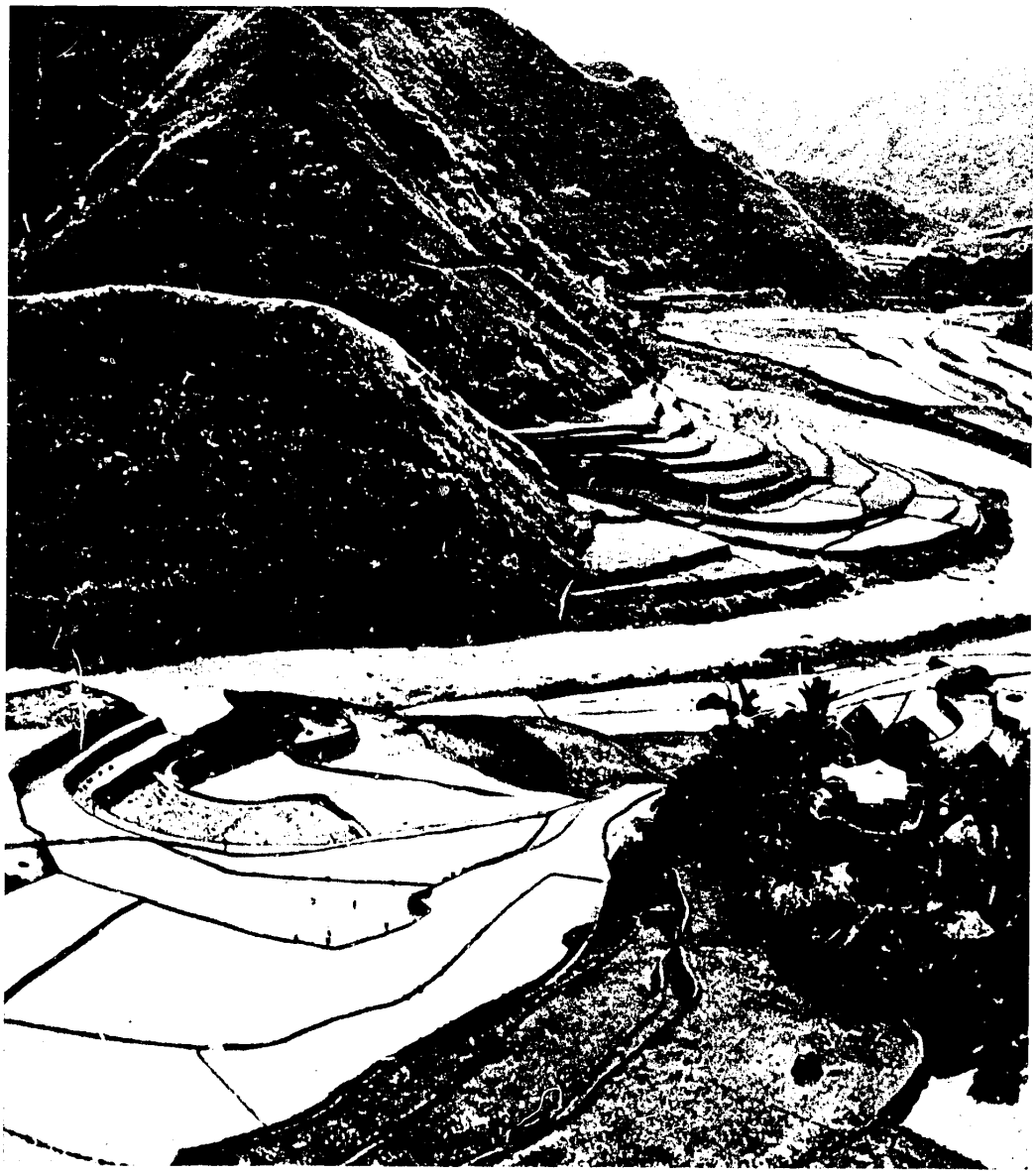


Philippines

CONTENTS

This chapter supersedes the geographic coverage in the General Survey dated October 1968.

FIGURES



APPROVED FOR RELEASE: 2009/06/16: CIA-RDP01-00707R000200090004-2

Military Geography

A. Location and description (U/OU)

The Philippines, an archipelago of approximately 7,100 islands, is located in the western Pacific near important maritime routes in the South China Sea. From Manila, the distance is about 600 nautical miles to the mainland of the People's Republic of China, 1,300 nautical miles to Singapore, and less than 2,000 nautical miles to all other capitals of Southeast Asia.

The islands have a total land area of about 116,000 square miles, and extend generally north-south for approximately 1,000 miles.[1] The main island belt is generally less than 250 miles wide. Luzon and Mindanao, the two largest islands, total nearly 75% of the land area; Palawan, Mindoro, and the largest islands in the Visayan Islands group (Masbate, Samar, Leyte, Bohol, Cebu, Negros, and Panay) comprise nearly all of the remainder. The estimated population was about 40.2 million in July 1973.

1. Topography

The country, besides being fragmented into numerous islands, is a complex of mountains, hills, and plains (see the Military Geographic Factors map, Figure 15, at the end of the chapter). For the most part, the larger islands are comprised of rugged, sparsely-inhabited mountains and hills, flat to rolling, and densely populated plains. The mountains and hills—the dominant landforms—are oriented generally north-south (Figure 1); they consist of ridges and spurs that divide the islands into isolated sections and of volcanoes (Figure 2) that are also isolated clusters. Sharp crests or peaks and steep, moderately to severely dissected slopes are common. Differences in elevation between crests and adjacent valley bottoms range from 500 feet in hills to more than 3,000 feet in mountains. Mountain summits are from 2,000 to more than 9,600 feet above sea level, and hilltops generally range from 600 to 2,000 feet in elevation. Vegetation in the highlands consists chiefly of dense broadleaf evergreen forest and brush, grasses, and open stands of pines. Small cultivated fields, mostly rice, corn, and sugarcane, dot scattered valley and hill slopes, many of which are terraced and irrigated (Figure 3). Most of the streams are shallow and swift in the hills and mountains. These streams flow in narrow gorges and V-shaped valleys for much of their length before emptying into the sea, and most are less than 50 feet wide and under 3.5 feet deep. Stream behavior is erratic; flash floods of short duration may occur after heavy rains in any month. Most of the rugged hill and mountain areas are sparsely settled. Villages are widely spaced and connected mainly by trails. The few roads are poorly maintained, and most have many sharp curves, steep grades, low-capacity wooden bridges, fords, and ferries.

The flat to rolling plains range in size from small, intermontane, valley floors and coastal flats to extensive, largely uninterrupted areas, such as that in central Luzon (Figure 4) and on Mindanao. On the flat plains, interstream sectors are less than 100 feet above adjacent stream bottoms; these are the prime agricultural areas of the Philippines. Interfluves on the rolling plains generally are between 100 and 500 feet above the streams. Cultivated vegetation, mainly wetland rice, and scattered grassy areas, interspersed with small areas of dense bamboo and bananas, are

[1] Distances are in statute miles unless nautical miles are specifically stated.

FIGURE 1. Hills and mountains in northern Luzon. These heavily forested highlands are thinly populated, but the lower hill slopes and valley floors are intensively cultivated. (U/OU)

FIGURE 2. The Mayon Volcano in southeastern Luzon. This nearly perfect cone rises 8,000 feet above sea level. (U/OU)

the predominant vegetation types on the plains (Figure 5). Most streams are bordered by narrow bands of dense forest. On the larger islands, especially Luzon and Mindanao, there are also large plantations of sugarcane, tobacco, coconuts (Figure 6), abaca, maguey, and pineapples. Although marshlands comprise only a small part of the plains, there are relatively large wet areas, especially on Mindanao, and along a few of the larger rivers. Narrow bands of mangrove fringe many of the coasts. Streams on the plains are numerous. They generally are 250 to 500 feet wide, more than 3.5 feet deep, and meander between low banks or natural levees of sand or silt; bottoms are chiefly sand and gravel. At times extensive areas along the larger rivers are flooded to depths of several feet. Although high- and low-water levels are irregular, most streams have their maximum flow between early May and late October. In most of the plains, the ground, mainly lateritic clay, is frequently miry from early May through November. During the remainder of the year it is predominantly firm. The ground is soft in marshy areas and for much of the time in rice paddies. The ricefields are inundated for 3 to 5 months of the year, between mid-May and mid-December. The rural areas contain numerous closely-spaced villages (Figure 7) and towns, particularly along the coasts and in the interior river valleys. The settlements, consisting chiefly of clusters of thatch-roofed wood or bamboo huts (Figure 8), are mostly fringed by ricefields containing numerous low dikes, levees, drainage ditches, and canals.

The larger urban centers, located along the coasts, are characterized by modern sections which have broad, paved streets and multistory masonry buildings. They are commonly surrounded by densely populated areas of closely spaced bamboo huts and wood and scrap-metal shacks. Streets in the slum areas are generally narrow, winding, and unpaved. A sparse network of narrow gravel, crushed-stone, and earth roads, mostly in poor condition, connects most of the settlements. In general, only on the relatively broad plain of central Luzon are the settlements linked by a dense network of roads, some of which have concrete, bituminous, or bituminous-treated surfaces. In places, the pavements are potholed and broken. The roads generally have slight grades and gentle curves and numerous low-capacity bridges (mostly wooden), fords, and ferries. The few railroads are 3'6" gage and in poor condition; except for an 8.5-mile double-track sector at Manila, they are single track. All are located on Luzon except for a line connecting Iloilo and Roxas, on Panay.

FIGURE 3. Picturesque terraced ricefields in northern Luzon highlands (U/OU)

FIGURE 4. Flat, cultivated plain near Nasugbu, Luzon (U/OU)

FIGURE 5. Wetland ricefields on Leyte (U/OU)

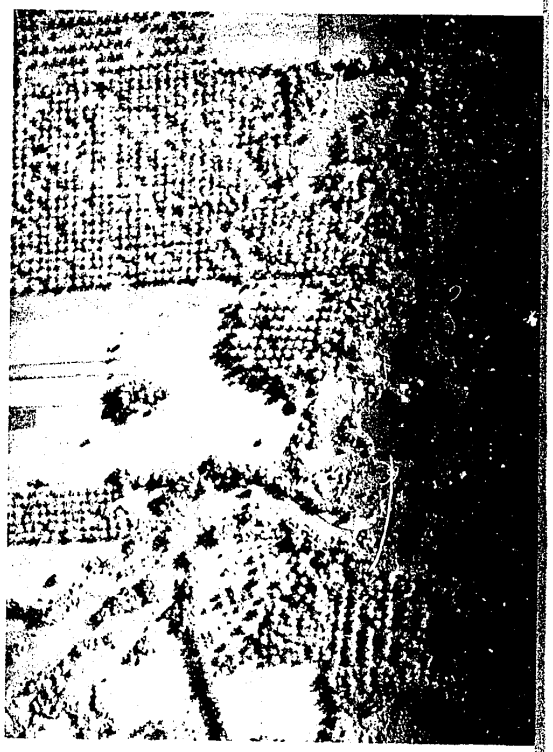


FIGURE 6. Aerial view of coconut groves in Cotabato Valley, Mindanao (U/OU)

FIGURE 7. Typical Philippine rural village (U/OU)

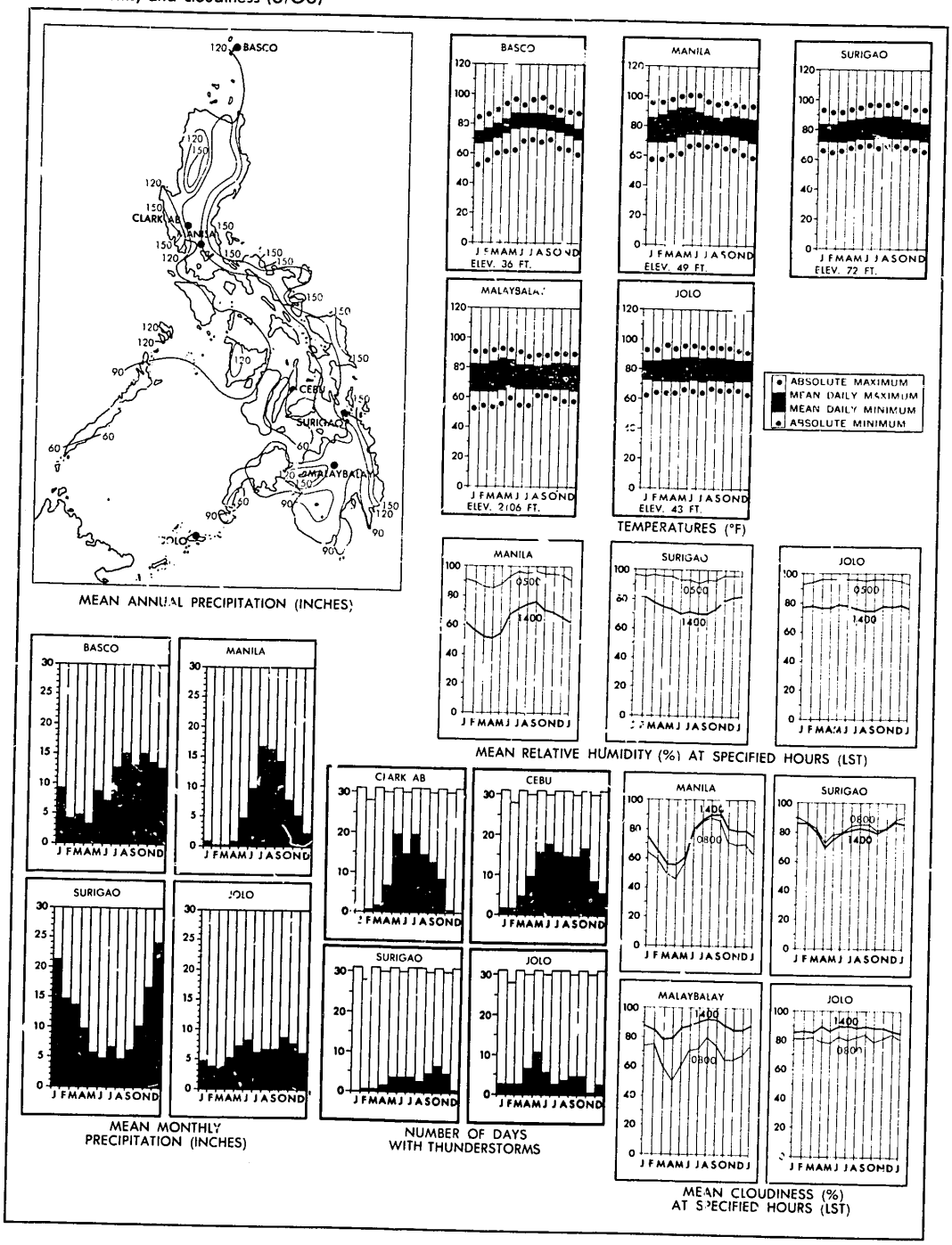
FIGURE 8. Village hut constructed with wood and nipa palm thatch (U/OU)

2. Climate

The country has a tropical maritime climate, characterized by distinct wet and dry seasons at most places, but also by remarkable uniformity in other aspects (Figure 9). The seasonal character of the weather, as shown by the rainfall distribution, is largely determined by the degree of exposure to persistent airstreams which invade the country at different times of the year. The northeast monsoon and the northeast trade winds together dominate the circulation in December through April, whereas the southwest monsoon dominates in July through September. As a result, the eastern Philippines receive their maximum rainfall shortly before and during the seasons of northeast flow, but the western Philippines have their maximum rainfall during the southwest monsoon. Highest mean monthly amounts during these rainy seasons are generally between 10 and 30 inches. Except in the east, minimum rainfall at most places occurs during February through April, when monthly amounts are generally less than 6 inches. Annual rainfall is abundant everywhere, averaging mainly between 60 and 120 inches, although many exposed sections average over 160 inches. The rainfall is normally in the form of showers and the heaviest showers are usually associated with thunderstorms, which reach their peak of activity 5 to 15 days per month during May through October. Occasional torrential rains are caused by the tropical cyclones that frequent these islands, mainly in July through December; destructive floods often follow.

The location of the Philippines in tropical latitudes and the surrounding warm oceanic waters produce rather consistent climatic elements. Mean daily maximum temperatures are generally between 65°F. and 75°F. throughout the year. Temperatures are somewhat lower in the mountains. Similarly, relative humidity ranges from 85% to 95% in the morning to about 60% to 80% in the afternoon during all months. The combination of high temperatures and high humidity is enervating, especially to those unaccustomed to such conditions. Cloudiness is fairly extensive in all months, averaging mostly between 50% and 90%, and cumulus clouds are the most abundant type. March through May is usually the least cloudy period, especially near the west coast of Luzon. Visibilities are generally adequate for most activities; the greatest restrictions occur during periods

FIGURE 9. Temperature, humidity, precipitation, thunderstorms, and cloudiness (U/OU)



of heavy rainshowers and when clouds enshroud the higher mountains. Surface winds are usually light except during thunderstorms or tropical cyclones. Some typhoon winds have buffeted the islands with speeds in excess of 100 knots.

B. Military geographic regions (C)

The Philippines is divided into two military geographic regions—the Central Luzon Plain and the Rugged Islands Complex (Figure 15). The combination of environmental conditions within each region would have a relatively uniform effect on military operations, but there would be marked differences between regions.

1. Central Luzon Plain

The region is generally well suited for ground operations except for a period of 3 to 5 months between mid-May and mid-December when ricefields are flooded and streams are highest. Movement would be fairly easy on the main roads, but sustained heavy traffic would cause rapid deterioration. During and after rains, movement would be slowed in places by miry and slippery surfaces, washouts, and flooding. In addition, the many narrow wooden bridges, ferries, and fords are potential bottlenecks. Conditions for offroad dispersal are generally good only in the areas where roads are not bordered by wetland ricefields. During dry periods cross-country movement would be fairly easy in most of the region. Throughout the region during the southwest monsoon and in areas exposed to the northeast monsoon, movement would be severely slowed or precluded by boggy ground and, at times, by extensive flooding. Obstacles to movement in local areas are steep-sided ravines, deep, soft-bottomed streams, permanently soft ground, dikes, irrigation canals, and drainage ditches. Construction of new roads would be moderately easy in most places when the ground is dry. Roads could be built with long tangents and gentle curves, and only light grading and clearing would be required; however, numerous culverts and bridges (many with raised approaches) would have to be constructed. At times, construction would be severely hindered or even halted for short periods by soft ground and flooding. Concealment from air and ground observation would be limited mainly to urban areas, patches of mangrove, clumps of bamboo, and narrow bands of dense forest along streams. The grassy areas and sugarcane fields afford good concealment from ground observation seasonally. Cover from flat-trajectory fire would be afforded in many places by dikes and banks of drainage ditches and canals in ricefields, streambanks, and some road and railroad embankments; masonry structures in the larger cities provide the best available cover. There are extensive potential billeting and storage facilities in the larger towns and cities. In most places, there are many sites suitable for the construction of bunkers; in the flat low-lying areas, construction would be hindered by a high water table, and sealing would be required to prevent seepage. There are few sites suited for tunnel-type installations because of inadequate relief.

Conditions are favorable for airborne and airmobile operations throughout most of the region and there are numerous potential airdrop zones and sites for helicopter landings. The ricefields are poorly suited between mid-May and mid-December, but during the remainder of the year they are excellent sites. Approaches to many sites would be partly restricted by nearby mountains and hills. There are four large and at least five smaller airfields that could be used for the landing of assault-type aircraft. Although new airfields could be constructed on the rolling plains with only minor amounts of earth moving and clearing, the orientation of runways would be restricted in places by streams and the air approaches would be restricted by nearby mountains and hills. Many sites with unrestricted approaches are available on the flat plains, but foundations are poor and subgrades would have to be raised to protect against flooding.

The region is favorable for amphibious operations. The long curving shores are predominantly sand, except along the northern part of Manila Bay where the shore is muddy and overgrown with mangrove. Close behind the sandy shores, or for short distances inland, meandering rivers and streams, lagoons, marshes and swamps obstruct movement in many places. Approaches are restricted to Lingayen Gulf or Manila Bay and are lightly obstructed by scattered dangers, mainly shoals and wrecks. High surf on the south shore of Lingayen Gulf is most prevalent, about 20% of the time, during the northeast monsoon. In Manila Bay, high surf is most prevalent-about 10% of the time-during the southwest monsoon. Outside the gulf and the bay, heavy sea and swell occur most often during the northeast monsoon. Tides are mixed; the diurnal range is 2.5 feet in Lingayen Gulf and 3 to 3.5 feet in Manila Bay. Exits from the beaches are predominantly cross-country or by tracks to all-weather roads several hundred yards to several miles inland.

Conditions for irregular force operations range from unsuited to fair throughout the Central Luzon Plain.

Concealment generally is poor from both air and ground observation on this intensively cultivated flatland; however, some limited possibilities exist year round in small forests and built-up areas and seasonally in tall grasses and sugarcane fields. Small groups could move cross-country throughout the year, but they would be slowed frequently by miry ground, deep streams, and widespread flooding. Water, which is generally biologically contaminated, and food are available to irregular forces. Tropical and other diseases, water buffalo, crocodiles, snakes, rodents, mosquitoes, flies, lice, fleas, ticks, centipedes, ants, scorpions, and spiders are hazards to operations.

2. Rugged Islands Complex

This region, which includes the remainder of Luzon and all of the other islands in the archipelago, is predominantly poorly suited for conventional ground operations.

Onroad movement would be confined to widely spaced roads on the larger islands; in many places, movement would be slowed by sharp curves, steep grades, narrow wooden bridges, and, during or after rains, by miry and slippery surfaces, washouts, and landslides. In addition, the roads would require extensive maintenance to sustain heavy traffic. Offroad dispersal would be very difficult or even precluded on steep and precipitous slopes in most places. The construction of new roads would require much cut, fill, and blasting, as well as numerous short tangents, sharp curves, and steep grades in the hills and mountains. Frequent periods of soft ground after heavy rains could severely hinder or halt construction throughout the region. Only the better drained parts of the coastal and interior plains are suited for road construction. Cross-country movement generally would be slow and arduous, and would be possible only by foot troops in most of the region. Only in widely scattered areas of dryerop cultivation, grasslands, plantations, and, during the dry season, in ricepaddies, are conditions fair for cross-country vehicular movement. Fair to excellent concealment from air and ground observation would be afforded by dense forests in many places. Concealment opportunities are very limited however, in prime forests at high elevations, in recently cutover areas, and on many of the cultivated plains. Most grassy areas and plantations afford good concealment from ground observation, but the blades of the grass generally are tough and sharp. Good cover from flat-trajectory fire would be afforded by surface irregularities (Figure 4) mainly in the mountains and hills. In general, there is a lack of suitable billeting and storage facilities. There are many suitable sites for tunnel-type installations in the hills and mountains (Figure 10) and some sites for bunkers on the well-drained parts of the plains.

The region is poorly suited for airborne and airmobile operations. Sites suitable for airdrops or helicopter landings are limited mostly to cultivated or grassy clearings and some beaches. There are only three large airfields in the region, but many of the islands contain at least one airfield that can accommodate assault-type aircraft. Because of the predominance of dense vegetation, surface irregularities, and wet ground, potentially suitable sites for airfield construction are limited to the better drained parts of the plains.

Conditions are generally unfavorable for amphibious operations. Large-scale amphibious operations would be precluded along hilly and mountainous coasts by steep terrain that generally rises abruptly from the sea. Along the coastal plains, long irregular shores front on narrow flatlands bordered by nearby rugged terrain (Figure 11). These flat coastal areas are compartmentalized by steep hills and mountains rising from the shoreline, and commonly contain bands of mangrove and numerous river mouths. Approaches to the numerous short beaches of sand or of sand mixed with gravel, cobble, and coral are commonly obstructed by islets, shoals, and coral reefs. High surf occurs on many of the coasts, especially where the shores are exposed to the northeast monsoon. At times, the seas are rough and the swell is moderate to heavy. Maximum tides are diurnal and range from about 2 to 6.5 feet. Along some of the Visayan Islands, rough seas combined with strong crosscurrents and riptides make landings extremely dangerous. In many places, flat nearshore bottoms consisting of coral rock and mud would hamper landings. Exits are generally cross-country to roads paralleling (commonly less than a mile inland) the coasts. Movement would be hindered in many places by ricefields, streams, ravines, and marshy areas.

Conditions for irregular force operations range from good to unsuited. Areas of dense forests and rugged terrain inhibit large conventional force operations but provide good opportunities for the cover and concealment of small groups on most of the islands. Movement generally would be slowed by steep slopes or dense forests in the hills and mountains and by sharpbladed grasses, deep streams, flooding, large marshes, and swamps along the coasts and large streams. Water and food can be obtained in most areas, but the water commonly is biologically comtaminated near populated places. The food sources include mainly crops in or near scattered

FIGURE 10. Natural caves like this one in eastern Mindanao are common in the Philippine highlands (U/OU)

machinery, automobile parts, textiles, telecommunications equipment, small arms and structural and sheet metal products.

The major shipyard in the country, at Mariveles, has drydocking facilities, considerable covered storage, and petroleum storage for 270,000 barrels. A naval shipyard with facilities for drydocking and small boat construction is at Cavite; nearby, is a former U.S. naval air station that is used jointly by the Philippine military commands. The large U.S. naval base on the shore of Subic Bay maintains drydocking facilities, seaplane and naval air stations, an underground ordnance and ammunition depot, and extensive covered and petroleum storage facilities.

FIGURE 11. Leyte coastal plain backed by mountains (U/OU)

settlements and fish in local streams or coastal waters. The high incidence of disease and presence of insect vectors and dangerous animals, including reptiles, are continuous hazards to operations.

C. Strategic area (C)

The Manila Bay Strategic Area (see the map at the end of the chapter and Figure 12), located on the broad central Luzon plain, has a total population of about 8 million and includes Manila (population 1,475,000) (Figures 13 and 14) and Quezon (population 837,000). Metropolitan Manila, is the hub of the country's government, commerce, industry, and telecommunications. The major government agencies are in Manila; only the subordinate ones are in Quezon, the capitol. Manila International airfield and the port at Manila are the primary points of entry for the country. The country's four petroleum refineries, with a combined daily throughput capacity of 272,000 barrels, and over half of the country's other industries are in the strategic area. The important items produced within the area include agricultural

Rural areas within the strategic area contain the most extensive ricefields in the country, a dense transportation net, two large military airfields—Clark and Basa Air Bases, U.S. and Philippine respectively, and most of the army installations.

In addition to the Manila Bay Strategic Area, there are four other important areas:

NAME AND POPULATION (1973)	SIGNIFICANCE
Davao, 435,000	Important port (interisland, international), major industrial and supply city for southern Mindanao. POL storage capacity 295,000 barrels.
Cebu, 384,600	Important port for the Visayan Islands. Ship repair and dry-docking facilities. Petroleum storage capacity 989,000 barrels. Large air base on nearby Mactan Island.
Iligan, 115,800	Second largest industrial center; includes a steel mill and fertilizer, cement, and chemical plants.
Iloilo, 232,500	Important port. Main distribution center for nearby islands. Ship repair facilities. Petrol storage capacity, 203,000 barrels.

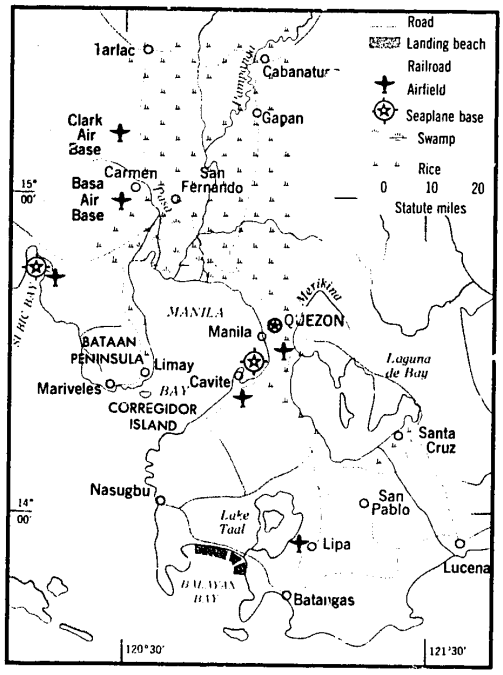


FIGURE 12. Manila Bay Strategic Area (C)

D. Internal routes (C)

The internal routes provide the easiest avenues of movement between the areas best suited for amphibious landings and Manila (Figure 15). The internal route from the landing area on Lingayen Gulf to Manila traverses flat to rolling plains, which contain numerous closely spaced villages, ricefields, and streams. This route contains a two- to three-lane road, which is mostly bituminous-treated, but has concrete and gravel sections; it is in generally fair condition. A single-track 3'6"-gage railroad in poor condition generally parallels the road. Although conditions for movement on the road are mostly fair, traffic would be slowed in places by rough, broken surfaces and large potholes. In addition, narrow wooden bridges at several stream crossings are potential bottlenecks. Offroad dispersal of vehicles would be easy in most places from about mid-December to early May; locally, high embankments and dense vegetation preclude dispersal. During the remainder of the year, extensive inundation of ricefields and frequent periods of soft ground would seriously hamper dispersal. Cross-country movement in most places would be hampered by watercourses, low dikes, drainage ditches, and canals, and would be precluded when the ricefields are inundated and extremely difficult where the ground is soft.

The route from the landing area northwest of Subic Bay extends to San Fernando, where it connects to the route from the Lingayen Gulf. This internal route crosses rolling plains covered by grass and brush in the western part and flat plains containing numerous ricefields in the eastern part; near the center, the route traverses small areas of densely forested hills. The route contains a one- to two-lane bituminous-treated or gravel road which has short concrete sections, and a short section of single-track 3'6"-gage railroad in poor condition. The road is generally in fair condition, but sections of the surface are broken and cracked. In addition, there are many sharp curves in the areas of

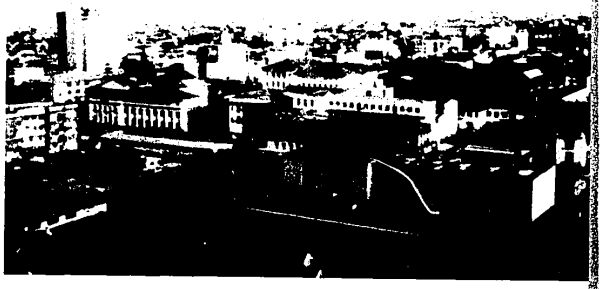


FIGURE 13. Manila, modern area as viewed from the Hilton Hotel (C)

FIGURE 14. Manila, slum housing (C)

rolling plains and hills, and, in places, the road could be easily controlled by forces occupying the adjacent ridges. Potential bottlenecks exist at several stream crossings, where there are low-capacity wooden bridges. In most places, conditions are fairly favorable for offroad dispersal and cross-country movement, but during the southwest monsoon, vehicles would be frequently hampered by miry ground and flooding, particularly near San Fernando. Steep slopes severely restrict offroad dispersal and cross-country movement in the hills; on the plains, ricefields, with numerous dikes, drainage ditches, and canals, are obstacles.

The internal route leading from the landing area on Balayan Bay to Manila traverses mostly rolling, cultivated plains. The route contains a one- to three lane bituminous-treated road which has a few concrete and gravel sections and is in fair to good condition; between Lipa and Manila there is a single-track 3'6"-gage railroad in poor condition. Numerous narrow wooden bridges are potential bottlenecks. West of Batangas, on-road movement would be slowed by numerous ravines, streams, some areas of steep slopes, coconut plantations, and ricefields.

E. Approaches

The unfortified coasts of the Philippine islands have an overall length of about 14,000 miles. The highly irregular coastline is inaccessible in many places because of shoals, fringing reefs, rocky headlands, and islets. The Philippines claims as national internal waters without regard to specific distances from any coast, all areas enclosed within baselines joining outermost islands and as territorial waters those areas between these baselines and the 1898, 1900, and 1930 treaty limits. The United States recognizes only 3 nautical miles from the shore as the Philippine territorial limits. (U/OU)

1. Sea (C)

Offshore approaches are generally clear to Luzon and Mindanao; elsewhere, they are restricted by islets, reefs, and rocks to narrow channels between numerous small islands. Nearshore approaches are obstructed by islets, shoals, fringing reefs, and, in places, shipwrecks and fishtraps. In addition, there are strong crosscurrents, riptides, and eddies in places. Nearshore bottom materials consist of sand, mud, and coral, and slopes are predominantly gentle to mild. On coasts fully exposed to the northeast monsoon, surf 4 feet or higher occurs about 70% of the time in December, January, and February; on coasts exposed to the southwest monsoons, surf 4 feet or higher occurs about 30% of the time in June, July, and August and 10% of the time in December, January, and February. Tides are diurnal and range from about 2 to 6.5 feet; the highest are along the Visayan Islands and the lowest along western Luzon. Calm to slight seas and predominantly low swell occur in most places during the southwest monsoon. During the northeast monsoon, however, seas of 5 feet or more are relatively common, reaching a frequency of 28% of the time in February off eastern and northern Luzon; moderate swell (6 to 12 feet) occurs as much as 11% of the time in many places. In addition, infrequent periods (less than 4% of the time) of heavy swell (over 12 feet) also occur during the northeast monsoon. At times weather conditions are hazardous. Heavy rains and typhoons, most common during the southwest monsoon, would seriously hinder or preclude amphibious operations. Gales are relatively common during the northeast monsoon, particularly off eastern Luzon.

Along the coasts are hundreds of beaches. Most of these are separated from each other by rocky headlands, peninsulas, and high cliffs. Many of the beaches are further fragmented by river mouths, sandpits, lagoons, mangrove swamps, and piers. The beaches, consisting chiefly of sand, or sand mixed with gravel, cobble, and coral, are generally steep in the high-water zone and flat in the low-water zone. They are firm when wet and soft when dry. Exits to nearby roads paralleling the coasts are mainly across narrow coastal plains, which in many places contain ricefields, streams, ravines, and marshy areas. In most places, cross-country movement into the interior would be severely restricted short distances inland by rugged hills and mountains. The areas best suited for amphibious landings are on the coasts of Lingayen Gulf, northwest of Subic Bay, and Balayan Bay.

The landing area on the coast of Lingayen Gulf (see the Military Geographic Factors map at the end of the chapter) contains four beaches. Approaches are generally clear except off the southern part, where there is a broad shoal offshore and boulders nearshore. Nearshore bottom slopes are generally too flat for dry-ramp landings of LST's. Bottom materials are chiefly mud. The tidal range, diurnal, is 2.5 feet. Surf 4 feet or higher occurs most often (13% of the time) on the 3 northern beaches in June, July, and August and most often (20% of the time) on the southern beach in October and November. The beaches, ranging from 3 to about 11 miles in length, are from 5 to 60 yards wide at high water and 15 to 100 yards at low water. The beaches are sandy, firm in wetted areas, and soft where dry; gradients are gentle to steep. Terrain behind the beaches consists of a narrow, flat plain

crossed by many small streams; interstream areas contain numerous ricefields. Exits are predominantly cross-country to a bituminous-treated and gravel road and a railroad paralleling the coast, generally less than a mile inland. Cross-country movement would be restricted in places by streams too deep to ford, ricefields, fishponds, saltpans, mangrove swamps, and marshy areas.

The landing area northwest of Subic Bay contains three beaches (see the map at the end of the chapter). Off-shore approaches are clear except for a shoal off the northern part and a small island off the southern part. Nearshore approaches are clear except for some sandbars off the southern part of the landing area and a few shoals. Nearshore bottom materials consist primarily of sand and mud, and in most places bottom slopes are steep enough to permit dryramp LST landings. The tidal range diurnal, is 3 feet. Surf 4 feet or higher can be expected to occur 31% of the time during June through August. The beaches, ranging from about 1 to 16 miles in length, are 5 to 130 yards wide at high water and 20 to 160 yards at low water. All are composed of sand, which is firm when wet and soft when dry. Gradients are moderate to steep. Terrain behind the beaches consists of a flat plain (1 to 8 miles wide) containing numerous ricefields. Exits are chiefly cross-country to a nearby bituminous-treated road 50 yards to 2 miles inland. Cross-country movement would be restricted by ricefields, stream channels, and narrow lagoons.

The Balayan Bay landing area contains three beaches (see the map at the end of the chapter and Figure 9). Offshore and nearshore approaches are generally clear; however, shoals, submerged rocks, and fringing reefs flank the extremities. In places, nearshore bottom slopes permit dry-ramp LST landings; bottom materials are mud or sand and coral. The tidal range, diurnal, is 3.7 feet. Surf 4 feet or higher occurs 10% to 15% of the time during the southwest monsoon and infrequently during the remainder of the year. The beaches, about 1, 2, and 9 miles long respectively, are broken in places by stream mouths. Beach widths range from 15 to 30 yards at high water to 30 to 75 yards at low water. These sandy beaches are firm when wet and soft when dry. Foreshore gradients are mostly steep, making movement of vehicles from the beaches difficult. A flat plain, about a mile wide and traversed by small streams, is immediately behind the beaches; interstream areas contain numerous ricefields, sugarcane fields, and vegetable plots. Exits are by tracks or cross-country to a bituminous-treated road that is generally less than 2 miles inland. Cross-country movement would be hindered by ricefields and stream channels, and, during the southwest monsoon, by miry ground and flooding.

2. Air (U/OU)

Air approaches[2] to the Philippine Islands are predominantly over the waters of the surrounding Philippine, South China, Sulu and Celebes Seas, although approaches from the north include southern Taiwan and those from the southwest include northeastern Borneo. In both places rugged terrain with scattered peaks of more than 8,000 feet above sea level are common. The highest elevation on Taiwan and approximately 200 nautical miles north of the northernmost island of the Philippines is about 12,000 feet. On Borneo, the highest elevation, about 13,450 feet, is approximately 110 nautical miles from Balabac Island in the Philippines. In general, weather conditions in all approaches are poorest in May through October, when the intertropical convergence zone and southwest monsoon affect the approach zones. Thunderstorms are the most frequent hazard at this time, occurring on 10 to 20 days per month in Borneo and mostly 5 to 15 days monthly elsewhere in the approaches. They are often accompanied by severe turbulence, and icing may be encountered above about 16,000 feet, the average height of the freezing level. Turbulence and icing hazards may also be present in convective cloudiness, which is most common during this period. Some convective clouds may extend vertically to 50,000 feet or more. Mean cloudiness generally ranges from 50% to 85%, with the greatest amounts over the land areas.

Weather conditions are somewhat improved in November through March or April in all approaches, primarily because of reduced thunderstorm activity. The thunderstorms normally number from less than 3 days monthly in the north to 5 to 10 days per month in Borneo. Mean cloudiness continues the same pattern in amount and distribution during this period but vertical development is quite often limited. The freezing level remains near 16,000 feet in the south, but lowers to 11,000 or 12,000 feet in the northern approaches.

The single, most dangerous hazard to flight operations is the migration of tropical cyclones through the approaches, mainly north of 11°N.

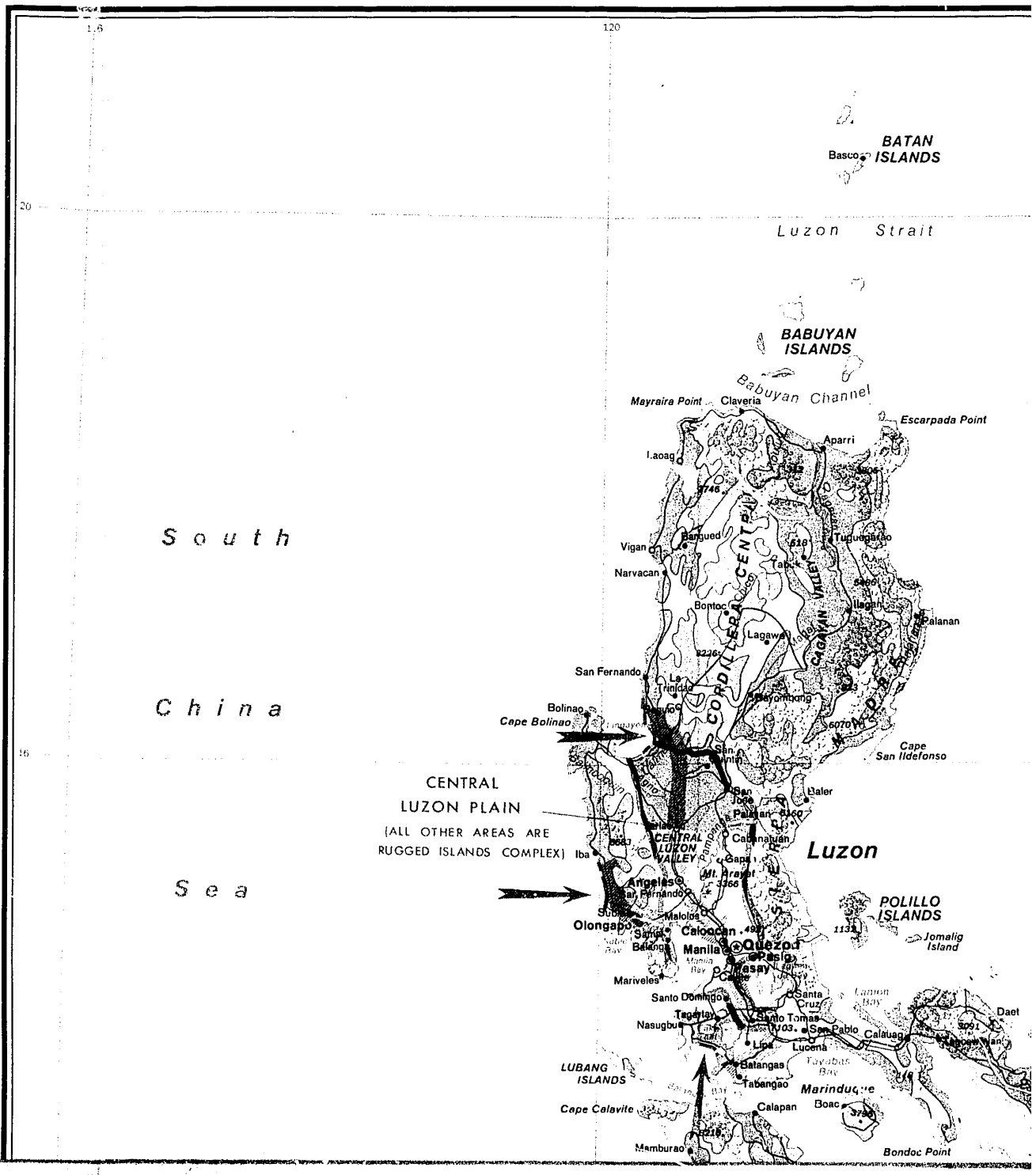
[2]The discussion zone for air approaches extends approximately 200 nautical miles beyond the coasts of the outermost islands.

Although these storms may occur in almost any month, they are most frequent in July through December and are generally accompanied by strong winds, extensive multilayered cloudiness, severe turbulence, the threat of severe icing, heavy rainfall, and extremely poor visibility conditions. They should be avoided in all cases, especially those of typhoon intensity (winds about 65 knots).

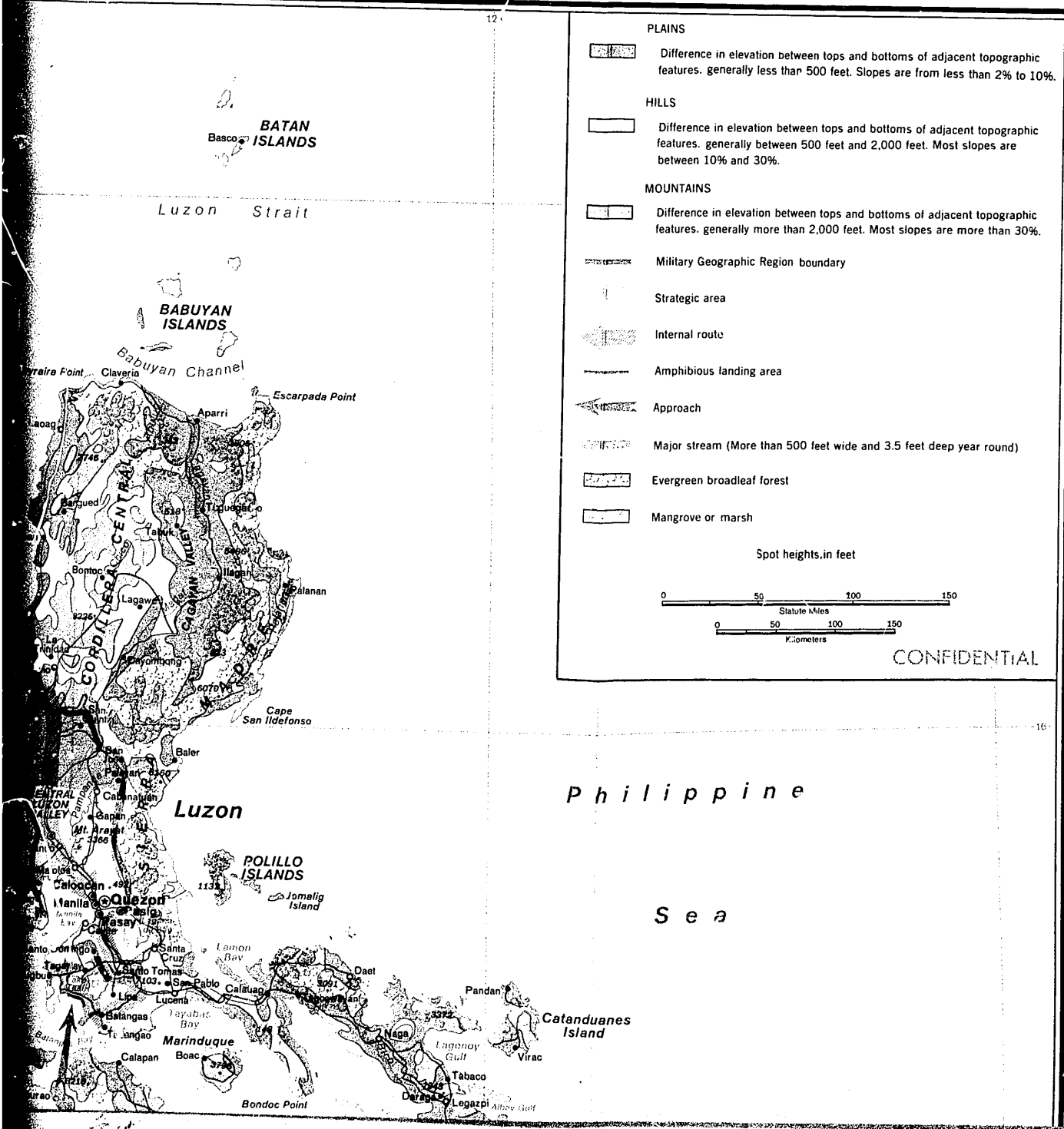
Upper winds are light to moderate all year in the southern approaches and during June through November in the northern approaches. In December through May in the north, strong westerlies prevail between 30,000 and 55,000 feet, with mean speeds greater than 50 knots. Strongest mean speeds, 75 to 85 knots, are present over and near Taiwan at about 40,000 feet in December through February.

Places and features referred to in this General Survey (u/ou)

	COORDINATES			COORDINATES	
	° ′N.	° ′E.		° ′N.	° ′E.
Agno (*strm*)	16 02	120 08	Luzon (*isl*)	16 00	121 00
Agus (*strm*)	8 11	124 12	Maetan Island (*isl*)	10 18	123 58
Agusan (*strm*)	9 00	125 31	Makati (*popl*)	14 34	121 02
Agusan del Sur (*prov*)	8 30	125 50	Malolos (*popl*)	14 51	120 49
Albay Gulf (*gulf*)	13 10	124 00	Mandaluyong (*popl*)	14 38	121 03
Ampayon (*popl*)	8 58	125 36	Manila (*popl*)	14 35	121 00
Angat (*strm*)	14 53	120 46	Manila Bay (*bay*)	14 30	120 45
Angeles (*popl*)	15 09	120 35	Marawi (*popl*)	8 01	124 18
Antipolo (*popl*)	14 35	121 10	Maria Cristina Falls (*falls*)	8 11	124 12
Antique (*prov*)	11 10	122 05	Mariveles (*popl*)	14 26	120 29
Arayat, Mount (*mtn*)	15 12	120 45	Masbate (*isl*)	12 15	123 30
Bacolod (*popl*)	10 40	122 57	Mayon Volcano (*mt*)	13 15	123 41
Bagacay (*popl*)	11 49	125 14	Mindanao (*strm*)	7 07	124 24
Baguio (*popl*)	16 25	120 36	Mindanao (*isl*)	8 00	125 00
Balabac Island (*isl*)	7 57	117 01	Mindoro (*isl*)	12 50	121 05
Balayan Bay (*bay*)	13 51	120 47	Mindoro Occidental (*prov*)	13 00	120 55
Baler (*popl*)	15 46	121 34	Mountain (*prov*)	17 05	121 10
Baler Bay (*bay*)	15 50	121 35	Muntinglupa (*popl*)	14 23	121 03
Baliwasan (*popl*)	6 55	122 03	Naga (*popl*)	13 37	123 11
Basilan (*popl*)	6 42	121 58	Nasugbu (*popl*)	14 05	120 38
Basilan Island (*isl*)	6 34	122 03	Navotas (*port*)	14 39	120 57
Basilan Strait (*str*)	6 49	122 05	Negros (*isl*)	10 00	123 00
Bataan (*prov*)	14 40	120 25	Negros Occidental (*prov*)	10 25	123 00
Batangas (*popl*)	13 45	121 03	Nueva Ecija (*prov*)	15 35	121 00
Batangas Bay (*bay*)	13 43	121 00	Olongapo (*popl*)	14 50	120 16
Bauan (*popl*)	13 48	121 01	Paete (*popl*)	14 23	121 29
Bauang (*popl*)	16 31	120 20	Pakiputan Strait (*str*)	7 07	125 40
Benguet (*prov*)	16 30	120 40	Palawan (*isl*)	9 30	118 30
[illegible]	13 44	123 07	Polanco (*prov*)	10 00	118 45



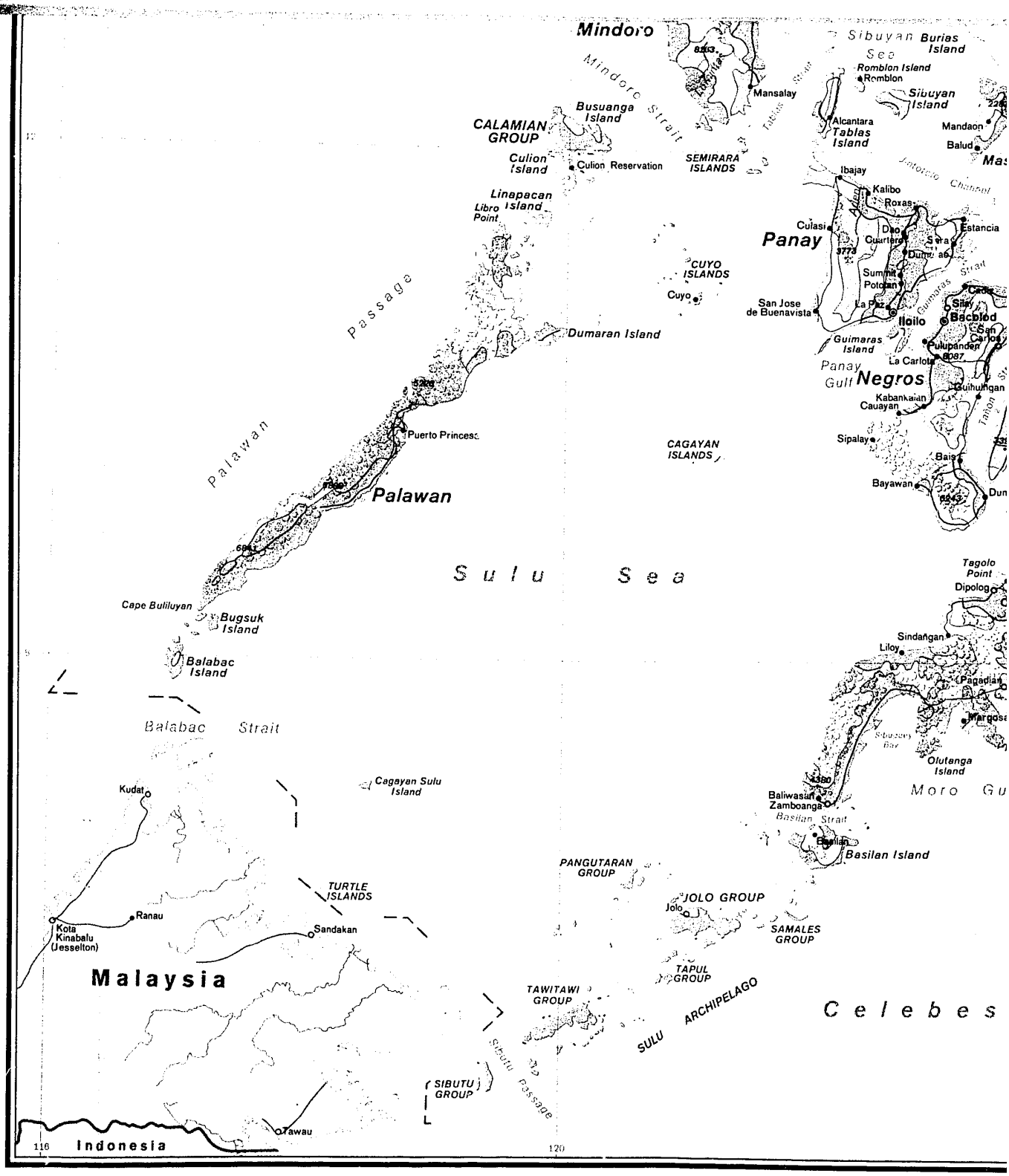
Confidential



Bohol (*isl*)	9 50	124 10
Bontoc (*popl*)	17 05	120 58
Bunyan (*popl*)	6 07	125 15
Bukidnon (*prov*)	8 00	125 00
Bulacan (*prov*)	15 00	121 05
Butuan (*popl*)	8 54	125 35
Cabanatuan (*popl*)	15 29	120 58
Cadiz (*popl*)	10 57	123 18
Cagayan (*strm*)	18 22	121 37
Cagayan de Oro (*popl*)	8 29	124 39
Cagayan Valley (*val*)	17 30	121 45
Calamba (*popl*)	14 13	121 10
Caloocan (*popl*)	14 38	121 03
Camalig (*popl*)	13 11	123 39
Camarines Norte (*prov*)	14 10	122 45
Canlubang (*popl*)	14 15	121 05
Capiz (*prov*)	11 24	122 34
Carmen (*popl*)	15 01	120 32
Casiguran (*popl*)	16 17	122 07
Catubig (*strm*)	12 34	125 01
Cavite (*popl*)	14 29	120 55
Cavite (*prov*)	14 15	120 50
Cavite Peninsula (*pen*)	14 26	120 53
Cebu (*popl*)	10 18	123 54
Cebu (*isl*)	10 20	123 45
Central Luzon Valley (*pln*)	15 30	120 40
Corregidor Island (*isl*)	14 23	120 35
Cotabato (*popl*)	7 13	124 15
Cotabato (*prov*)	7 00	124 40
Cuartero (*popl*)	11 21	122 40
Cubi Point (*pt*)	14 48	120 16
Dagupan (*popl*)	16 03	120 20
Danao (*popl*)	10 32	124 02
Dao (*popl*)	11 24	122 41
Daraga (*popl*)	13 09	123 43
Davao (*popl*)	7 18	125 25
Davao del Norte (*prov*)	7 30	126 00
Davao Gulf (*gulf*)	6 40	125 55
Digos (*popl*)	6 45	125 20
Dumaguete (*popl*)	9 18	123 18
Dumarao (*popl*)	11 16	122 41
Floridablanca (*popl*)	14 59	120 31
Gapan (*popl*)	15 19	120 57
General Santos (*Rajah Buayan*)	6 07	125 11
Guimaras Island (*isl*)	10 35	122 37
Guimaras Strait (*str*)	10 30	122 44
Iligan (*popl*)	8 14	124 14
Iligan Bay (*bay*)	8 25	124 05
Ilocos Norte (*prov*)	18 10	120 45
Ilocos Sur (*prov*)	17 20	120 35
Iloilo (*popl*)	10 42	122 34
Iloilo (*strm*)	10 42	122 35
Iloilo Strait (*str*)	10 43	122 36
Kalibo (*popl*)	11 43	122 22
Kalinga-Apayao (*prov*)	17 45	121 15
Laguna (*prov*)	14 10	121 20
Lanao del Norte (*prov*)	8 10	123 55
Lanao del Sur (*prov*)	7 55	124 20
La Paz (*popl*)	10 43	122 34
Larap Peninsula (*pen*)	14 18	122 39
La Trinidad (*popl*)	16 28	120 35
Lebak (*popl*)	6 32	124 03
Legaspi (*popl*)	13 08	123 44
Lepanto (*popl*)	16 52	120 46
Leyte (*isl*)	10 50	124 50
Ligao (*popl*)	13 14	123 32
Limay (*popl*)	14 34	120 36
Lingayen Gulf (*gulf*)	16 15	120 11
Lipa (*popl*)	13 57	121 10
Lubang Island (*isl*)	13 46	120 11
Pampanga (*strm*)	14 47	120 39
Pampanga (*prov*)	15 04	120 40
Pandacan (*part of Manila*)	14 36	121 00
Panay (*isl*)	11 15	122 30
Pasay (*popl*)	14 33	121 00
Pasay (Rizal) (*popl*)	14 33	121 00
Pasig (*strm*)	14 36	120 58
Poro Point (*pt*)	11 58	124 20
Poro Island (*isl*)	16 06	120 06
Port San Vicente (*popl*)	18 30	122 09
Pulupandan (*popl*)	10 31	122 48
Quezon (*popl*)	14 38	121 00
Rizal (*prov*)	14 35	121 10
Rizal (*see, Pasay*)	14 33	121 00
Rosario (*popl*)	14 25	120 51
Roxas (*popl*)	11 35	122 45
Samar (*isl*)	12 00	125 00
San Carlos (*popl*)	10 30	123 25
San Fernando (*popl*)	15 01	120 41
San Fernando (*popl*)	16 37	120 19
San Fernando Point (*pt*)	16 38	120 17
Sangley Point (*pt*)	14 30	120 55
San Jose (*popl*)	15 48	121 00
San Juan (*popl*)	14 35	121 07
San Juanico Strait (*str*)	11 20	124 58
San Pablo (*popl*)	14 04	121 19
San Pedro Bay (*bay*)	11 11	125 05
Santo Domingo (*popl*)	14 14	121 03
Sipalay (*popl*)	9 45	122 24
Sorsogon (*popl*)	12 58	124 00
Spratly Island (*isl*)	8 38	111 55
Subic Bay (*bay*)	14 45	120 13
Sulu (*prov*)	5 30	120 30
Sulu Archipelago (*isls*)	6 00	121 00
Summit (*popl*)	11 06	122 38
Surigao (*popl*)	9 45	125 30
Surigao del Norte (*prov*)	9 46	125 38
Tabangao (*popl*)	13 42	121 05
Taal (*lake*)	13 55	121 00
Taal, Mount (*mtn*)	14 00	121 00
Tacloban (*popl*)	11 15	125 00
Tarlac (*popl*)	15 29	120 35
Tarlac (*prov*)	15 30	120 30
Tawitawi Island (*isl*)	5 10	120 00
Toledo (*popl*)	10 23	123 38
Tondo (*part of Manila*)	14 37	120 58
Tuguegarao (*popl*)	17 37	121 44
Valenzuela (*popl*)	14 42	120 58
Visayan Islands (*isls*)	11 00	123 30
Zambales (*prov*)	15 20	120 10
Zamboanga (*popl*)	6 54	122 04
Zamboanga del Sur (*prov*)	7 30	122 25

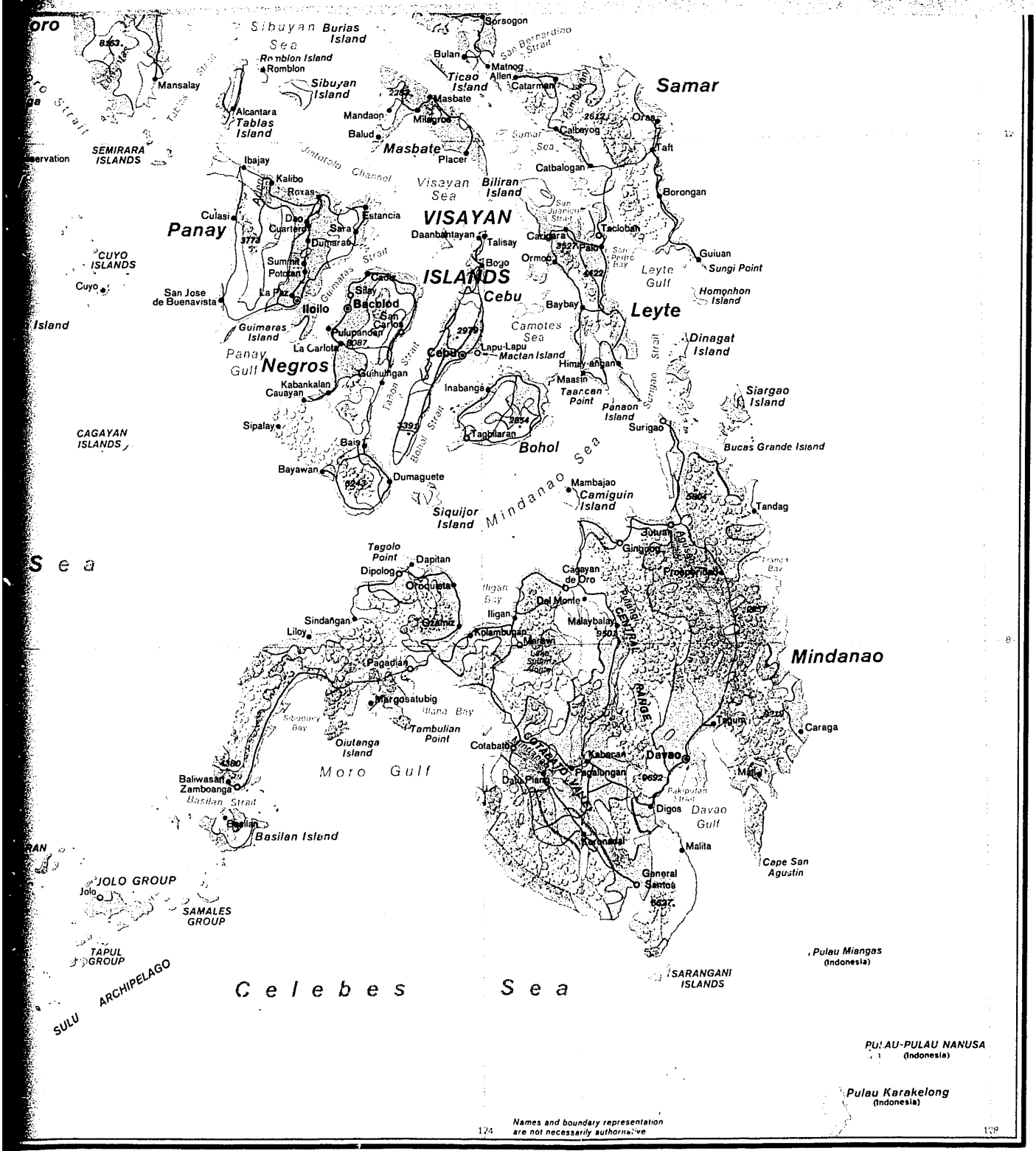
Selected airfields

Bacolod	10 39	122 56
Baguio	16 23	120 37
Basa AB	14 59	120 29
Cagayan de Oro	8 25	124 37
Clark AB	15 11	120 33
Cubi Point NAS	14 48	120 16
D Z Romualdez	11 14	125 02
Davao	7 08	125 39
Fernando AB	13 57	121 07
Iloilo	10 43	122 33
Laoag	18 11	120 32
Mactan International	10 10	123 59
Manila International	14 31	121 01
Sangley Point AB	14 30	120 54
Zamboanga	6 55	122 04



Confidential 71385

No Foreign Dissem



No Foreign Dissem

Military Geographic Factors Figure 15