Nepal

By Pradyumna P. Karan

With 35 Maps and 60 Illustrations

A Physical and Cultural Geography
Nepal, a land for centuries almost unknown to the outside world, in the past decade has been thrust into the foreground of the international scene, its strategic position between India and Chinese-occupied Tibet making it of enormous importance to both East and West. Since 1950, its people have felt for the first time the impact of the social and political movements which have swept Europe and Asia during the past century, and their leaders have embarked on the task of transforming a medieval kingdom overnight into a modern democracy. Yet it has remained for most of the world a land of mystery and romance, often written about by the few travelers who have reached it, but unexplored by modern scholarship.

This book, the first published geography of Nepal, undertakes to present in maps, text, and photographs the most significant aspects of the physical and cultural geography of the kingdom. Extensive field study in Nepal was necessary to accomplish this, and most of the thirty-five plates published here represent either entirely new information or a compilation of data not previously displayed in cartographic form. The large-scale map of Nepal's administrative divisions, for example, is the first map ever made showing the boundaries of the country's 491 thums (equivalent to counties in the United States). In addition to many miles of travel by jeep and plane, Dr. Karan climbed on foot over the mountainous Himalayan terrain a total distance equivalent to twenty ascents of Mt. Everest. To secure information for the maps of landforms, vegetation, rural settlements, land use, and crop distribution, he photographed most of the country from a light airplane with a 35-millimeter camera. The information supplied by his maps and text is supplemented by sixty photographs, most of them made by the author, and the text is enriched by the intimate knowledge of the land and the people which Dr. Karan gained during his extensive travels in Nepal.

A native of Bihar, India, Pradyumna Prasad Karan is a graduate of Patna University, and holds the M.A. degree from Benares Hindu University and the Ph.D. degree from Indiana University. He is the author of numerous scholarly studies in geography and coauthor of the forthcoming World Economic Geography. A former consultant to the American Geographical Society of New York, Mr. Karan taught at Patna and Indiana universities before joining the University of Kentucky faculty in 1956.
GEOGRAPHIC LOCATION OF NEPAL
Preface

There is little available research material, especially statistical data, on Nepal. The topographical maps of the Survey of India, though out of date, provide valuable information when carefully interpreted. A census of population was completed in 1955 and the Interim Report, published in Nepali, gives new data on the basis of which several maps in this book have been prepared. The available materials were supplemented by field study and air reconnaissance over most of Nepal. The American Philosophical Society, Philadelphia, and The Population Council Inc., New York, provided research grants for field study.

During my stay in Nepal in 1957, Professor Jagat Bahadur Burhathoki, head of the department of geography at Tribhuvan University, was especially helpful, as were the many Nepalese who aided me during my travels. I wish to acknowledge the help given by Harry B. Price, United Nations economic adviser, and Howard J. Kumin, United Nations statistical expert, both assigned to the Government of Nepal; Paul W. Rose, director of the United States Operation Mission in Kathmandu and his staff, and H. Lal, director of the India Aid Program.

I am grateful to the Faculty Research Fund Committee of the University of Kentucky, headed by Dr. Herman E. Spivey, dean of the Graduate School, without whose generous support on more than one occasion the work could not have been brought to completion.

The initial idea for this book was suggested to me by my friend William M. Jenkins, Jr., a political scientist, who has collaborated with me in writing the text. He prepared the first drafts of chapters on historical growth, land use, and diseases, and has critically read the entire manuscript, made many excellent suggestions, and helped me to avoid numerous errors. He also designed the cover and general format of the book. Without his initial idea and help at all stages, this book could not have been written. His questions have set the task and his learning has lightened it.

This book was written during the past two years in the congenial and stimulating academic atmosphere of the charming University of Kentucky campus at Lexington. It has taken an unconscionably long time in writing and drafting the maps, for ever since I returned to Lexington from Nepal in the fall of 1957 there has been a heavy burden of teaching which could not conscientiously be shifted to make room for authorship. I am most grateful to Bruce Denbo, director of the University of Kentucky Press, for calmly and patiently bearing with each successive postponement of the completion date.

I wish to thank people who very kindly agreed to comment upon portions of the manuscript: Dr. Norman J. G. Pounds, Indiana University, read and offered suggestions for improving chapters on historical growth and political geography and reviewed the general outline of the book; Dr. James A. Shear, University of Georgia, examined the climate section. Professor J. R. Schwendeman, chairman of the department of geography, and Drs. Thomas P. Field and William A. Withington of the University of Kentucky were generous with their time and knowledge, and offered valuable help and advice. My students Roy Hobbs, Jerry Wade, and William Adams assisted in processing statistical data for several maps. Roger Potts of the Kentucky Geological Survey assisted in designing the maps and spent much time in compiling and drafting the map of administrative units from my field notes and sketches. The map of landforms has been drawn by means of a system developed by Robinson, Thrower, and Tanaka. The Geographical Press, a division of C. S. Hammond and Company, kindly permitted use of A. K. Lobeck's physiographic diagram of Asia as base map for plate 1.

My amateur photography, responsible for most of the illustrations in this book, has been supplemented from several professional sources. I wish to acknowledge the courtesy of the owners for permission to use photographs from the United Nations Review, the Geographical Review, the New York Times, Life (Time, Inc.), and Lowell Thomas and Cinerama Theatres of California, Inc.

And, last but by no means least, I am greatly indebted to Patricia Cornett, secretary in the department of geography, who performed numerous chores and managed the typing and retyping of the manuscript.

Pradumma P. Karan

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In the Shadow of the Throne

The land is the stage upon which the people are the players. For the Nepalese, the stage has a fantastic backdrop—the towering peaks of the Himalaya and the high, rugged passes leading down into lush green valleys—an awe-inspiring land which popular Hinduism regards as the dwelling place of myriad gods and the site of the Great God's unapproachable throne.

The tiny Himalayan kingdom of Nepal is a land of diversity. The Mongoloid tribes of Tibet and the Indo-Aryan peoples of northern India, overflowing into the country from north and south since prehistoric times, have come together to form a racial and cultural picture of great complexity. This is the home of fierce Gurkhas—Magars, Gurungs, Newars, Limbus, and Sunwars—and hardy Sherpas, and of a number of other small ethnic groups (including the yeti or “abominable snowman!”). Nepal is sacred to the Buddhists as the birthplace of Buddha and to the Hindus as the source of rivers flowing into the holy Ganges; Hinduism and Buddhism are practiced here not only as separate religions but in a synthesis of the two.

The physical setting is as rich in its diversity as the population. Few areas of the world as small as this present so many contrasts of environment. Dense swampy jungles, smiling rice-clad valleys, bleak alpine highlands, and fantastic snowpeaks all occur within the borders of Nepal. The mountainous northern interior has bitterly cold winters, whereas the southern Terai has a hot subtropical climate. The effect of these environmental differences on soil, vegetation, and crop production results in equally striking variations in population density. In the Terai, rice, sugarcane, and jute are grown; in the north only potatoes and other hardy crops can be produced.

Yet with all these, Nepal is a small country. It comprises 54,563 square miles—roughly the size of Florida—but extends about 500 miles east to west in the shape of an elongated rectangle. The northwestern section of the country lies in the same latitude as northern Florida, the southeastern extremity in the latitude of Fort Lauderdale, and Katmandu, the capital, in the latitude of Tampa.

The country may be divided into three zones: the Terai Plain, the Bhabar and Churia Hills (known in Nepal as the Inner Terai), and the high Himalaya. The Terai, a low, fertile, alluvial plain, in effect the northern extension of the Ganga plain, is 20 miles wide at its broadest point and extends over most of the southern boundary of Nepal. A belt some 10 miles wide of rich agricultural land stretches along its southern edge. North of this, bordering the forests of the Bhabar and Churia Hills, the Terai is a marshy region in which malaria is endemic. A green belt of excellent timber parallels the hills, but the typical growth of this area is the savanna or elephant grass, which grows to a height of 15 feet and so densely as to impede the progress of the animal for which it was named.

For centuries the Terai has been feared for the wild animals which inhabit it. Its northern part still remains the home of the tiger, elephant, rhinoceros, wild boar, chita, hog-deer, and swamp deer. Wading birds, wild ducks, and cranes winter in the Terai, migrating from their summer homes in the Himalaya.

Three regions can be distinguished in the Terai. The eastern and midwestern areas are much alike, each containing thousands of acres of fertile land and having a year-round growing season in a fully tropical climate. The soil is fine-grained and of good fertility; the yield of rice in the early ripening paddies is from 1,200 to 1,500 pounds to the acre for irrigated land, somewhat less in unirrigated areas. Sugarcane, jute, corn, mustard, and onions are also grown in these regions. The far western Terai is a dry area, its rainfall amounting to only about 30 inches and subject to rapid evaporation.

Rising above the Terai is a gravelly and fairly steep talus slope known as the Bhabar. It is built of loose materials in which the smaller streams lose themselves, sinking into the ground to reappear in the marshes and jungles of the upper Terai. Here great rivers swirl down from the Himalaya, and during periods of heavy rain bring down from the rugged contours of the higher mountains millions of tons of silt and stone. Dense growths of trees flourish in the porous soil of the Bhabar. There is a scrubby undergrowth in the forests, and grasses in the deforested areas.

The Churia Hills are geologically a continuation of the Siwalik Range of India. They are covered with timber, savanna grass, and wild ginger whose branches hang like weeping willow from the slopes. The butea (chircha, dhak, or palah), a flowering tree called in English “flame of the forest,” is native to the Churia Hills. Possibly the entire sub-Himalayan region was once covered with dhak forest and subtropical pine. This entire Bhabar and Churia Hills section of Nepal, known as the Inner Terai, is sparsely populated, and large areas are almost uninhabited.

The third zone of Nepal, the high Himalaya country, is one of the most mountainous areas in the world. Within it are five of the world's highest peaks—Everest, Kanchinjunga, Makalu, Dhaulagiri, and Annapurna, all above 26,400 feet. The northern part of this region, mostly over 14,000 feet, is uninhabited except for scattered settlements in the mountain valleys. One of these villages, in Solo Khumbu, was the home of Tenzing, who with Edmund Hillary stood for 15 minutes on the summit of Everest in 1953.

Despite the rough and stony land and bitter cold climate, the Bhotia and Sherpa inhabitants of this region grow potatoes, barley, and wheat. In summer the Himalayan people take their herds of sheep, goats, and yak up to the higher mountain pastures. Here along the Tibetan border life continues much as it has for hundreds of years. Caravans carrying cloth, spices, and small manufactured goods from India and Nepal cross the mountain passes into Tibet, and bring back salt, wool, and herds of yak.
In the southern part of this region, the outer Himalayan ranges enclose several fertile valleys, including the Katmandu Valley—the heart of the country, sometimes called simply “the Valley.” The Katmandu Valley, with a population of 410,871, is the administrative, economic, and cultural center of the kingdom. In Katmandu, as in other valleys of the southern Himalaya, rural communities have a subsistence economy, and farming is intensive, characterized by small terraced fields, primitive implements, and dependence on rice as the leading crop.

The following chapters, with the aid of maps and photographs, describe the principal physical and cultural elements of the geography of Nepal, giving special stress to the cartographic representation of resources, economic activity, and demographic characteristics. Finally, an attempt is made to bring from this variety of geographic elements a regional geography of Nepal, so that the diversity of the land and the people may be better visualized and understood.
**EXPLANATION**

- --- Approximate boundary at the time of death of Amsuvarman (640 A.D.), under the sphere of Tibetan influence.
- --- Sphere of Indian influence in 11th Century.
- --------- Chief Kingdoms of the 17th Century.
  1. KATMANDU  3. BHADGAON
  2. PATAN  4. GURKHA
  Territorial Extent of Gurkha Kingdom about 1769 achieved by the conquest of Katmandu valley kingdoms by the Gurkha King, Prithwi Narayan.
- --- Maximum extent of the Gurkha Kingdom by the end of the 18th century.
- --- Territories lost to British India as a result of Anglo-Nepali War 1814-16.
- --- Present limits of Nepal.

Base map by Survey of India
The earliest entrance of man into the land of Nepal is shrouded in the mists of antiquity, and it is difficult to distinguish between myth and fact. The history of the Himalayan kingdom is in many ways inseparable from that of India, although the two great epics of early Indian literature, the Ramayana and the Mahabharata, shed little light on the subject.

It is all but impossible to establish an accurate chronology for the early history of Nepal. The chronologies of different scholars disagree as to the names of dynasties and rulers, and where they agree as to name, they frequently differ as to the dates of the reign of a particular ruler. Even the date of the movement of the Indo-Aryans into the area is uncertain, but can be fixed as sometime between the tenth and seventh centuries B.C.

Historians are agreed that the Katmandu Valley and other parts of modern Nepal were well populated at the time of the birth of Gautama Buddha in 563 B.C. During the Mauryan era of Indian history (c. 250 B.C.) Buddhist culture flourished in Nepal, and Ashoka, the Indian King, built four stupas at Patan in the Katmandu Valley and erected a pillar to mark the birthplace of Buddha in the Terai.

The first recorded use of the name Nepal occurs in the second century B.C., when the country was under the Emperor Samudra Gupta, found on a pillar at Allahabad, containing a shrunken image of a late eighth century Buddhist sculpture. The Gupta dynasty has been noted for its patronage of the arts and architecture. The religious monuments erected by the Newars—stupas, pagodas, pillars, and Buddhist images—are beautifully executed, enhanced by rich carvings of wood overlaid with gold and painted in rich hues. The artisans worked with the materials at hand: the clays, the excellent timber, and the plentiful stone.

Although the prohibitions of Sakya were nominally autonomous, for most of their history they have been, either directly or indirectly, under some measure of foreign domination. The early influence of the Gupta dynasty has been noted. Further evidence of Indian domination is offered by Bana in his work Charita Harsha, which records that the Indian ruler Sri Harsha invaded the country in 607 A.D. After the successful invasion Sri Harsha supposedly returned to India, leaving the conquered state in the hands of a governor who was driven out by Amsuvarman, one of the great rulers of early Nepal.

Amsuvarman, who came to power about 620 A.D., was descended on one side from the Surajavansi, on the other from the Rajputs. (The line which he established has been given the name Vaiya Thakur in recognition of his Rajput blood.) Although authorities disagree as to the exact time of his rule, both Chinese and Tibetan histories and legends record his reign and his accomplishments. Amsuvarman was the first of the Nepalese kings to assume the title "Parama Bhattaraka Maharaja Dhiraja"—King of Kings.

Amsuvarman had no hereditary right to the throne, but he founded a new dynasty and brought Nepal to new heights of achievement, perhaps to the greatest glory it has ever known. Deeply interested in science and cultural matters, the new king instigated the publication of the first Sanskrit grammar in the country. He established a new system of coinage; the coins, bearing on the face the image of a flying griffin with one paw raised and on the reverse a lunar crescent with sun rays, bore testimony to the political prestige of the new ruler.

About the first quarter of the seventh century, however, the Chinese chronicler Hsien-feng, who visited the region about 630, noted that a civil war had broken out in Nepal, and that the new ruler had been driven out by his minister, Tung-kung. The minister had then established himself on the throne.

Historians speak of the Licchavi, the Kiranti, and other ancient tribes, but all agree that the Valley was developed by a people known as the Newars. The Newars may be descendants of the earliest settlers, or a migrant tribe; at any rate they are supposed by many to be the oldest living groups in Nepal and India, a people of peculiar culture who were possessed of great artistic and organizational ability. The Newars organized the agricultural system of the Valley and contributed greatly to the early development of Nepalese art and architecture. The religious monuments erected by the Newars—stupas, pagodas, pillars, and Buddhist images—are beautifully executed, enhanced by rich carvings of wood overlaid with gold and painted in rich hues. The artisans worked with the materials at hand: the clays, the excellent timber, and the plentiful stone.
Nepal became an ally rather than a subject of Tibet. They base their contention upon the fortuitous circumstance that the daughter of Anusvarman found favor in the eyes of Song-Dzan Tag-Po, son of the founder of Tibet, and contend that through their marriage the two countries entered into friendship. The facts would seem to be otherwise, and Chinese records indicate that as late as the eighth century A.D. Nepal was a vassal of Tibet.

Anusvarman died around 640 A.D. and Po lived ten years longer. In the years which followed, Nepal pursued a somewhat independent course in its domestic affairs, although within the Tibetan sphere of influence. The ruler who followed Anusvarman, Narendra Deva, brought a period of prosperity to the country and restored many of the religious shrines and temples. In 650 A.D. Nepal was said to be comparable with the best administered states of India. Less competent rulers followed, however, in a succession of dynasties of both native and foreign origin, the throne frequently being wrested from the incumbent by force or intrigue.

Though the Katmandu Valley remained the political and cultural core of the nation, during much of her history the present territory of Nepal was divided into a large number of principalities. During the thirteenth century, for instance, some 24 small states surrounded the Katmandu Valley; during the fourteenth century the Valley itself was divided into three principalities, one centered at Patan, another two miles away at Patan, and the third six miles away at Bhaktapur.

Around the thirteenth century the Hindus, fleeing from the Moslem penetration of their own country, began to take refuge in the hills of western Nepal, where they set up a number of small kingdoms. It was the little western kingdom of Gurkha, formed by some refugees of Rajput origin, which in the eighteenth century consolidated this territory and formed the modern state of Nepal. Prithwi Narayan, Prince of the Gurkhas, in 1769 conquered the Katmandu Valley, as one writer has it, "more perhaps by intrigue, terrorism, and a ruthless blockade than by battle." Prithwi Narayan elected to take the title of King of Nepal.

By the end of the eighteenth century the new nation had extended its territory to the Kangra Valley in Punjab, an expansion which was checked by the Sikh leader, Ranjit Singh (plate 2). The warlike people then turned their attention toward Tibet, only to be repulsed again. Their territorial ambitions brought them into conflict with the British in the beginning of the nineteenth century and led to the Anglo-Nepali War of 1814-15. The war was not one of Britain’s finer military efforts, but good fortune and superior armament finally won the day. By the terms of the Treaty of Sugauli, which was signed on November 28, 1815, Nepal lost Sikkim, Kumaon, Garhwal, and all of the Terai west of the Kali River. This reduced the kingdom to approximately its present boundaries.

Nepal was also forced to accept a British Resident at Katmandu, but this representative of the crown was, in effect, an ambassador rather than a symbol of foreign sovereignty. At this time the Nepalese correctly concluded that "peaceful penetration" of the country, particularly by Europeans, could have unsettling effects. The governments of Nepal and of India, through which Europeans would have to pass to enter Nepal, placed effective restrictions on travel into the area. Percival Landon estimated in 1828 that only about 120 Englishmen and 10 other Europeans had set foot in the Katmandu Valley. H. W. Tilman, who visited Nepal in 1948 with a British climbing party, notes that "from the time of Brian Hodgson (British Resident from 1833 to 1843) onwards, not even the British Resident has been allowed to set foot outside the valley." In the seclusion of a land protected by treacherous mountain peaks to the north and malarial jungles to the south, Nepal developed in its own way, preserving its feudal pattern of life during the period when the western world was being swept by radical new social doctrines. The Gurkha rulers, having experienced at first hand the impact of western militarism, organized their government along strictly military lines, even minor officials being given military titles.

Shortly after the conclusion of the Anglo-Nepali War, Gurbhan Juddha Vikram Sahi died and the throne descended to his infant son, Rahendra Vikram Sahi. This event was to have a profound effect upon the political future of the country. The Prime Minister at this time was Bhim Sen, and with the aid of the Queen Mother, Tripari Sundari, this ambitious man increased the power of his position at the expense of that of the monarch. (The position of Prime Minister was established by Anusvarman, but up to this time had been of little importance.) Sen pushed through reforms in taxation and governmental structure and increased the emphasis upon the military.

With the death of the Queen Mother in April, 1832, the power of Sen was sharply reduced, and the entry of his nephew, Matabar Sing, into an important governmental position evoked the jealousy of Bhim Sen’s brother, Ranbir Sing Thapa, the commander-in-chief of the army. This family quarrel and the simultaneous dispute between the King’s two wives were resolved by Bhim Sen’s suicide in 1839. The Pandi or Brahman party, supported by the senior Queen, now came into power, but upon her death two years later the Thapas were restored at the insistence of the younger Queen, who had supported Bhim Sen. Sen’s nephew, Matabar Sing, was returned from exile in India to head the government. The years which followed were marked by murder and intrigue, and Matabar himself was assassinated by the King’s order in May, 1845. The King, Rahendra Vikram Sahi, was failing mentally, and Matabar’s murder was reputedly instigated by Gagan Sing, the lover and confidential attendant of the Queen. The death of Matabar signaled a massacre in which 31 of the most influential political leaders were supposedly killed.
In 1845 Jang Bahadur, the talented nephew of Matabar Sing, became Prime Minister. This capable man quickly disposed of the troublesome Queen, who wished to have the two sons of the King's first wife put to death so that her own son could accede to power. When her request was refused, this strong-willed lady plotted the death of Jang Bahadur, but her intrigue was uncovered and she, the King, and the sons other than the heir apparent were exiled. The hereditary prince, Surendra Vikram Sahi, was placed on the throne as Regent and was elevated to the kingship when the former King organized a conspiracy against Jang Bahadur.

Jang Bahadur instituted many reforms and evidenced a genuine interest in the welfare of the people of Nepal. He was pro-British, and under his administration relations with Britain, which had been uneasy since the treaty of 1815, became more friendly. After 1848 Jang Bahadur frequently offered Gurkha troops to serve the British under his personal command. He visited England in 1850 for a personal audience with Queen Victoria, in which he assured her of the friendship of Nepal for the British.

In 1854 the Nepalese clashed with the Tibetans over the treatment of Nepalese nationals in Lhasa. After a fierce struggle, fought under great hardships on the high plateau of Tibet, the Tibetans in March, 1856, submitted to an annual tribute of 10,000 rupees and agreed to abolish customs duties on Nepalese goods. An ancient situation was reversed by this treaty, which further provided that a representative of the British be stationed in Lhasa to assure Nepalese traders of fair treatment.

Jang Bahadur resigned in favor of his brother Bam Bahadur in 1856, with the intention of retiring completely from public life. In recognition of his service to Nepal, King Surendra Vikram Sahi gave him the title of Maharaja and conferred upon his family hereditary title to the premiership of the country. This excellent public servant's retirement was short-lived, however. Bam Bahadur died in 1857 and Jang Bahadur was recalled to office.

Shortly after his return, in June, 1857, the Prime Minister was able to fulfill his bold ambition of giving military assistance to the British. The Mutiny had broken out in India, and this time his offer of troops under his personal leadership was accepted. During the campaigns of 1857 and 1858 he led 12,000 Gurkha troops against the Indian rebels. In recognition of his assistance the British Queen made Jang Bahadur a Grand Commander of the Order of the Bath and restored to Nepal a tract of territory along the Oudh frontier which had been ceded to the British under the Treaty of Sugauli.

The first of Nepal's hereditary Prime Ministers died in 1877. The cause of his death is not exactly known, but according to the legends which have grown up around the life of this man, the greatest of all Nepalese, he died as a result of a struggle with a wounded tiger. Fact or fancy, it is an end in keeping with his exciting career.

The unique institution of hereditary Prime Minister persisted until 1951, and during this period the Maharajahdhiraj, as the King was officially called, was only a nominal ruler—an official whose name appeared on government documents but who had no real power.

Making the position of Prime Minister hereditary did not entirely remove the office from the political intrigue which had surrounded it since the time of Amsuvanman. In 1885, Ranaudip Singh, who followed Jang Bahadur, was assassinated; Bir Shamsher Jang Bahadur survived two assassination attempts before his death from a broken blood vessel in 1901. Deb Shamsher, who succeeded him, served only a few months before being dismissed for misconduct;* he was followed in the same year by Shri Chandra Shamsher.

Many monuments in Katmandu commemorate the rule of the Ranas, hereditary prime ministers of Nepal for more than a century.

In recent times, succession has been more orderly.

The Rana, as this hereditary line has been called, were not, on the whole, progressive. They controlled great wealth, and the continuance of their position seemed to them to rest on an economically depressed Nepal. The last two of the line did attempt reforms, however. Before World War II, Shri Juddha Shamsher announced a 20-year plan for progress, and in October, 1949, his successor, Shri Mohan Shamsher, set up a National Planning Committee to develop a 15-year economic plan. Despite these efforts, and acknowledging the limited resources of the country, one finds little to praise in the rule of the Ranas; under them the nobility flourished, but the masses were left to their own devices or starvation.

In February, 1951, the 104-year-old Rana oligarchy was brought to an end by an almost bloodless revolution under the leadership of the late King Tribhuvana Bir Vikram Shah Deva, called "the Father of Modern Nepal." The people and the crown joined in overthrowing the Prime Minister's regime and, on February 18, King Tribhuvana proclaimed Nepal a constitutional monarchy and abolished the hereditary rule of the Ranas.

Under this enlightened monarch Nepal reentered the world community and for the first time in centuries Europeans were welcomed to the country as official guests and tourism was encouraged to some extent. The coronation of King Mahendra Bir Vikram Shah Deva in 1956 was a lavish event to which many foreign diplomats and dignitaries were invited.

Reforms begun by his father have been vigorously pursued by King Mahendra, and in 1959, on the eighth anniversary of Tribhuvana's historic proclamation, Nepal's first general election began.

The period between 1951 and 1959 was marked by political instability and a rapid succession of governments, but it was also a period of achievement and of persistent efforts by the King and some of the political leaders for the development of democratic institutions, culminating in the recent general election. In June of 1954 an Advisory Assembly of representatives from important elements of the population was established with a view to instituting more democratic governmental procedures. Questions of judicial reform, social welfare, and economic development became the concern of the government on a scale never before equaled in the country.
Before the politically unsophisticated and almost entirely illiterate masses of Nepal could be prepared to elect a government, enormous obstacles had to be overcome. But on February 12, 1959, a new constitution for Nepal was proclaimed by King Mahendra. Drafted by a commission advised by British constitutionalist Sir Ivor Jennings, the constitution provides for a bicameral legislature with a representative lower house. During the following week the arduous process of polling Nepal’s scattered population was begun, and in May the country's first elected government took office. The success of the first election is a tribute to the hardy and disciplined people of Nepal who, with so little experience in democracy, have displayed in a practical way their faith in its principles.

2 This section is based on D. R. Regmi, Ancient and Medieval Nepal (Kathmandu, 1952). See also Luciano Petech, Medieval History of Nepal (c. 750-1480) (Rome: Instituto italiano per il medio ed estremo oriente, 1958).
Isolated until recently by mountains, the little-known Himalayan kingdom of Nepal is today the scene of a struggle between democracy and communism—foreign ideas which, though they are little understood by the general masses of Nepal, are bringing forth major changes. This conflict is in part a reflection of Nepal’s location between Communist-occupied Tibet and democratic India, and in this respect it continues a pattern which has always been prominent in Nepalese history. Hemmed in by two major Asian powers, each of them vitally interested in this strategically located country, Nepal has been profoundly influenced throughout its history by both India and the Tibetan region of China (plate 1).

The boundaries of Nepal to the south, west, and east were established approximately as they stand today by the Treaty of Sugauli, which ended the Anglo-Nepali War of 1814-15 (plate 2). The northern boundary coincides more or less with the high peaks of the Great Himalaya, along the frontiers of Tibet and the Communist empire. Nepal’s northern border is undemarcated, and large parts of her territory are shown within the borders of Tibet on Chinese and Soviet maps. As with other mountain boundaries, it is not clear whether the boundary line is to follow the highest crests or the watershed. In the Great Himalaya some southward-flowing rivers have eroded their valleys headward to a point where they drain areas well to the north of the line connecting the highest crests. The location of the northern boundary of Nepal has caused occasional friction between Nepal and China.

The boundaries between Nepal and India are completely unfortified and no passports are required of citizens of the adjoining countries. Thousands of persons cross the border each year as agricultural workers, tourists, and temporary inhabitants. Most of Nepal’s boundary with India is clearly demarcated, and there has been no boundary dispute between Nepal and its southern neighbor. The use of Himalayan streams flowing from Nepal into India for power and irrigation calls for the cooperation of the two countries, and they have agreed, as in the case of Kosi, to cooperate in utilizing the water resources.

The Constitution of 1959

Nepal’s new constitution, proclaimed by King Mahendra in February, 1959, took effect on June 30 of the same year, after the newly elected parliament had been sworn in under the interim constitution of 1951. Under the 1959 constitution the executive power is retained by the King, who may veto any act of the legislature, and who has extensive discretionary and emergency powers. Civil rights, however, are guaranteed, and a Supreme Court is established. The upper house consists of one member from each of 109 constituencies, elected for a term of five years by the people. All citizens over the age of 21, regardless of race, sex, creed, or caste, are entitled to vote (only criminals and lunatics being excepted). The cabinet, consisting of eleven ministers and eight assistant ministers, is an advisory body appointed by the Prime Minister and responsible to the lower house of the parliament. The King may remove any Prime Minister who fails to retain the confidence of the lower house, and he may call or dismiss the parliament at will.

Within Nepal, administrative divisions have changed with every dynasty to suit the whims, conveniences, or strategic ideas of the court. In many instances, administrative boundaries have followed water partings, or provincial units have been formed on the logical bases of drainage basins. However, as late as 1924 no modern maps (or maps of any accuracy) for the entire country were available. The various political divisions existed, but no one knew their extent and boundaries. In the three seasons of 1924-1927, staff members of the Survey of India (European surveyors were not allowed inside the country) mapped the entire 54,345 square miles of Nepal from the Terai to Tibet, and excellent maps (1 inch to 4 miles) showing the political divisions and physical features of the country were made available for the first time. The divisions shown in the Survey of India map sheets have been used by the government of Nepal, though there have been a few minor changes, the basic political units shown on these sheets are regarded as correct. However, the Nepal government is considering the revision of these units of administration.

At present, Nepal has 38 districts (some of them further divided into subdistricts) (plate 3). These districts are divided into a total of 491 counties (thums). Each of the 38 districts is administered by a Bara Hakim (governor) appointed by the King. The Nepal government has made no effort to produce a map of the thums, and in fact very few Nepalese know the number and boundaries of these county divisions. The official census report, however, gives the population figures by thums. With the aid of notes, sketches, and information supplied by the local officials in various parts of the country and at Katmandu, a map of Nepal showing all the thums has been prepared for the first time (back pocket). This thum map does not claim to be entirely accurate, because there are certain areas which the author has not visited, and in a number of instances precise information was not made available to him.

Although the thum boundaries cannot be seen in Nepal (there are no markers), they nevertheless represent sharp lines of control separating one county from its neighbors as far as payment of taxes and police jurisdiction are concerned. In many cases the county boundaries follow the natural features, but in others they exist independently of physical or cultural boundaries.
The Functioning of Political Control

The state of Nepal had its beginnings in the Katmandu Valley district, and from this core area has extended into the outlying regions. For the most part, the national territory beyond the core area has remained undeveloped and imperfectly controlled. Vast stretches in the Terai and along the Great Himalaya are but little integrated into Nepal's cultural and economic life.

The ecumene, or economic heart of any political area, which is not in itself political but generates political power, appears on the map as the region of densest population, the greatest commercial and economic activity, and the most closely spaced transportation network. The ecumene of Nepal is the eastern half of the country, the Himalayan valleys and the eastern Terai, where more than half of the population lives and where economic activities are most concentrated.

The national capital of Nepal, like those of many other states, exerts an influence far above that implied in its role as the administrative center. Not infrequently, as in news broadcasts, Katmandu is used symbolically in preference to the name of the country as a whole. The largest city of Nepal, it is also the cultural and commercial center of the nation as well as the focal point for transportation routes and a functional link with other nations.

The actual degree of control which the Government of Nepal exercises over the territory within its boundaries varies widely from place to place. In the remote Himalayan valleys, for example, there are groups of people who are untouched by the laws and requirements of the national government; Katmandu exercises de jure, but not de facto, control over these areas. A map of Nepal showing areas of de facto political control by the central government—although difficult to compile—might have more meaning than those showing the familiar de jure pattern of sovereignty.

The distribution of population, the diverse relief, climate, and vegetation, and the lack of adequate transportation facilities, represent major forces of disunity in Nepal. The government has recognized the difficulty of maintaining political control over a national territory with such a poor circulatory system, and has attempted to remedy this by the construction of routes leading out from the capital city of Katmandu. Katmandu has been the hub of air and land transportation from India, with connections to many outlying sections of eastern and central Nepal. The result has been a marked concentration of political and economic affairs in the Nepalese capital.

The problem of tying such a mountainous country together is aggravated by the great distances and by the lack of natural travel routes. The southern Terai is completely cut off physically from other sections of Nepal by a series of complex mountains. Each of the high Himalayan valleys is effectively separated from neighboring valleys by mountain barriers. The result is development of a large number of isolated population groups without a strong sense of national unity. The state idea, consequently, is weakly developed in Nepal. Such raison d'être as has existed for the state in historic periods has been based largely on the military power of the Gurkha rulers of the eighteenth and nineteenth centuries; among the chief factors today is the determination of the dominant political groups to prevent any breakup of their country. The Nepalese have, in fact, no common concept of nation, and the lack of a common language and of mass communication media has prevented the development of a national culture. The fact that nearby powers have tended to attract segments of Nepal away from Katmandu's control has also contributed to the disunity of the country.

These massive obstacles were surmounted in a spectacular way in the conduct of the first general election in 1959. An energetic program of education to prepare the people for voting was carried to the most isolated areas. Though the people of the capital and other important towns had been increasingly aware of public issues since the upheaval of 1951, among the people of the interior, political consciousness was undeveloped. The Nepalese people, though uneducated, are inquisitive. To explain the significance of the election and the rights and duties of citizens, and to demonstrate electoral procedures, mock elections were held, pamphlets and posters distributed, and lectures and exhibitions organized at many places. The various political parties also contributed to the education of the voters and the development of public interest by organizing local units and conducting an active campaign in all parts of the country.

Because of the enormous difficulties of communication and transportation, as well as the shortage of trained personnel to administer the polling, the election was spread over the period of February 18 to April 8. The staff of the election commission had previously observed the conduct of the election in India, an experience which proved of great practical value. To receive instructions radioed from Katmandu in outlying districts and to transmit returns to the capital, communications detachments of the British and Indian armies were placed at the disposal of the Nepal government. The polling stations were so distributed that no voter would have to walk more than two miles from his home to the polling booth. In sparsely populated districts, this meant that one polling place had to be provided for every six or seven hundred electors. Each of the 109 constituencies, which were determined with regard to existing administrative limits, communication facilities, population, and uniformity of culture, contains about 78,000 people.

The polling places were designed on the Indian model, one ballot box, marked with a party symbol, being assigned to each of the nine political parties which contested the election.

The election was carried out with no disorder whatever, and 43 percent of the electorate—in some constituencies as much as 90 percent—cast votes. The success of this difficult undertaking is a tribute to the discipline of the Nepalese people and to the efficiency of the government's election.
commission. The response of the electorate suggests that a recognition of their common interests and of the opportunities offered by the new constitution may have given rise to a new spirit of nationalism among the Nepalese which may serve to overcome some of the disruptive influences inherent in Nepal's situation. The long history of Nepal as a nation, and the unifying influence of common religion, may operate also to strengthen the sense of national unity.

Internal Political Problems

Though political developments during 1959 in Nepal have been encouraging, the country's uncertain political stability is constantly threatened by economic distress and poverty, the political immaturity of a nation with no past history of democracy, and the shortage of trained personnel for government. The conflicting interests among the people are reflected in the existence of some dozen national political parties, and there has been a tendency for political movements to oscillate between the extreme right and the extreme left. In the recent election, however, there was little to distinguish the nine parties which entered the contest, as far as their announced programs and promises were concerned.

All promised land reform, development of unexploited resources, hydroelectric power, industry, improvement of health, education, and communication, and so on. In foreign affairs all professed a neutral policy of nonalignment with power blocs, friendly relations with other countries, and promotion of international peace. But in the leadership and support of the parties and in the details of their programs, the differences between them are clear.

The Nepali Congress, led by B. P. Koirala, lays great emphasis on socialist aims, to be realized gradually through political institutional means. It gives high priority to redistribution of land and improvement of agriculture, village development, cottage industry, and improvements in health, education, and communication; it also favors protection of forest resources, promotion of heavy industry, security of foreign capital, and labor legislation. The United Democratic Party, led by former Prime Minister K. I. Singh, is more radical, proposing to liquidate landed aristocracy. Though frequently accused of alignment with the Communists, Singh has been critical of China and opposed the Communists in the election campaign. The Communist Party itself is weak, being confined to the Kathmandu Valley and to young labor movements in the Terai. The rightwing Gurkha Parishad Party is supported mostly by the Ranas and aristocrats. The oldest political party, the Praja Parishad, was formed in 1936, but has been weakened by a conflict between its leaders which in 1958 resulted in a split of the party.

A total of 864 candidates entered the contest for the 109 seats in the lower house of the parliament, 339 independents having qualified in addition to the candidates nominated by the various parties. Prior to the election it was predicted that no party would be able to secure a working majority, and that weak and unstable coalition governments would be the result. Despite these predictions, two-thirds (73) of the seats were won by the Nepali Congress Party, which contested all of the seats. The conservative Gurkha Parishad won only 19 seats, the United Democratic Party 5, and the Communists 4. Every party president except B. P. Koirala of the Nepali Congress was defeated. Koirala, who heads the government sworn in on May 27, appointed a cabinet in which he was careful to include representatives of all castes, classes, and regions, one post going to the parliament's only woman representative.

The new government thus appears to have a sound political position, and its leaders have shown a sincere interest in coping with the nation's problems. But the realities of Nepal remain: the stark contrast between wealth and poverty, the lack of a solid middle class to hold the balance between upper and lower groups, the gap between high living costs and low wages, and the resistance of the landowning class to fundamental economic and social reforms.

If democracy is to be established in Nepal, the government must raise economic standards and reduce illiteracy among the masses through a widespread educational program.

World Relations

Isolated in the Himalaya, Nepal has tended to ignore or resist the impact of the sociopolitical movements which have swept most of Asia in recent times. Since the revolution of 1950, by which the Prime Minister's dictatorship was overthrown and a constitutional monarchy inaugurated, the isolation of Nepal has been broken, and in 1955 Nepal became a member of the United Nations. The subjects of foreign policy and international affairs have captured the imagination of thousands of Nepalese youths and politicians who a few years ago would have been hard put to it to locate foreign countries on a world map. The Himalaya is no longer an impassable barrier, and the recent political developments in Tibet and the creation of independent India have brought Nepal out of seclusion.

Until recently, Nepal's foreign relations were strictly limited to the British government in India. The Rana rulers were dominated by Great Britain and, strictly speaking, Nepal's independence was formal. To prevent the extension of Chinese influence from Tibet, imperial policy kept Nepal an isolated buffer state under British influence. After 1947, relations between Nepal and independent India were established as between two sovereign states, but India is vitally interested in building in Nepal an independent and progressive democracy with the strength to resist Communist expansion from the north. Speaking in parliament of the Indian attitude toward Nepal, the Indian Prime Minister has said: "Geographically Nepal is almost a part of India, although she is an independent country. . . . It is not possible for the Indian Government to tolerate an invasion of Nepal from anywhere, even though there is no military alliance between the two countries. Any possible invasion of Nepal . . . would inevitably involve the safety of India." On a later
Therefore, much as we appreciate the independence of Nepal, have occasion still fairly effective. The Himalayas lie mostly on the northern border of Nepal. We cannot allow that barrier to be penetrated because it is also the principal barrier to India. Therefore, much as we appreciate the independence of Nepal, we cannot allow anything to go wrong in Nepal or permit that barrier to be crossed or weakened because that would be a risk to our own security.

Thus Nepal continues in her traditional role as a buffer state. Though she herself plays a minor role in geopolitics, her location gives her immense geopolitical significance, and the Himalayan kingdom has become the stage of a long-range and delicately intricate contest between India and China for political influence. Successful political subversion in Nepal would bring Chinese power well to the south of the Himalaya and down to the edge of the Gangetic plain. India's declaration that she would defend Nepal against any aggression, received in Katmandu as a friendly gesture, may be taken as a warning not only to China but to India.

Geographic proximity and cultural affinities have thus far kept India's influence dominant. Nepal's communication and trade with the outside world are carried on through India, and a large part of Nepal's foreign aid and technical assistance comes from India. Indian army patrols, by Nepalese request, help guard the Nepal-Tibet border, and India has helped train the Nepalese army. Most of Nepal's political leaders received their education and their political apprenticeship in India.

This dominance of Indian influence has given rise to the fear of Indian "imperialism" among the Nepalese, and this fear operates to the advantage of the enemies of democracy. Since the introduction of parliamentary government Nepal's internal politics have shown great instability, and there is a tendency for pro-Indian and pro-Chinese factions to emerge. A postelection group of opposition parties described the Indo-Nepalese agreement on the Kosi project as another instance of India's "colonial policy." However, China's territorial claims on Nepal and the recent threats of Chinese aggression on the frontier have forced the Nepalese government to lean even more heavily on India.

The emergence in 1947 of independent India, whose leaders had denounced the autocratic government in Nepal, forced the Ranas to widen the range of their international contacts. In 1948 the first formal relations were established with the United States. In the fall of 1950 the advance of Chinese Communists in Tibet greatly increased the strategic value of Nepal. In this respect the United States' interests parallel those of India, and in 1951 economic aid under the Point Four Program was extended to Nepal. This program has since been greatly expanded (under the new name of International Cooperation Administration) and a United States Operations Mission has been established in Katmandu to supervise and administer economic aid to Nepal. The U.S.O.M. is housed in Rabi Bhawan, one of the stately palaces of the hated Rana rulers.

The operations of the United States and India in Nepal offer an unusual example of international cooperation. Technical assistance projects under the American aid program are planned in consultation with Indian officials. In such enterprises as road building, the development of air travel, and health and education services there is joint Indian-American participation. For example, Indians, with Nepalese help, are building landing strips, and Americans are installing navigational aids at the new airfields. One of these strips, at Mustang in the Great Himalaya, is within a few miles of the Tibetan border. Among the important American aid programs being carried out now are an antimalaria campaign in the Terai, mineral exploration and development, and the Rapti Valley Development Project. The United States is also building a 28-mile aerial ropeway, costing three million dollars, to haul 20 tons of freight an hour in buckets over the mountains, and constructing roads between jungle towns that now are linked to Katmandu only by runners, who take as long as 22 days to reach the more remote valleys. A major program is construction of an improved telephone system within Katmandu, a radio-telephone network extending to all the districts of Nepal and New Delhi and Calcutta in India.

The United States has won the spending race in Nepal by pouring in millions of dollars14—more than the total income of the Nepalese government—but the program has not aroused great local enthusiasm. Most of the American aid has gone into projects far from Katmandu; for example, development in the remote Pokhara Valley, where conditions are so backward that the first wheel anybody ever saw was on an airplane bringing in supplies. In the malarial Rapti Valley in south Nepal, the United States has helped build an all-weather road. Previously, the valley was used mainly as a hunting reserve for the Ranas, who would move their entire government, along with their wives and elephants, to the valley for a few months of hunting each year. The new road, together with the DDT-spraying program, is opening up new land for settlement of thousands of homeless and landless farmers. But it is hard to convince certain local politicians in Katmandu of the value of all this aid. The presence of a group of nearly 50 American technicians and administrators and their families living in Rana palaces in luxury (according to Nepalese standards), spending evenings at the bar of the International Club with the Third Prince or some Rana playboy, engenders criticism from the Nepalese and obscures the value of United States efforts even, at times, among the better informed citizens.

Since the withdrawal of British power from India in 1947 and the assumption by India of the dominating role in Nepalese politics, the principal interest of the United Kingdom in Nepal has been the retention of the right to recruit Gurkha soldiers for the British army in Southeast Asia. Under a 1947 agreement Britain continued to recruit Gurkhas up to twelve battalions and maintained recruitment depots in Uttar Pradesh in India, but in 1952 India withdrew Britain's privilege of recruiting Gurkhas in Indian territory. A new agreement, therefore, was signed with Nepal in 1953, permitting Britain to operate recruitment depots near Jaleswar and Biratnagar in the Terai.

Because of popular Nepalese sentiment against recruitment of Gurkhas, the 1953 agreement is subject to termination at any time, although fighting manpower is still Nepal's most profitable export. The rise of nationalism is a factor in the present sentiment against the mercenaries. Educated Nepalese today are not flattered when a foreign visitor recalls the gallantry of Gurkha regiments in two world wars. They appear to regard it as faintly disreputable that so many thousands of their countrymen found their livelihood fighting distant wars under alien flags. During the 1959 election campaign the Communist party made a public issue of Gurkha recruitment, contending that it was an affront to Nepalese dignity for Gurkha regiments to do the "dirty work" of "foreign imperialists." Other political parties ignored the
issue, but agreed that Nepalese should not be allowed to hire themselves out as fighting men. However, they conceded that until Nepal could provide jobs at home for these men, nothing would be gained by forbidding further recruitment.

Nepal's own army of 10,000 men is too small to absorb the 25,000 Gurkhas serving abroad (15,000 men in the Indian army and 10,000 men in the British army). The pensions the Gurkhas receive upon retirement and the remittances they send to their families while on active duty have long been Nepal's steadiest source of foreign exchange and a significant contribution to its national income. As a concession to rising sentiment in Nepal, the United Kingdom is now somewhat closemouthed about her recruiting activities, and the Gurkha tradition of soldiering in foreign armies appears to be on the way out.

Nepal's contact with China dates back to the seventh century, the Imperial, Nationalist, and Communist Chinese governments have frequently talked, and sometimes tried to and succeeded in launching an attack on Tibet, and in the peace negotiations of 1856 Tibet agreed to pay an annual tribute to China's control in Tibet led to a change in this relationship. The annual Tibetan tribute mission was stopped. In 1954 Nepal planned to establish border patrols along the Nepal-Tibet border, and India is helping man about twenty guard posts, but guarding the rugged Himalayan terrain, communications, and a aid program of twelve million dollars spread over a period of three years. And in accepting the economic aid of China, Nepalese political leaders have sought to take advantage of Nepal's position between India and China to balance her relations with the two great Asian countries. In addition to regular economic aid, the Chinese have made token gifts from time to time, for example, in 1957 Premier Chou En-Lai, on a state visit to Katmandu, donated $4,000 for a Buddhist shrine, and the Nepalese Premier received a lump sum grant during his official exchange visit to Peking.

Despite China's overtures of friendship and economic aid to Nepal, the 500-mile undermarked boundary between the two countries constitutes a major problem. Chinese maps continue to show large parts of Nepal as well as adjoining India within China. The circulation of these maps showing Chinese territory extending far to the south of the Great Himalayan Range suggests that Communist China would one day formally challenge the Nepalese frontier just as they are claiming parts of Indian territory. Since the flight of the Dalai Lama from Lhasa in the spring of 1959 and the Chinese military operations in Tibet, the northern border of Nepal has become very unstable. Members of the Nepalese parliament touring the border areas have reported that Communist China is making large-scale military preparations close to Nepal's frontier, and active Communist agents are working among the border people. A member of the parliament from western Nepal reported that the Chinese have constructed roads cutting through Nepalese territory in the northwest, joining the military depot in Taklakot in Tibet with another place near the border, and a large number of Chinese were cutting timber from the Jamal district of northwest Nepal. According to the Nepali newspapers, Chinese troops were reported to have crossed the border in large numbers in Doti and Dandeldhura.

There is very little which Nepal can do by herself to check the Chinese penetration. The immense height of the passes across the Great Himalaya is no longer an effective deterrent. In 1954 Nepal planned to establish border patrols along the Nepal-Tibet border, and India is helping man about twenty guard posts, but guarding the rugged Himalayan border is difficult and reports of the movement of Chinese troops across the border have continued to appear from time to time.

In the event of a Chinese invasion, Nepal cannot defend herself without external assistance. Terrain, communications, and numbers all favor Communist China along one of the world's most rugged frontiers. From Katmandu to the border area there are only trails and the going is uphill, through steep, narrow defiles or over mountains. The Chinese, on the other hand, are in possession of the high ground. They can operate from the relatively level Tibetan plateau to support their troops in the Himalaya. Their supply line extends back hundreds of miles through Tibet into China proper, but the Communists are reported to have built one or more main highways into Tibet, one of them a lateral road paralleling the Nepal frontier. They have completed, or are working on, several roads that lead toward the frontier. Two or more Chinese airstrips near the border also have been completed. Supply difficulties for both sides are immense, but much greater for the Nepalese than for the Chinese.

It seems that there is little possibility of a major conflict between China and Nepal because of the difficult terrain. But recent developments along the India-China border have put Nepal on guard against Communist ambitions in the strategic Himalayan region, and this realization is likely to color Nepal's attitude toward China.

Chinese Communist propaganda in Nepal has been supplemented by the Soviet Union's overtures of friendship. In the summer of 1958 the King of Nepal paid an official visit to the Soviet Union following the presentation of credentials by the Soviet Ambassador in 1957. In the summer of 1959 a Russian embassy was opened in Katmandu. The Soviet Union has agreed to provide economic aid worth thirty million rubles to Nepal. It will be used to construct a fifty-bed hospital, a small sugar factory, a hydroelectric plant, and a sawmill. In addition, the Soviet Union has promised to make a survey for an east-west highway across the country. The Soviet experts, who began their job in the fall of 1959, have completed aerial and ground surveys for the alignment of this road. None of the other projects have begun as yet.

In the near future neither the Communist nations nor India and the United States are likely to push forward too hard in Nepal. India must maintain its present political influence in Nepal for its own security, and the United States has tacitly backed India's security concern. At present, China does not seem to plan military aggression—which would mean war—in Nepal. But the Communists will continue their long-range plan of infiltration, exert pressure on the government, and promote dissension among the masses in order to gain influence. Until the new government takes effective measures for social and economic advancement, Nepal will continue to be a target of world Communist expansion.
According to Spate, the "boundaries between India and independent Nepal...lie for the most part in the jungly and malarial terai, a negative tract." W. Gordon East and O. H. K. Spate, eds., *The Changing Map of Asia*, 2d ed., rev. (New York: E. P. Dutton & Co.; London: Methuen & Co. Ltd., 1953), p. 130. It is hardly accurate to refer to the Indo-Nepal boundary as running through a "negative tract," since it passes through densely populated agricultural and commercial areas in eastern, midwestern, and far western Terai (see land use and population maps, below).


6 Ram Chand Malhotra, "Public Administration in Nepal," *Indian Jour. Public Administration*, IV (1958), 451-64. Up to the present, no fundamental changes in divisional administration have been reported.

7 Angur Baba Joshi, "The First General Election In Nepal," *Parliamentary Affairs*, XII (1959), 311-19. This section is based primarily on Mrs. Joshi's report.

8 Although no figures are available for the exact number of people voting in the election, it has been estimated that 4,226,000 were eligible. *Statesman's Yearbook*, 1959 (London: Macmillan and Co.).


10 For an evaluation of the defensive role of the Himalayas with one growth of air power, see K. M. Panikkar, "The Himalayas and Indian Defense," *India Quarterly*, III, 2, 3 (April-June, July-September, 1947), 127-35, 233-58.


14 For a short text of Nehru's foreign policy speech in parliament promising to defend Nepal against aggression, see *New York Times*, November 28, 1959. For details see *The Statesman* (Calcutta), November 28, 1959. For reaction of B. P. Koirala, the Nepalese Prime Minister, see *The Statesman*, November 30, 1959.


19 It should be understood that the institution of paying tribute was often not so much a means of recognizing suzerainty or overlordship as a pretext for the tribute-bearing mission (sometimes comprising a hundred or more people) for doing business, being feasted, and otherwise profiting greatly from the excursion. Nepal has paid tribute to China, and Tibet to Nepal. At one time or another all had some special relationship with Britain. If today Nepal and China want to base their claims on historical grounds (especially as far as Tibet is concerned), each can do so as easily by selecting the historical period most favorable to her cause.


Physiography

Until a comparatively recent date in geological history—the middle Tertiary epoch—all of Nepal and probably the whole of Tibet were covered by the great geosynclinal Tethys Sea. In this sea, deposition of sediments continued for a long period, until at length, owing to forces of unknown origin, a period of crust movement set in and the floor of the Tethys Sea began gradually to rise and be thrown into a series of long, parallel, wavelike folds.

As the crests of the earth waves rose from the waters of the Tethys Sea, they were eroded by rain and wind, and the rising land became broken and irregular. Drainage basins were carved out of the flanks of the ranges and a river system of transverse valleys gradually developed. As elevation continued, the troughs of the folds emerged and a series of longitudinal valleys was established. From a combination of the concurrent processes of elevation and erosion, the mountain systems of Nepal evolved. As denudation proceeded, deeper and deeper parts of the crust were laid bare, but the forms of many folds can still be traced and the trend of their longitudinal axes can be followed for considerable distances. As a result of earth movements, folds have been superimposed on folds and arches have been distorted and crumpled or overturned until they are almost horizontal. The details of mountain structure in Nepal can be unraveled, therefore, only with extreme difficulty. Where the stress has exceeded the breaking strength of rock, the structure has been complicated by fractures; parts of the crust have moved horizontally, forming nappe. Nor are these the only causes of complexity, for along many of the planes of weakness and fracture, molten material has been forced up from below and has partly absorbed the original sediments.1

The orogenic activity which transformed the Tethys geosyncline into the present Nepal Himalaya appears to have taken place in three phases.2 The first phase of upheaval, at the end of the Eocene period and in the Oligocene, ridged up the ancient crystalline and sedimentary rocks which make up the central axis of the Nepal Himalaya. A second movement of great intensity in the Miocene period folded the sediments. The third and last main upheaval, which took place in the post-Pliocene period, raised the central part of the range, together with the foothills, into the vast range of mountains which have since been reduced to form the present Himalaya. Geologists believe that the post-Pliocene elevatory movement continued for a long time, and there is some evidence that it has not as yet entirely ceased.

Landforms are the surface expression of geologic structures as modified by the processes of erosion. In Nepal, broadly speaking, there are two major surface features, the Himalaya in the north and the Terai plains of the south (plate 4 and inset). Within this general framework there are many varieties and complexities of landform (plate 5).

Physiography of the Himalaya

Geologically, the Himalaya is roughly divisible into three zones from south to north: the sub-Himalaya, the Middle Ranges and the Inner or Great Himalaya, and the Tibetan zone (plates 6 and 7).

The Sub-Himalaya or Outmost Ranges. The foothills of the Nepal Himalaya rise gently from the Terai plains to about 2,000 feet, and then abruptly in steep, almost perpendicular escarpments. A succession of narrow parallel ridges whose strike is almost northwest-southeast follows, separated by more or less broad longitudinal valleys. These longitudinal valleys, known as "duns," are a prominent feature of certain sections of Nepal. The extensive, picturesque duns behind the Churia Hills in the Chitawan, Nawalpur, and Butwal districts are quite typical of the Nepalese landscape.

These outer hills, formed entirely of the younger Tertiary rocks, rarely attain an altitude of more than 4,000 feet. The Churia Hills of Nepal have the same general structural and lithological characteristics as the Siwaliks, the outer hills of the sub-Himalayan zone in India. These outer sub-Himalayan ranges are made up of a series of broad anticlines and synclines, dissected into escarpments and separated by the narrow, longitudinal valleys or duns noted earlier. Overthrust faults are a characteristic and highly significant feature of the outer Himalaya. Wherever the younger Tertiary rocks (the Siwalik system of Indian geology) are found in contact with the older formations, the plane of junction is a reverse fault. This plane of contact is known as the Main Boundary Fault.3

The Churia Hills, like the outermost ranges of the Himalaya in India, consist of a great thickness of detrital rocks, such as coarsely bedded sandstones, clays, conglomerates, and sandy limestones. The composition and character of the Siwalik rocks indicates that they were derived from the weathering of the granitic core of the central Himalaya. These deposits have been folded and elevated in the most recent Himalayan upheavals.

The Middle Ranges and the Inner Himalaya. The middle ranges (or Lesser Himalaya) consist of higher mountains (5,000-15,000 feet) cut into deep ravines and precipitous defiles. These ranges contrast in form with the outer foothills described above, being ridges of irregular direction which branch again and again. The intricate system of ranges which lies between the Great Himalaya and the Churia Hills averages 50 miles in width. The Mahahatar Lekh, a singularly well defined range of mountains extending from the Mahakali to beyond Kosi Valley, may be taken as a type of the mountains of the Middle Himalaya. Its ridges present generally a steep escarpment toward the south and a relatively gentle slope toward Tibet. The northern and northeastern slopes are clad in dense forest, the glory of Middle Himalaya, succeeded higher up by a capping of snows; the southern slopes, except in protected valleys, are bare, being too steep to maintain a soil cover for the growth of forests or to allow the winter snows to accumulate.

Geologically the Middle Himalaya is composed of highly compressed and altered rocks of various ages. The structure
of this zone is only vaguely known, but it is characterized by overfolds of the recumbent type, severed by reverse faults that have passed into thrust planes along which large slices of the mountains have moved bodily southward. The tectonic sequence of eastern and central Nepal worked out by Hagen and Lombard reveals a number of nappes (plates 6 and 7).

To the north of the Mahabharat and associated ranges of the Middle Himalaya, and enclosing between them the Valley of Katmandu, are the more lofty mountain ranges of the inner zone of the Himalaya, rising into peaks of perpetual snow. Beyond this Inner Himalaya the country, with the exception of the deep gorge of the Arun, is a high desert.

The structure of the Inner Himalaya has not yet been the subject of intensive study. A great deal of investigation in the central ranges, especially in the zone of most complex folding and intrusion, remains to be done before the structure of these mountains can be described in other than very general terms. The evidence so far obtained from the works of Hagen, Bordet, and Lombard, tends to show that large areas of the Inner Himalaya in Nepal are built of piles of nappes.

Lombard and Bordet distinguish three structural elements in the Everest massif. The first unit, including Lobuje, Pumori, Loh peak, the northwest ridge of Everest, and Lhotse consists of fossiliferous geosynclinal sediments ranging from Tertiary in the north to upper Permian in the south. The second unit, forming the Nuptse mass, is an anticlinal thrust slice with a granitic core and a partially preserved sedimentary cover of paragneiss. This slice truncates the underlying third element, the Khumbu nappes, which forms the area east and west of Khumbu glacier and consists of crystalline schists and paragneissse folded by movement from the north. Along the Dudh Kosi between Namche Bazaar and Jubing the Khumbu nappes are thrust over the roots of the Katmandu nappes.

According to Hagen, the structural relations of the thrust arcs which form the Himalayan range show that the height of the ranges was attained during a relatively late phase of horizontal compression, rather than as a result of isostatic adjustment. Lake deposits and salt formation are cited by Hagen as evidence that the uplift of the main range was so rapid that it dammed antecedent south-flowing rivers, all of which subsequently cut deep valleys between the thrust arcs.

The Great Himalaya is one of the most formidable mountain barriers in the world. There are few passes, most of them above 16,000 feet. (United Nations)

The Tibetan Zone. North of the Great Himalaya, at elevations of 15,000 feet or more, the rocks dip gently northward and are overlain by fossiliferous marine sediments of more recent origin. Almost invariably these marine sediments occur only north of the Great Himalayan axis.

The Nappe Zone

In the Himalaya compressive forces have produced thrust faulting, with resulting complexities of geologic structure and related topographic forms. One of the most striking examples of thrust faulting is found in the Middle and Inner Himalaya of Nepal, where great rock sheets have moved at low angles for many miles and created such complicated geologic structures that their mapping and interpretation have been among the most difficult problems in Himalayan geology. The thrust sheets (known as deccen or nappes) are particularly associated with recumbent or inverted folds. Two main nappe groups have been noted in central Nepal, each consisting of several nappes. The lower one was called by Hagen the Nawakot nappe system, and the overlying one the Katmandu nappe system. It is possible that these two correspond to the Garhwal and Krol nappes in the Garhwal Himalaya to the west.

The Nawakot nappe system consists of two main sheets, one thrust over the other, and composed of quartzites, phyllites, coaly phyllites, sandstones, large boulder beds (Permian and Carboniferous), dolomite (Triassic), limestone, and breccias. The root zone of this nappe system occurs along a line running from about 10 miles northeast of Gurkha to a point about 27 miles north of Katmandu in the Trisuli Valley. From this line to the south, the Nawakot nappes form the large Gosainkund anticline. Still further south is the vast Katmandu syncline.

The roots of the Katmandu nappes form the main range of the Himalaya. In the Katmandu area, they are overthrust from north to south for about 40 miles, forming the klippe of Katmandu. In western Nepal, south of Jumla, large
masses of Katmandu nappes are overthrust. These masses consist of phyllites (Daling), sandstones, schists of different degrees of metamorphism, gneiss (Darjelling), quartzites, and limestones of Ordovician age. The lower parts of the Katmandu nappes are intruded by granites, pegmatites, and aplites, which have caused metamorphism. The Katmandu nappe system consists of four major sheets. The root zone, near Rasu Garhi, exhibits a higher degree of metamorphism than that south of Katmandu. Hagen has pointed out many similarities between the crystalline zone of the northern root part of the nappe and the root zone of the Swiss Alps. The Katmandu nappes are lying more or less conformably on the Nawakot nappes. The southern parts are, however, thrust suplementarily and contorted by movements of a late phase.

Glaciation in the Himalaya

At the higher elevations the landscape of the Great Himalaya is characterized by the lofty serrate ridges, cirque-indented slopes, and sharp peaks produced by glacial action. These ice pinnacles attain heights up to 30 meters; they develop especially on the southeast sides of convexities in the glacier, with their tips tilted toward the sun at its zenith. The origin of this interesting formation is uncertain.

The present glaciers of the Nepal Himalaya, some of them among the largest in the world, are merely the shrunken remnants of those which flourished in the Pleistocene age. Heaps of terminal moraines, now grass-covered and in some cases forested, ice-transported blocks, smooth and striated hummocky surfaces, and other indications of the work of glaciers are observed at elevations several thousand feet below the present tongues of the glaciers. Grooved and polished rock surfaces have been found in most of the Himalayan valleys. The mountains have a characteristic glaciated aspect, and the valleys are filled with moraines and fluvioglacial drift. A more detailed geomorphic survey of Nepal will bring more convincing proofs of ice action in the Himalaya.

Geomorphic Features of the Himalayan Valleys

The outstanding geomorphic phenomenon encountered in the Himalaya is the intimate way in which geologic structure has controlled the details of the topography. This is most excellently illustrated in the configuration of the valleys in Nepal Himalaya.

Although a great majority of the valleys in Nepal are erosion valleys, there are a few examples of tectonic valleys—synclinal troughs enclosed between two contiguous anticlinal flexures. The Katmandu Valley and the many duns in the sub-Himalaya (Churia Hills) are examples of these synclinal troughs, though the Katmandu Valley has been modified by the deep alluvium which fills its bottom and rests on the slopes of the bordering mountains.

The most distinctive characteristic of the Himalayan valleys in Nepal is their transverse course. They cut the geologic structures and run across the strike of the Himalayan ranges. These transverse valleys follow the deep gorges which the rivers have cut by the slow process of vertical corrosion of their beds. In some cases these transverse gorges of the Nepal Himalaya, particularly those of Kosi and Gandak, are several thousand feet in depth from the crest of the bordering ranges. Even the zone of highest, snow-capped ranges is deeply entrenched by rivers. The origin of these transverse gorges of the Himalaya has been the subject of much discussion among geologists. There is no doubt, however, that some of the great Himalayan rivers, among them the Kosi, are older than the mountains they traverse. During the formation of the mountains by folding, contortion, and upheaval of rock beds, the old rivers kept to their own channels, eroding their beds at an accelerated rate because of the uplift of the regions near their sources. Thus the elevation of the Himalayas and the erosion of the river valleys proceeded at the same time, the two processes keeping pace with each other with the result that a completely developed valley system with transverse gorges emerged with the rise of the Himalaya.

The deep, precipitous gorges of the Nepal Himalaya, cutting across the highest elevations of the mountains, indicate that most of the Himalayan valleys antedate the mountain structure across which they cut. The fact that Himalayan rivers such as the Kosi, Gandak, Kali, and Karnali drain not only the southern slopes but also to a large extent the Tibetan slopes of the Himalaya is explained by their antecedent character. The watersheds of the Nepalese rivers lie, not along the line of highest peaks in the Himalaya, but far to the north of it, usually in Tibet.

Some rivers in the Everest area of Nepal, the Arun, for example, have captured the streams belonging to the Tibetan drainage system on the northern slopes of the Himalaya through the rapid head erosion of their main transverse courses. Detailed study of the geologic and geomorphic history of the Himalaya will be required before examples of river capture by head erosion in other parts of Nepal can be cited with assurance.

Some tributary valleys in the Great Himalaya of Nepal join the main troughs discordantly. Although in some cases the hanging valleys are a result of glaciation, in most instances they result from rapid erosion of the main valley. The elevation of the Himalaya steepened the gradient and accelerated the downcutting of the main valleys without a corresponding effect on the tributaries, which produced discordant junctions marked by cascades and waterfalls.

In the eastern part of the Nepal Himalaya, valley courses are uniformly broad, with gently sloping sides, because the heavy rainfall of this region subjects the valley sides to erosion. In the drier western part, however, river erosion is the chief agent of denudation and deep defiles are cut out of the hard crystalline rocks without much lateral erosion of the valley sides.
NEPAL
TOPOGRAPHY

Scale 1 Inch to 40 Miles, or 1:2,534,400

Heights in thousands of feet and decimals, thus 29.0 = 29,002 ft.
Compiled from Survey of India large scale maps.
NEPAL
LANDFORMS

Scale 1 inch to 40 Miles, or 1:2,534,400

Base map by Survey of India
Heights in thousands of feet and decimals, thus 29.0 = 29,000 ft.
Compiled by ROY HOBBS
from Survey of India large scale maps

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Heights in thousands of feet and decimals, thus 29.0 = 29,000 ft.

Base map by Survey of India

Compiled by ROY HOBBS
from Survey of India large scale maps
TECTONIC MAP OF CENTRAL NEPAL

GENERALIZED SECTION ACROSS NEPAL SHOWING THE BROAD TECTONIC FEATURES
NAPE roots of major Tectonic thrusts

- Synclinal axis
- Anticlinal axis

GEOLOGICAL STRUCTURE OF CENTRAL NEPAL

After Hogen
Himalayan valleys are in an early stage of development. They have been rejuvenated again and again by the rise of the nickpoints along the valleys. 

*Physiography of the Terai*

The Terai plain forms the northern extension of the Gangetic plain, and varies in width from 16 to 20 miles, narrowing considerably in the Deokhori and Chitawan districts. This plain is the result of filling up by long-continued alluviation of a tectonic basin formed when the strata of the Tethys Sea were folded and raised into the Himalaya Mountains. Nepal Terai, therefore, represents a foredeep in front of the advancing earth waves of the Himalaya. This sunken tract has a basement of ancient crystalline rocks whose uneven surface, traversed by faults, indicates that it sank by a series of block faults. It is believed that the frequent earthquakes in the Terai are due to movement along a fault or series of faults below the alluvium. The northern boundary of the trough is marked by a series of parallel reverse faults, the boundary of the outermost Himalaya. The trough is deepest in Nepal Terai and the adjacent area of north Bihar and Uttar Pradesh, and its floor gradually rises towards the south. In India, south of the Ganga, the cover of alluvium is shallow and the hills and ranges of gneiss, quartzites, and slates in south Bihar give a clue to the continuation of the gneissic highlands further south beneath the Ganga alluvium. Recent gravity surveys in India indicate a maximum of about 6,500 feet of alluvium near the Indo-Nepal border. Probably this deep trough has sunk further under the load of accumulating sediments.

In this northern part of the Ganga plain, the alluvium contains more clay than the recent alluvium in the flood plain of the Ganga tributaries, where the soil is fertile loam. The older alluvium, known as Bhangar, is of a pale reddish-brown and is somewhat gravelly here and there, particularly near the foothills. The rivers here tend to scour their beds and therefore, except for the Kosi, are less liable to flooding than further south, in the areas of newer alluvium.

Small areas along the Indo-Nepal border fall into the zone of recent alluvium, but most of this zone lies in India.

*River Geography*

The Terai region of Nepal is a land of rivers (plate 8). Nearly three million Nepalese living in the valleys of the Kosi, Bagmati, Gandak, and their tributaries continually face the danger of floods and consequent crop failures. Throughout recorded history, man has toiled unceasingly in this area of Nepal and adjoining India to protect his land, his home, and his family.

In the upper courses all of the rivers run through hilly regions where there is little or no flood problem. It is in the low lying areas of newer alluvium in the Terai and the plains lower down in India that floods are especially serious. Here the majority of the people live in large compact villages and towns. The river alluvium makes the soil particularly fertile, and the flat or rolling topography lends itself admirably to farming. The most suitable time for planting is soon after the beginning of the rainy southwest monsoon. But this is also the time when floods occur, and strenuous efforts have to be made to provide just enough water for the crops and at the same time protect those who work in the fields and the communications which are necessary for moving the produce.

Physiographic features are of great importance in understanding the frequency of floods on these rivers. South of the Churia Hills, which consist of sandstones, sandy limestones, and gravel beds of the Siwalik system of Indian geology, is the Bhabar area described above, a zone of hill wash and alluvial fans composed of highly porous gravels. Further to the south is the Terai area, forming a strip from northwest to southeast along the southern border of Nepal. This is a typical piedmont or sub-Himalayan plain. The southern fringe of the Terai is rather elevated and is composed of Bhangar alluvium, which usually forms the inter-fluvies. This area is less liable to annual flooding. The valley flats of the main rivers, made of newer alluvium or Khadar, are almost annually affected by the floods. In this area the soil is loam with a mixture of sand and silt. Here the Gandak, Bagmati, Kosi, and their tributaries bring a heavy load of sediments from the Himalaya. When the rivers reach the plains, their velocity is checked and they deposit so much of the load of sediments in their beds that their shallow channels can no longer accommodate the huge volume of water during the monsoon. The flood waters deposit sediments over the countryside every year in all these areas.

The rivers flow in a meandering fashion in the Terai, and in times of flood the mainstream sometimes crosses the neck of a meander loop, usually changing the river's course. Several oxbow-shaped meander loops in Nepal and adjoining areas of India give evidence of the shifting of these streams, a tendency which contributes greatly to the danger of floods.

One of the worst offenders in this respect is the Kosi River—Kaushiki of the Sanskrit classics—which has long been...
known as the river of sorrow. The third largest Himalayan river, yielding pride of place only to the Brahmaputra and the Indus, this mighty stream drains a catchment area of some 22,888 square miles, of which 2,228 square miles are under glaciers. Rising in the upper regions of the Himalaya with its three tributaries, the Sun Kosi from the west, the Arun from the north, and Tamur from the east, it forms the Sapt Kosi at Tribeni and then flows in a narrow gorge for six miles to debouch upon the plains of Chatta. Further downstream, the river runs in a sandy alluvial plain, winding its way southward through the Nepal Terai and north Bihar, exhibiting the many bifurcations and interlacings of a deltaic stream, till it falls into the Ganga.

The Kosi has no defined banks and through the ages has been perpetually changing its course, because of the heavy silt charge it carries in suspension and the detritus that moves along its bed. The coarse silt deposited by the flood waters of the Kosi turns arable land and orchards into barren fields, where only thorny shrubs and wild grass grow. In its movements the river has laid waste large tracts of land, estimated at between 300 and 500 square miles in the Saptari and Morang districts of Nepal, and a much larger area in India. The flood menace is now gradually shifting away from the Morang district and is concentrated in Saptari.

Above the Chatra gorge, the Kosi flows in a steeply sloped boulder bed. As the bed gradient is reduced in the Terai plain, the river tends to form shoals and split itself, and from late autumn to early summer the Kosi is seen in the delightful garb of innumerable and unending channels, interlaced like the meshes of a net, on which elephant grass throws down a “steely gray mantle of useless flowers.” Some of the channels are so swift and dangerous that even the “stateliest elephants may be swept off their feet.”

In the monsoon months, when about 80 percent of the annual rainfall occurs (precipitation in the Himalayan catchment is about 70 inches in the foothills and about 140 inches on the southern slopes of the Great Himalaya) the Kosi emerges from the Chatra gorge into the alluvial plain with a very large volume of water. The freshets begin in June, giving the milky water of the river a reddish tinge, and often raising its level as much as 30 feet in 24 hours. From June to September the Kosi is a rolling mass of water, carrying the heaviest charge of detritus known in a tropical river. In flood the Kosi currents carry death in their wake, and when they retreat, the land is but a wilderness of sand.

The Bagmati River leaves the Katmandu Valley through a narrow gorge in the Mahabharat Range at Chobar.


4 For studies of the structure of the Himalaya by Hagen, Bordet, and Lombard, see bibliography.


7 Wadia, Geology of India, pp. 419-21.

8 The following section is based on Hagen, “Ober die raumliche Verteilung der Intrusionen im Nepal-Himalaya.”


10 This section is based on Wadia, Geology of India, pp. 376-77.


Climate, Vegetation, and Soil

Climate, vegetation, and soils are intimately related to one another, and together make up most of the physical environment. Though it is often necessary to separate them from one another for purposes of description, it must be remembered that it is the totality which matters. Soils, for example, derive in part from the parent rock, but their depth and composition vary with relief and climate, and their texture with the nature and distribution of the plants that contribute humus.

In Nepal, a moderate climate particularly well suited to man is found only in the mountain valleys of about 5,000 feet altitude. The rest of the country suffers from extreme heat, as in the Terai, or extreme cold, as in the mountainous areas of the north. The climate changes markedly with elevation. In the Himalaya the variations of exposure to sunlight and to rain-bearing winds have the effect of producing very intricate patterns of local climate; but there are also broad climatic areas based chiefly on the decrease of temperature with increasing elevation. These high-altitude climates are not similar to the climates of the middle latitudes, for with increasing elevation the seasonal variation of temperature becomes smaller and smaller until it practically disappears.

The Terai area of south Nepal, like the adjoining part of India, is a land of tropical monsoon climate. The monsoonal rhythm, expressed in seasonal rainfall associated with the southwest winds of the summer monsoon and practically rainless winters, extends into the mountain valleys. The Great Himalaya protects the southern part of the country from the bitterly cold winter winds—air masses generated in the Central Asian source regions. The winter high pressure is much weaker and produces much lighter winds (winter monsoon) than in Mongolia or Tibet. On the other hand, the intensive heating of the Terai (along with northern India) in the summer produces steep low-pressure gradients and the southwest wind (summer monsoon) is generally much stronger in Nepal than it is in China or Mongolia.

Insolation and Temperature

No figures are available on the insolation received in Nepal, but it is supposed that the amount of insolation decreases from south to north. The insolation received in the southeast is greater than in the rest of the country. The surface cover of the earth reflects insolation in varying degrees: reflected radiation from the surface of fresh snow is 85 percent, that from bare ground is 10 to 25 percent, from cultivated fields 20 to 30 percent, and from forests 10 to 18 percent. The average landscape in Nepal, with a predominance of vegetation-covered mountains and cultivated valleys, therefore, may be expected to reflect about 10 to 20 percent of the insolation. It is reasonable to suppose that the insolation received is greater in the early part of the summer before the “break” of the monsoon and its accompanying cloudiness.

The temperature conditions in Nepal are of an extremely complex pattern. Temperatures decrease, in general, with increasing altitudes, and averages of less than 50°F during the coldest month begin about 4,500 feet above sea level. There is a marked winter season even in the Terai, where January temperatures average from 60°F in the eastern district of Morang to 50°-55°F in the western districts of Kanchanpur and Kailali. During June the average temperature varies from about 80°F in eastern to 90°F in western Terai.

In the high mountains, altitude and degree of exposure to the sun are responsible for local temperature conditions. For instance, in the still conditions of winter, the cold night air flows into hollows and valleys even in the lower ranges of the Himalaya, at elevations of 4,000 to 5,000 feet. Fog and frosts are frequent, and in certain hollows night temperatures sometimes may be below freezing. In the Kathmandu Valley, average temperatures range from 50°F in January to 78°F in July, and the lowest and highest temperatures recorded in the last 30 years have been 27°F and 99°F.

In the humid, subtropical Terai the range of temperature between the average of the warmest month and the average of the coldest month varies from about 20°F in the east to 35°F in the west. The range of temperature increases westward in the Terai, but becomes narrower as one ascends the mountains. At Kathmandu (27°42'N), 4,500 feet, the difference between the averages of the warmest and the coldest month is 28°F, the same as the difference at Sacramento, California (38°35’N), 25 feet above sea level.

Precipitation

Most of the rainfall in Nepal is associated with the southwest monsoon, which breaks about mid-June and spreads 10 to 15 days later over nearly all of Nepal. The southwest monsoon usually lasts from June to September (2½ to 3 months) and in this period accounts for approximately 80 percent of the precipitation. There is fairly steady east to west decrease in amount of rainfall; in the Terai, the decrease is from 70-75 inches in the Morang district to 30-35 inches in Kanchanpur. The Himalayan slopes show a comparable decrease from east to west; total rainfall is naturally higher in the Himalaya than in the Terai plains. Measurements taken in connection with the building of a dam on the Kosi River show the rainfall is roughly 50 inches in the Terai plains of Biratnagar district, rising to 70 inches in the foothills and still higher on the southern slopes of the Himalaya.

In the inner Himalayan valleys the amount of precipitation varies with the extent of exposure to the rain-bearing monsoon winds. Several high valleys located in well-marked rain shadow of the mountains are extremely dry. In Kathmandu Valley the average annual rainfall is about 58 inches, most of which falls in the period from June to September.

During the winter (December-January) the northwest wind brings some precipitation, usually about 5 to 10 inches in western Terai and about 20 inches in the western mountains. Although adequate data is lacking, the winter rains are said to be produced by depressions originating over...
The Mediterranean Sea and traveling over Iran and lands to the west. In this period western Nepal gets more rain than eastern. It snows above 6,000 feet in the Mahabharat, and in valleys of the main Himalayan range snow is very common.

Climatic Regions

In such a mountainous country as Nepal the climatic conditions present a most intricate pattern. Variations in exposure to the sun, variations in hours of sunlight, and sharp differences in rainfall within small areas are characteristic. In general, however, all this intricacy of detail resolves itself into broad climatic zones whose limits are determined by altitude. When one of the mountain ranges is viewed from the air, the outlines of these climatic zones are quite visible in the contrasts of vegetation.

At least three major climatic regions can be recognized in Nepal: the hot and humid subtropical area of the Terai and the foothills, the cooler (microthermal) region of the Mahabharat and Inner Himalaya, and the tundra region of the Great Himalaya (plate 9). Although each of the four basic weather elements—temperature, pressure, precipitation, and winds—varies with altitude, temperature is the primary criterion for dividing Nepal into these three broad vertically arranged zones.

A very common error among Nepalese is to think of their high-altitude climates as similar to climates with the same average temperatures which are found at sea level in the middle latitudes. Many Nepalese writers have stated that by ascending to the mountain valleys (7,000 to 8,000 feet) one reaches temperatures comparable to those of climates much farther from the equator. This is true only if we consider average annual temperatures; it is far from true if we consider seasonal variation of temperature or variety of weather. As one ascends the mountains, the range of temperature becomes smaller, but there is none of the weather variety characteristic of a middle latitude climate.

The humid subtropical zone reaches approximately 4,000 to 5,000 feet above sea level. It is, in effect, an upward projection of the humid subtropical climate of northern India, from which it is difficult to differentiate it satisfactorily. With a rainfall of 80 inches in the east, decreasing to about 40 inches in the west, it is the environment of nature's rainforest or savanna and man's rice, sugarcane, and jute. The southeast is the zone of the truly tropical plantation crops.

North of this the climate changes markedly with elevation. The Mahabharat Range and Inner Himalayan chains have microthermal climates difficult to classify for purposes of mapping. The winters range from moderately cool to severe, and summers are warm and rainy. Although rice, sugarcane, bananas, oranges, and other lowland products reach their respective uppermost limits at some point in the higher part of this climatic zone, in the lower sections and valleys are the areas of the most intensive farming in Nepal. Approximately 10,000 feet above sea level moderately cold winters and short cool summers tend to place an upper limit on successful grain farming. This lower zone includes the narrow Himalayan valleys and skirts the rugged slopes of the Great Himalayan Range. The broad-leaved trees of its moister, warmer section tend to resemble those of the humid subtropical climate. This is especially true of the southern flanks of the high mountains. In its higher margins, however, broad-leaved trees are replaced by coniferous evergreens. In some places, as in the valleys where there is less moisture, scrub forest or short grasses appear. Urban as well as rural settlement is very much in evidence in this climatic zone. Three of Nepal's large urban centers—Katmandu, Patan, and Bhatgaon—are in or near this zone.

In the upper part of this climatic zone, above 10,000 feet, winters are severe and summers short and cool. This zone may be distinguished from the lower zone by two criteria. First and perhaps most important in an agricultural country, it is a zone of frost, only occasional in the zone's lower reaches but common above 10,000 feet. Second, it tends to be the habitat of native tribal economy. This zone extends to about 14,000-15,000 feet, which is the upper limit of agriculture as represented by such hardy crops as potatoes and barley, and the upper limit of natural tree growth. The relative positions of the tree line and snow line vary with the rainfall. Snow lines are generally higher in dry regions, whereas the tree lines are lower; the zone of high grasslands is, therefore, widest in dry areas and narrowest in the wet areas of the east.

This land of severe winters and cool summers is the last retreat and the major home of native Nepalese tribes such as the Sherpas and Bhotias, and is characterized by small permanent settlement and by rather primitive ways of life. It is wholly rural with a good deal of transhumance. The population density seldom exceeds 50 persons per square mile except in a few favored places. The local inhabitants continue to live as their ancestors have done—grazing their yak and sheep, and growing their meager crops of potatoes and barley. Throughout the year the temperatures remain surprisingly uniform—usually between 35° F and 45° F. Precipitation varies greatly from valley to valley, with a rough average of 20 to 25 inches annually. It is a dreary life in a dreary land.

At elevations over 15,000 feet, the climate is that of a true alpine tundra.

Natural Vegetation

Rock and soil vary within short distances in Nepal, and there are sharp variations of slope, altitude, and drainage. Despite the strongly marked and often abrupt changes in flora which result from local soil and climatic conditions, there is a degree of uniformity in the vegetation of large areas which allows the country to be divided into four distinct vegetation belts (plate 10).

The zone of tropical moist deciduous vegetation occurs in southern Nepal, in the Terai and the Churia Hills. In the deciduous forests of the lowland Terai, new riverine species are found abundantly in the main river beds and on islands; old riverine species are found further away from river beds where the soil is no longer subject to flooding. The new riverine forests, which hold together the gravel, boulders, and sand brought down by the rivers from the Churia Hills and the Mahabharat, cover an area estimated at 800 square miles, or less than 2 percent of the country.
There forests consist mainly of khair (Acacia catechu) and sissoo (Dalbergia sissoo), often in association with thick tall grasses. Sissoo is a valuable tree used in furniture making. From Khair, catechu is extracted for "pan," a mixture of betel nut, betel leaves, and catechu chewed habitually by the Nepalese.

The old riverine forests cover a larger area, extending across the country in a zone lying between the new riverine forests and the sal forests of the foothills. Semal (Bombax malabaricum), karma (Adina cordifolia), sitis (Albizia spp.), bot dangero (Lagerstroemia spp.), latikarma (Hymenodictyon spp.), and many other trees occur in these forests. Semal, which can be used for plywood, matches, and even paper, has been extensively worked in the Bardia, Kailali, and Kanchanpur districts; it is less abundant in the eastern part of the country. Karma is potentially of high commercial value for furniture and veneer. There is little market for the other species.

North of the old riverine forests, as the land starts to rise, sal (Shorea robusta) appears, frequently constituting over 45 percent of the stand in western Nepal but less dominant in the east, where humidity is higher. The sal forest, extending over about 3,500 square miles in the Bhabar, is economically the most valuable forest of Nepal. Sal is used for house building and railroad ties, and has a vast market in India. All the readily accessible parts of this forest have been devastated by overcutting and depletive practices. Annual burnings and grazing tend to prevent the establishment and development of the seedlings. Healthy and extensive stands remain in only two areas, Chitawan in central Nepal and Morang in the east.

On the Churia Hills sal, associated with pine, is found between 1,000 and 4,000 feet. The sal of this area is inferior in quality, and because of the distance from road or rail terminals the stands have not been exploited. Chir (Pinus longifolia) grows in the driest part of the Churia Hills. There are other species of little commercial value, but the ground cover of sabai grass, sold in India as a raw material for paper pulp manufacture, is an important resource.

Pine predominates, with some oaks, in a long belt along the Himalayan slopes, mostly at 3,000 to 7,000 feet. Sal may be found in suitable sites on the lower margins. In this zone the cultivation of the land is so intensive, especially in central and eastern Nepal, that very little of the natural vegetation remains.

A humid subtropical climate prevails here at about 5,000 feet, and the vegetation consists of subtropical moist hill pine and deciduous trees.

On the Mahabharat Range, in a broad stretch of country running along the whole length of Nepal at elevations of 5,000 to 10,000 feet, the forests consist of a mixture of many species, chiefly pines, oaks, rhododendrons, poplars, walnuts, alders, magnolias, and, in some areas, conifers. These forests are of great importance for soil conservation and for the supply of fuel, forage, and material for poles and farm implements.

In the eastern part of the Mahabharat the forests consist mainly of oak, magnolia, larch, and pine. Here a fairly dense population practicing shifting cultivation has cleared all but the inaccessible and remote parts of the forest, and practically nothing remains but a stand near Okhaldunga in Chinsangku (East No. 3), and some inferior clusters on steep slopes and rocky terrain.

In the western part of this area the population is less dense and some fairly extensive forests still exist, chiefly of khair (Pinus excelsa), chir, and deodar. In the upper basins of the Mahakali and Karnali rivers there are almost virgin stands of khair and deodar mixed with walnut. The deodar is found as far east as the Gandak River (Narayani). In the lower basins of these rivers the chir and deodar have been logged on a small scale in the last few years.

Northward the subtropical vegetation passes into temperate coniferous forest, which can be subdivided into two zones according to elevation. In the upper part (approximately 11,000 to 12,000 feet) the forest consists of fir (Abies spectabilis) mixed with birch (Betula utilis). Rhododendrons are abundant in this subalpine zone. In the lower part (approximately 7,000 to 11,000 feet) various species of oak are dominant but larch, bamboo, and some hardy deciduous trees also appear. There is a significant difference in vegetation between the northern and southern slopes of the Himalaya. On the southern side conifers do poorly and are being replaced by oak forests.

In certain sections of the Inner Himalayan ranges, as on the northern flanks of the Dhaulagiri Range, the moist temperate is replaced by rather open xerophytic forest. This dry temperate forest consists mainly of junipers with scattered oak and ash. On the more arid hillsides and terraces, junipers are replaced by thorny bushes (Caragana spp.).

The vast area of the Great Himalaya bears some of the most valuable forests in Nepal. From 9,000 to 10,000 feet are magnificent forests of khair mixed with spruce (Picea morinda) and fir (Abies pindrow); above that khair gradually gives way to cypress (Cupressus torulosa) and junipers. Of the hardwoods, oak and maple occur up to 9,500 feet, and from there to the timber line (13,000 to 14,000 feet), birch.

Alpine vegetation occupies the extreme north—the higher parts of the Great Himalayan range. Winters are very cold and summers short and cool. Precipitation is slight and occurs chiefly as snow in winter and as light rain in summer. The plants are adapted to the extreme cold, to conditions of drought which exist in winter and even in summer, and to the very short growing season. Trees, except dwarfed varieties growing in particularly sheltered spots, are lacking. Most plants are low and stunted; in some areas, moss or lichen predominates over a land surface that is devoid of soil. On slopes, short woody plants appear, often with thick leaves. Some of these bear an abundance of brilliant flowers in summer. The vegetation conforms closely with the aspect of the land. A southerly slope may have stunted bushes and grass, while a northern one has chiefly lichens and bare rock. In certain parts of this zone stretches of arid vegetation produce a brown landscape.

The upper part of the alpine zone (14,000 to 15,000 feet) has a sort of grassy vegetation just below the snow line which affords favorable grazing ground in summer. The lower part of the alpine vegetation zone (approximately 13,000 feet) consists of an abundance of low bushes of rhododendron (on well-drained and humus-rich soils) and scaly junipers (on sunny and dry sites).
The Mahabharat forests are dwindling, and throughout the country's main productive forest resource, the Himayalan forests are rich in timber but unworkable longer contribute to the economy. The examination of maps and air photos and considerable air reconnaissance have revealed that this figure is excessive and that forest covers only about 17,500 square miles, or roughly one-third of the country. Much of this forest area is unproductive because of over-felling, and annual burning.

The forest area may be classified as follows:

- New riverine forests: 800 square miles
- Old riverine forests: 1,200 square miles
- Sal forest of the Bhabar: 3,500 square miles
- Foothills forest: 2,000 square miles
- Oak forest: 8,000 square miles
- Coniferous (softwood): 2,000 square miles
- 17,500 square miles

Roughly the forest cover (plate 10, inset) in the four physiographic regions of Nepal is as follows:

- Terai: 700 square miles
- Bhabar and Churia Hills: 6,500 square miles
- Mahabharat: 9,500 square miles
- Himalaya: 800 square miles
- 17,500 square miles

The Terai forests are practically all ruined and can no longer contribute to the country's economy. The Bhabar forests are the country's main productive forest resource. The Mahabharat forests are dwindling, and throughout the area the problem of soil erosion urgently demands solution. The Himalayan forests are rich in timber but unworkable at present.

In the Terai plains proper, areas under forest are very small indeed because most of the land is taken for agriculture. The shortage of forest produce, especially fuel, is encountered over large parts of India is seen in acute form in the plains. The demand for forest produce is very large because of the dense population, but the supply is limited, especially for village consumers, and the practice of burning cowdung is widespread. The possibility of increasing the area under forest is very limited, however, as most of the lands in the Terai must continue to be used for cultivation. The people in the Terai must remain dependent on adjacent hill areas for a large part of their requirements of forest produce. Their needs can be met to some extent (to a large extent in areas where the density of population is not high) by the creation and efficient management of small plantations of trees near the villages. The importance of such village tree plantations has not yet been realized. But in many densely populated parts of Nepal these plantations cannot be large enough to meet the fuel needs: use of such alternative fuels as soft coke is essential for supplying fuel needs and to stop the burning of cowdung.

Soils

Soils are, next to water, Nepal's most vital natural resource. Geographically, soils are significant not only as an economic resource, but also because they reflect to some extent the geomorphic history of the region. It is now commonly agreed that five major factors—climate, topography, soil biota, geological foundation, and age—condition the development of soils. Climate acts directly through temperature and indirectly through its influence upon the amount and kind of vegetation. The soils of Nepal reflect the mesothermal, microthermal, and tundra climatic zones and the tropical (including the subtropical), temperate, and alpine zones of vegetation. Azonal lithosols exist on the steepest and highest Himalayan slopes, but on the gentler slopes of the Mahabharat Range and Churia Hills shallow zonal soils prevail where the vegetative cover remains more or less intact. Red or yellow soils occur under tropical deciduous and subtropical moist forest cover on the lower slopes. Brown or gray podzolic forest soils and mountain meadow soils appear at successively higher altitudes under temperate coniferous and alpine vegetation.

Alluvial soil crosses the whole length of southern Nepal, from Morang in the east to Kanchanpur in the west. Covering approximately 9,000 square miles, it supports nearly 30 percent of Nepal's population and provides the largest share of agricultural income. These soils are easily cultivated and respond rapidly to irrigation and manuring. So long as the water supply is assured, there are few soils which are more suited to intensive agriculture.

In so large a region there are naturally many local variations in the character of the soils, but the alluvial soils of the Terai possess a common origin in their derivation from materials transported and deposited in relatively recent times by the numerous tributaries of the Ganga River system rising in Nepal. They are immature azonal soils with weak profiles, undifferentiated into defined zones. Geologists divide the alluvium into two age groups, the older represented by the higher land rising above the flood level of the present rivers. Here the soils are brown, argillaceous loams, more or less permeated with nodular kankar (limestone). The newer alluvium is chiefly confined to the existing flood plains. It has to a great extent been derived from the older alluvium by the rivers, which constantly change their courses. The typical soils of the newer alluvium are pale brown clays and loams with considerably more sand than the older alluvium, less clay, and usually no kankar.

Fringing the alluvial soil of the Terai is the tract known as Bhabar. This is the slope of gravel and shingle along the fundamental parent material. These young mountain soils are liable to constant erosion. Of restricted extent except in the intermontane basins, they include mountain meadow and forest soils, alluvial ripelands, and podzolic soils, as well as talus accumulations, scree, and residual materials left by the weathering away of limestones and dolomites.
The foothills of the Himalaya are built up of the Siwalik series, the outermost stage of which consists of loosely aggregated conglomerates with soft sandy beds. Such materials in a climate with a heavy monsoon rainfall give rise to shallow, immature, sandy soils of a light character with little humus, on which the salt flourishes up to about 3,000 feet. This area is sharply marked off from the Bhabar deposits, though sometimes there is no topographically marked division.

Northward the salt forests lose their depth and vastness, and their tropical characteristics disappear. The country is much barer. The hillsides become covered with small villages, each with a little plot of terraced fields enclosed by woods.

Important though geological causes have been in influencing soil conditions in the Himalaya, their role is subordinate to that of increasing altitude and the concomitant development of a temperate climate in the zone ranging from about 5,000 to 11,000 feet. Here the salt forests of the sub-Himalaya give way to forests of pine mixed with other conifers and with magnolias, oaks, laurels, and rhododendrons. Shubby varieties of rhododendron, as well as a few conifers and with magnolias, oaks, laurels, sub-Himalaya from about 5,000 to 11,000 feet. Here the sal forests of the Himalaya, their role is from those of mountain forest to tropical.

Between 3,000 feet, the average upper limit of the endemic malaria zone, and 10,000 feet, the average upper limit of cultivation, soil erosion is widespread and severe, having been considerably accelerated by improper land use practices. This situation raises vital problems for almost three-fourths of Nepal's population.

In eastern Nepal, over large parts of the Sun Kosi, Arun, and Tamur river valleys, not more than 10 percent of the land is under forest, and the forest, as in other parts of the Mahabharat, is so situated that it has little influence on checking erosion in the drainage basins. Standing on abrupt slopes which are undermined at their bases by runoff channels, the forest is gradually disappearing under the impact of landslides and riverbank excavations. As a result the Terai plain and the northern part of Bihar (India) have long suffered from floods.

For the most part the Churia Hills are forest clad and the soil, though consisting of highly erodable boulder, gravel, and sand, is safeguarded against erosion. Here the least exposure of soil, even on fairly gradual slopes, starts erosion, but fortunately, because of the porosity of the soil and the unhealthy climate, there is little farming.

The Bhabar consists of boulders, gravel, and sand deposited from the Mahabharat and Churia Hills. Along a belt eight miles wide, the porous soil and unhealthy climate prevent land settlement and efforts at cultivation have failed. The whole area is under forest and there is little erosion. The Bhabar forest is of particular importance, for it acts as a depository for the material brought down from the mountains and thus protects the Terai farmlands, which would otherwise be covered with sterile alluvium.

The Terai is cultivated plain with moderate erosion, but some croplands are lost yearly as a result of the floods described in the preceding chapter.

**Man and Soil**

In Nepal, as in other long-inhabited countries, man's use of the land has considerably altered soil characteristics.

All too commonly, the Nepalese farmer has exhausted the fertility of the soil, or by continuous grazing and cultivation has subjected it to accelerated erosion. When natural forces are unhampered, soil exhaustion usually does not occur rapidly, although in certain parts of the Himalaya, chemical elements are lost from the soil through heavy leaching. But the alluvial soils of the lowlands and mountain valleys have been exhausted through centuries of cultivation without replenishment of the chemical elements removed by the crops. Even at present low standards of consumption, agricultural production in Nepal is inadequate to meet the needs of the population, and one of the nation's most pressing needs is to increase crop yields through better soil management. It should be emphasized that in the long-settled sec-
NEPAL

EROSION AND LAND CLASSIFICATION

1. Area affected by Glacial erosion and deposition
2. Area eroded by Frost and Snow
3. Moderate
4. Severe

LAND CLASSIFICATION (Generalized)
1. WASTELAND
2. POOR QUALITY
3. MEDIUM QUALITY
4. GOOD QUALITY

Compiled from field reconnaissance
Base map by Survey of India

Scale 1 inch to 40 Miles, or 1:2,534,400

ALBERS CONICAL EQUAL AREA PROJECTION
Excessive grazing and other destructive practices have led to severe and widespread erosion in the Middle Himalaya.

The practice of shifting cultivation prevails mainly in parts of the Kosi River Basin, particularly the Arun Valley, in the pine stands of the Mahakali and Karnali Valleys in the west, and in certain softwood forests of the Himalaya.

In the Arun Valley region, the rainfall is approximately 80 to 100 inches annually, spread over a period of five to six months. Forest remnants in Okhaldhunga region (East No. 3) show that the natural stands in the area are dense, hardwood associations. Population density is fairly high, and in the Dhankuta and Bhojpur districts averages 200 persons per square mile. This area is now nearly deforested. This is not surprising in view of the density of population and the practice of short crop rotation in forest clearings. The substantial and frequent exposure of the unstable soil, coupled with the high rainfall, has resulted in maximum erosion. Crop farming on terraces is possible and frequently practiced, as in the upper part of the Dush Kosi River valley. Only the inertia of certain tribes and the lack of wise counsel are responsible for the continuance of uneconomical shifting cultivation.

In the Mahakali and Karnali Valleys the climate is drier, with an annual rainfall of 30 to 45 inches spread over three to four months. The natural vegetation is forest of *Pinus longifolia* and *Pinus excelsa* in the uplands. The forest is open, with range, except in the more humid parts, where there is denser forest of hardwood species. Population density is low and in the districts of Baitadi and Dandeldhura averages 40 persons per square mile. In this region the Tibetan tribes burn the forest after having tapped the pine, and at the beginning of the monsoon rains sow mountain rice, barley, or buckwheat. They then completely abandon the crops, to return after the monsoon to gather what wild animals have not eaten. Yields are extremely low and the size of areas burned for cropping is out of all proportion to the needs of the sparse population. Every year shifting cultivation destroys large areas of valuable pine forest to little or no purpose.

In the Himalayan region to the north of the main range (western and central Nepal as far east as the Himal Chul Mountain), shifting cultivation is not a regular practice and the extent of land so utilized varies from year to year. North of the main Himalayan range the climate is dry and cold, and the population is extremely sparse. The natural vegetation (varying with altitude, soil, and exposure) is either hardwood (oak, maple, birch), dense softwood (pines), or xerophytic trees. In the northern part of the Baglung and Jumla districts, in September of the year before cropping, the trees (preferably pines) are tapped at the base to allow the sap to flow. In March, fire is set to the forest and pines burn like torches. Then the natives sow millet or buckwheat between the stems for only one year. This method has been used over fairly small areas in Jumla and Baglung, but has not been very destructive in this region because there is quick renewal of pine stands at between 8,000 and 10,000 feet. Higher up the practice is more dangerous, for the species is no longer in its optimum habitat and regeneration is slow and difficult.
Land Use and Agriculture

The economy of Nepal is predominantly agricultural, and with increasing population there has been a tendency to bring as much land as possible into cultivation. As in other old and densely populated countries, the area of cultivation now comes very close to the limitations imposed by climate, topography, and other physical factors (Plate 12). Most of northern Nepal, where the lofty and rugged ranges of the Great Himalaya rise into peaks of perpetual snow, is barren and useless. Most of western Nepal, the Middle Himalayan ranges, and the foothills remain under forest. (The forested area, described in Chapter 5, is about one-third of the total area of the country.) Though patches of cultivated land have been carved out of the forest in the west, agriculture is localized to a marked degree in a relatively narrow band of the Terai and in the major river valleys of the central and eastern parts of the country.4

Grazing areas are not shown separately on the land utilization map, because grazing in Nepal takes place wherever pasture is available, mostly in forests and on other uncultivated lands (including currently fallow lands). The pastures of the high Himalaya are good, but difficult of access, and there is little alpine pasture, for the ground is too steep for grazing above the timberline. The pasture available is insufficient for the large cattle population; fodder crops are seldom grown, however, and the sparse pasture is supplemented by the stubble of harvested millet, wheat, and rice, and by straw.5 In addition to the cattle population, the grazing lands must support a large number of sheep and goats for which there is practically no other feed available. The consequent overgrazing is one of the chief causes of the destruction of natural vegetation and of soil erosion in Nepal. In some forest areas managed by the state, grazing is regulated, but in most of the forests, it is practically unrestricted.

Slightly over 10 percent, or 6,476 square miles, of Nepal's total area is under cultivation. The highest percentages of cultivated land are in the warm, humid plains at the foot of the mountains. The Terai plain contains nearly two-thirds of the cultivated land, and in the southeastern Terai 70 to 80 percent of the land is cropped.

In almost all cultivable parts of Nepal, temperatures are high enough for plant growth the year around, but because of moisture deficiency, only 20 percent of the arable land produces more than one crop annually. Rainfall in most of the country is concentrated in a short period of three or four months; for the rest of the year there is very little rain. Other areas lie in the rain shadow of mountains and receive almost no rainfall. The western Terai is a semiarid region dependent upon irrigation for agricultural use.

During the long dry season between September and June in western Nepal, fields are fallow and the stubble is grazed over by cattle.
NEPAL
LAND USE

Scale 1 Inch to 40 Miles, or 1:2,534,400

20 0 20 40 60 80 100 MILES

Base map by Survey of India
Subject data Compiled from aerial photographs

CULTIVATED LAND

FOREST & MOUNTAIN PASTURE

WASTELAND (Alpine Tundra, glaciers, some isolated grazing and farming in mountain valleys.)
EXPLANATION

IRRIGATED AREAS

AREAS PROPOSED TO BE IRRIGATED

SITE OF KOSI DAM

MAP SHOWING KOSI PROJECT

NEPAL
IRRIGATION

Scale: 1 Inch to 40 Miles, or 1:2,534,400

Subject data by Nepali Government
U.S. Operation Mission and India Aid Mission

POKHARA
VIJAYAPUR LOWER AND UPPER SCHEME

RAPTI VALLEY MULTI PURPOSE DEVELOPMENT PROJECT

TILAWE IRRIGATION PROJECT

SIKRA-JITPUR TUBE WELL SCHEME

SIRSA-DOOTHAR PROJECT

JUDHA CANAL IRRIGATION AREA

CHANDRA CANAL IRRIGATION AREA

AREA TO BE IRRIGATED BY KOSI PROJECT

JHAMTA

BANGAON

ALBERS CONICAL EQUAL AREA PROJECTION

PRADYUMNA P. KARAN, 1958

@ EAST OF GREENWICH 81°
Areas presently under cultivation include considerable land which, for ecological and topographical reasons, should be under grass or forest. On the other hand, vast areas which are in these respects well suited for farming are uncultivated because of a lack of irrigation facilities.

Where physical conditions permit, land use is highly intensive and the soil is cultivated thoroughly and deeply; in those parts of the country where water is scarce and soil is poor, the farming is extensive. An estimated 55 percent of the harvested land is in rice, 20 percent in corn and millet, and 10 percent in wheat. Smaller proportions of the arable lands are devoted to the production of potatoes, oil seeds, tobacco, jute, sugarcane, buckwheat, and vegetables.

Approximately one-fifth of Nepal’s cultivated land is irrigated. The most common type of irrigation consists of tapping water from the rivers by means of dams three to five feet in height and conveying the water to the fields in canals. There are, however, three larger irrigation projects in operation, and others of a more extensive nature are planned (plate 13). The Chandra Canal, which has its headworks at Fatehpur, is on the Trijuga, a tributary of the Kosi River. In operation since 1958, this canal is 58 miles long and irrigates 37,000 acres of paddy. The Judha Canal dates from 1946 and irrigates an area of 6,010 acres. Its headworks are in the Trisuli Valley, West No. 1, 2, 3, and 4, and is the second most important agricultural area of Nepal, the Central Hill Farming Region (2). Here the Mahabharat Range and the mountains of Inner Himalaya enclose several fertile valleys, including the famed Katmandu Valley—the heart of the country. Most of these broad, well-watered mountain valleys are at altitudes of 4,000 to 5,000 feet; they have deep, rich soils and support a dense population. The fields are small, and the hillsides, which often have a slope of 50 percent, are carefully terraced. Rice is the leading crop, and subsistence farming is the basis of the economy.

In the Eastern Hill Farming Region (3), which includes the districts of East No. 1, 2, 3, and 4, Dhankuta and Lam, agriculture is concentrated in mountain valleys and along terraced slopes of the Inner Himalaya. The climates here are microthermal, and vary with elevation. In the high mountain valleys, though the land is rough and stony and the weather bitter cold much of the year, agriculture is practiced by the Sherpas and other Himalayan peoples. Potatoes and barley grow in Khumbu (Chisankhu, East No. 3), mostly at between 8,000 and 10,000 feet; potatoes, the Sherpas’ biggest crop, grow at altitudes up to 14,000 feet and occasionally even higher. In summer the Sherpas take their herds of sheep, goats, and yak to the higher mountain pastures. In the lower regions the Limbus, Sunwars, and Rais, who are predominantly subsistence farmers, grow mainly rice, potatoes, and corn. Where there are transportation facilities, potatoes are exported to India.

In the Midwestern Terai (4), comprising the districts of Siuraj, Khajahan, Majhikanda, and Palhi, rainfall decreases to about 40 inches and is uncertain. The soils and the marketing position are good, but the deficiency of moisture limits the intensive use of cultivated land, and harvests are often poor.

West of the Kali Gandak River, both in the mountains and in the sub-Himalayan Terai plains, areas of cultivated land are widely scattered. This is largely because of drier conditions (estimated rainfall of about 30 inches). Two agricultural areas may be distinguished in this part of West Nepal: the warm-dry Far Western Terai (5) and the Western Hill Farming Region (6).

The Far Western Terai Region spreads over the low-lying areas of Kanchanpur, Kailali, Bardia, and Banke. Although soils are fertile, rainfall is inadequate for successful agriculture. Normal cultivation is unsafe without irrigation, but available water is limited to the Gogra, the Sarda, and their tributaries. Elsewhere, dry farming techniques may be used. Considerable areas are left fallow. The area of cultivated land per person is the largest in all Nepal. Draft animals are more numerous than elsewhere. Crops include wheat, barley, corn, and some summer rice.

The Western Hill Farming Region extends from Putthan to Dandeldhura. It is characterized by fertile soils, steep slopes, excessive erosion, and marginal rainfall. The chief level areas are along the rivers. Most of the crop land is on steep, terraced hillsides. Wheat, millet, potatoes, and corn are the main crops. Dissected topography and mile-high elevations introduce regional contrasts. Rice is grown in the lower valley bottoms in the summer, followed by wheat.

A low dam diverts the water of a small stream in a typical Nepalese irrigation system.
NEPAL
AGRICULTURAL REGIONS

BASE MAP BY SURVEY OF INDIA
SUBJECT DATA COMPILED FROM FIELD RECONNAISSANCE

MAJOR AGRICULTURAL AREAS
1. Eastern Terai
2. Central Hill Farming Region
3. Eastern Hill Farming Region
4. Mid Western Terai

MINOR AGRICULTURAL AREAS
5. Far Western Terai
6. Western Hill Farming Region
### TABLE I

**Agricultural Land Utilization**

<table>
<thead>
<tr>
<th>Crops and Tillage</th>
<th>Pharping</th>
<th>Sundarijal</th>
<th>Budanilkantha</th>
<th>Halchok</th>
<th>Nakadesa</th>
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<td>100.00</td>
<td>49.99</td>
<td>100.00</td>
<td>84.57</td>
<td>92.99</td>
</tr>
<tr>
<td>Legumes</td>
<td>1.63</td>
<td>5.43</td>
<td>none</td>
<td>none</td>
<td>2.47</td>
<td>2.72</td>
</tr>
<tr>
<td>Potatoes</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>3.67</td>
<td>4.04</td>
</tr>
<tr>
<td>Green vegetables</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td>Other crops</td>
<td>2.36</td>
<td>7.93</td>
<td>none</td>
<td>none</td>
<td>0.10</td>
<td>0.11</td>
</tr>
<tr>
<td>Total cropped area</td>
<td>30.02</td>
<td>100.00</td>
<td>49.99</td>
<td>100.00</td>
<td>90.94</td>
<td>100.00</td>
</tr>
<tr>
<td>Total arable land</td>
<td>18.95</td>
<td>100.00</td>
<td>25.94</td>
<td>100.00</td>
<td>46.94</td>
<td>100.00</td>
</tr>
<tr>
<td>Multiple-cropped†</td>
<td>8.12</td>
<td>42.87</td>
<td>21.06</td>
<td>81.20</td>
<td>37.44</td>
<td>79.76</td>
</tr>
<tr>
<td>Irrigated</td>
<td>6.73</td>
<td>35.51</td>
<td>17.50</td>
<td>67.46</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

* The nearness of this village to the Katmandu market accounts for the comparatively large area under green vegetables.
† The close coincidence of multiple-cropped acreage with acreage under wheat reflects the fact that wheat is generally a winter crop. The acreage gained by multiple cropping is, of course, larger than the area multiple-cropped, since some parts of the arable land are sown three or more times.

The distribution of Nepal's leading crops was mapped with the aid of field reconnaissance and available published material. These maps (plate 15) are generalized, but in the absence of agricultural statistics give a reliable impression of the distribution of various crops.

### TABLE II

**Yield of Principal Crops (Bushels per Acre)**

<table>
<thead>
<tr>
<th>Crops</th>
<th>Pharping</th>
<th>Sundarijal</th>
<th>Budanilkantha</th>
<th>Halchok</th>
<th>Nakadesa</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>92.31</td>
<td>18.46</td>
<td>50.03</td>
<td>69.14</td>
<td>37.38</td>
<td>63.93</td>
</tr>
<tr>
<td>Wheat</td>
<td>18.46</td>
<td>6.84</td>
<td>14.77</td>
<td>14.77</td>
<td>10.34</td>
<td>21.42</td>
</tr>
<tr>
<td>Maize</td>
<td>30.85</td>
<td>15.98</td>
<td>23.08</td>
<td>14.77</td>
<td>10.34</td>
<td>21.42</td>
</tr>
</tbody>
</table>

Distribution of Crops

The distribution of Nepal's leading crops was mapped with the aid of field reconnaissance and available published material. These maps (plate 15) are generalized, but in the absence of agricultural statistics give a reliable impression of the distribution of various crops.
Rice is the most important crop in Nepal, occupying an estimated ten million acres. This staple food grows very well at altitudes up to 5,000 or 6,000 feet; above this, other grains, such as millet and maize, give higher yields.

Rice culture is similar to that in other Asian countries, but there are interesting variations. Rice is grown in water as a measure of weed control, and although some land is irrigated, the majority of the rice growers of Nepal depend upon the monsoon rains for water. In these areas the following pattern is fairly typical. Approximately one month before the monsoon, the land, which has become hard and dry during the winter, is broken with a wooden plow with a small metal blade, leaving large hard clods which are then powdered with a crude, long-handled, wooden mallet. Then, when the rains come and the paddy fields are flooded, the soil is puddled by bullock teams drawing wooden harrows. The rice shoots, previously grown in seed beds, are transplanted in the manner of all southeast Asian countries. The women plant the crop with ritual and prayers for a good harvest. Weeding is a family chore, and each weed is pulled by hand.

Though at every season of the year the predominant colors of the fields change, the painstaking precise pattern of parallel rows of paddy plants on terraced hillsides always seems the same. Such intensive cultivation exacts an immense amount of hand labor from the farmer, for long experience has taught him that plants must stand at certain optimum intervals in the rows and the rows must be consistently the right distance apart. Even the paths that run through the open, cultivated areas or end at the edges of fields are carefully adjusted to intervals between plots, which are sometimes only the breadth of a human foot.

The Nepalese farmer is a thrifty man. He grows soybeans on the levee around his paddy and carefully preserves the rice straw at the time of harvest for use as cattle feed in the winter. Rice yields, however, remain low in much of Nepal. Improvement of strains and, in some instances, the substitution of crops of higher yield may be required for better utilization of Nepal’s limited arable land.

Wheat and barley are more important to the people of the higher altitudes than rice. Farming methods are primitive here. The grain is cut with scythes, threshed with flails, and milled with large vertical water wheels. The resulting flour, tsampa, is generally of low quality and frequently contains sand or soil introduced during the threshing process.

Wheat and barley are also grown in the lower areas, particularly in the Kathmandu Valley, but yields are very low and as much as 40 percent of the crop may be lost to smut and rust. Barley suffers less than wheat from smut and rust, and it would seem advisable to extend the growing of barley at the expense of wheat. There is also a need for more general use of fungicides for the control of smut.

Corn is commonly grown in all agricultural areas of Nepal from the lowest valleys of the Terai to the plant production limit at approximately 13,000 feet. It occupies drier lands which are not suitable for rice farming. It is a poor land’s crop and a poor man’s food in Nepal.

In respect to all cereal crops, there is tremendous scope for improvement in traditional methods of threshing, cleaning, and grading. Modern techniques should result not only in greater output but also in higher quality.

Leguminous crops are raised in great variety for food, and in a few cases to provide fodder. They are beneficial to the soil and to the other crops that follow them in rotation. A number of pulses are grown for food, most of the beans, peas, or lentils being preserved by drying.

Edible soybeans appear to be of great importance, and indigenous black, brown, and white seeded varieties give high yields of good quality at all altitudes from 4,000 feet to the plant production limit. Soybeans are often grown with millet, potatoes, or corn. In areas where millet is grown under irrigation, soybeans are frequently successfully grown on the irrigation ridges.

The most important oil crop in Nepal is mustard, raised principally in the south and east. Its production was greatly reduced and almost abandoned shortly before World War II, because of the importation of cheaper oils from India, but it has regained its importance recently. At present, yields are low and methods of oil extraction are crude and inefficient. In the Terai, groundnut (peanut) and rape can be grown for oil.

The remarkable adaptation of the potato to almost every soil and altitude in Nepal has affected the diet of a vast population. In the mountain districts, notably in Dhankuta, Lamjung, Kaski, Syanja, and Baglung, potatoes of very good quality are produced. This American plant has become the predominant staple food in the high Himalayan valleys. By control of disease the yield could be considerably increased.
The growing of sugarcane is highly concentrated in the southeastern Terai, for sugarcane is essentially a tropical crop which requires plenty of rainfall and is exacting as to climate and soil. Moreover, as sugarcane must be factory processed, it must be grown principally in districts where the sugar industry is organized. The great bulk of the crop is raised in the Morang district, and most of the cane moves to the sugar factory at Biratnagar.

Of the vegetable fibers, jute alone is important in Nepal. The main jute area lies in the Morang district in eastern Terai, where the crop is of great importance and supplies the jute factory at Biratnagar. Some raw jute is also exported to India. The quality of the fiber is good, and the fact that the jute plant grows spontaneously in many areas in the south indicates good possibilities for expanded production. In the development of the Rapti Valley, consideration should be given to introducing jute and establishing a jute factory.

Hemp grows wild in Nepal and is cultivated mainly for the drug marijuana, which is obtained from the seed. Flax is grown mostly for seed production, but there is a possibility of obtaining a good quality fiber.

A wide variety of fruits are grown for local consumption. In subtropical Terai, particularly in the east, mangoes and bananas are raised. In the mountain valleys, peaches, apricots, apples, and pears are grown in small orchards. In the Pokhara Valley (Kaski, Tanahu) citrus fruits, especially oranges, are important. Oranges grown in Pokhara are of excellent quality and much superior to those grown elsewhere.

Many family holdings, like this one in the Kathmandu Valley, are too small to support the family in possession or utilize its labor potential.

There are good possibilities for expanded production of peaches, apricots, apples, and pears in many Himalayan valleys. All are being successfully grown on a very small scale at present. Expanded production of fruit would depend on improvement in transportation facilities, and in due course would call for improved methods of fruit preservation. Extensive planting of fruit trees on the mountain slopes and also in the valleys would greatly assist in soil conservation, which is of vital importance in many parts of Nepal.

These painstakingly terraced hill slopes in the central hill farming region reflect the pressure of the population on the available land.

Vegetables are very little grown except in the Kathmandu Valley. Since the diet of the population in many areas is rather monotonous and not well balanced, growing of such vegetables as peas, carrots, cabbage, tomatoes, radishes, and beans should be encouraged.

Agricultural Marketing

Until very recently there has been little demand for farm produce in Nepal. Most of the farming is on a subsistence level, and the only internal market worthy of the name is Kathmandu, where some of the populace depend upon markets for food. This market is mainly supplied from the Valley because transportation difficulties make the importation of foodstuffs from other regions impractical, if not impossible.

Production for export is largely restricted to the Terai. Along the pilgrimage routes by which the hill people bring their products once a year to the Indian frontier, there are small market towns where cotton goods and salt are bartered for rice and oilseeds from the Terai, or for ghee (Nepalese cheese), or wool and medicinal herbs from northern Nepal and Tibet.

Land Tenure, Taxation, and Debt

The complex and burdensome systems of land tenure and the almost total lack of official land records hamper agricultural progress in Nepal and limit tax revenue from the land, which is the chief source of government income. There is no uniform basis for tax assessment; the land tax varies from region to region. It is not possible here to give a detailed account of the various tax systems, but it is important to note the wide discrepancies. According to Nepalese law, all land belongs to the state, and the taxes are rents assessed by the government. Until quite recently, these rents were levied without regard to the size or productivity of the landholding. This, together with the privileged status of certain lands, placed the tax burden almost entirely on the small holder and tenant. About two-thirds of the actual cultivators of the land are tenants.

There are three main systems of land tenure, but each of these has a number of variations, and details of the tenure system in some regions are unknown. About a fourth of the cultivable land is held under the birta system, of which there are about sixteen variations. Birta lands were granted under the old regime, rent-free, to Ranas and other members...
of the ruling class. Some birta holders have over 100,000 acres—one of them nearly a million. This land, rented by the holders to tenants-at-will, was untaxed until 1955, when the government imposed taxes on birta holders and prohibited their taking more than 50 percent of the total yield from the tenant. The taxes on birta land are still much lower than on comparable land, and it is estimated that if the birta lands were subject to the same tax rate as the land under the zamindari system, the government would gain eight to ten million rupees of revenue.

Farmers from nearby villages sell vegetables in Katmandu’s marketplace, the only large produce market in Nepal.

The zamindari system, which prevails in most of the Terai region, is also of feudal origin, but the government has modified and made use of it for the purpose of tax collection. The zamindar, a local official whose position is hereditary, is now in theory a commission agent who rents the land under his supervision on behalf of the government. The zamindar, a local official whose position is hereditary, is now in theory a commission agent who rents the land under his supervision on behalf of the government.

In the eastern mountain regions the system of tenure is known as kipat. The Limbu and Rai tribes, who are in possession of the land, may sell or distribute it as they see fit. Taxes are collected by a tribal official known as the subba, whose powers and functions appear to vary from one area to another. The subbas theoretically pay a part of the land revenue to the central government, but revenue from the kipat lands is low, because government control in the area is not sufficient to enforce collection, and income from these farms is in any case small.

Nepalese leases are not written and are normally for short terms. Though the practice is to renew, and frequently the tenancy agreement continues throughout the lifetime of the tenant, there are no standard or recognized terms of tenancy. Buildings and other fixtures are generally provided and kept up by the tenant. The tenant may be paid in kind or in cash, and the agreement frequently includes provision for the tenant to work at least some time for the landlord. With the increase in population in recent years, there is an increased demand for farms and rents are high. The tenant, or even the farmer who cultivates his own land and operates other holdings as a tenant, may find himself heavily indebted as the result of a bad crop year.

Surveys conducted in eastern Nepal and in the Katmandu Valley reveal that two-thirds of the farmers are in debt, the most commonly cited causes of indebtedness being years of low yield and the expenses of traditional ceremonies such as marriages. The debts in most cases are no larger than 300 rupees, but this is approximately the annual income of most tenants. Rates of interest higher than 10 percent are forbidden by law, but in practice much higher interest rates prevail, and it is very difficult for the average farmer to repay his loan. He lives out his time in debt and his son inherits it, perhaps to increase it and pass on a heavier debt to his heirs. On birta land especially, a kind of serfdom exists arising from debts incurred with the landlords by the ancestors of the present tillers.

As a consequence of the tax and tenure systems, about two-thirds of the arable land of Nepal is in the control of large landowners; the actual cultivation of the land is in the hands of tenants and the holdings are excessively subdivided. A survey made by the writer in the summer of 1957 indicates that the size of farms varies regionally, not in relation to the fertility of the soil or the full utilization of labor, but in response to the pressure of population. Part-time farms of 0.1 to 0.5 acres predominate in the high mountain valleys. Tenants on these small holdings must have other means of income, and unemployed members of the family seek work elsewhere as soldiers or laborers, or emigrate to India. Self-sufficient farms of 0.5 to 2.0 acres, which will support a family but on which no additional produce is grown for market, are fewer, and in the main limited to the Terai. Farms of 5.0 to 10.0 acres which produce marketable surpluses are limited in number and are generally found only in the Terai. In heavily populated areas the system does not permit full employment or production for market.

During the Rana regime, zamindars frequently exacted feudal dues, and ejection of tenants was quite common. Since the advent of the new government the interpretation and enforcement of the laws have been more favorable to tenants. In the case of land owned outright by zamindars (some own tracts of as much as 10,000 acres) tenants have few rights and, because of the local influence of the zamindars, have little hope of enforcing those which they may theoretically have. The zamindar also collects the annual payments on raiyatan, which is land assigned by the government to peasant cultivators for a small down payment, with an additional sum to be paid annually.

In the eastern mountain regions the system of tenure is known as kipat. The Limbu and Rai tribes, who are in possession of the land, may sell or distribute it as they see fit. Taxes are collected by a tribal official known as the subba, whose powers and functions appear to vary from one area to another. The subbas theoretically pay a part of the land revenue to the central government, but revenue from the kipat lands is low, because government control in the area is not sufficient to enforce collection, and income from these farms is in any case small.

Some zamindars cultivate the bulk of this land himself. In the eastern Terai especially, farming operations are on a larger scale than in other regions, and the zamindar may cultivate a large tract himself. In the eastern Terai the holdings are small and are rented under the batai system, which is similar to the sharecropping system. The produce is shared between the zamindar and the tenant, either half and half or five-ninths and four-ninths. No information is available on the numerous other variations of the zamindari system.

Changing Aspects of Rural Life

While in most of Nepal, rural life continues much as it has for centuries past, in the villages of the Katmandu Valley striking changes are discernible. It is quite clear, for example, that readymade consumer goods are slowly
replacing the products of local craftsmen; people now are beginning to buy things which they once made for themselves. This includes goods such as readymade clothing, kitchen utensils, some new foods, and other items which may be had for cash. The existence of a cash market in Katmandu for vegetables and other farm produce makes it possible for the farmer to obtain some manufactured commodities. The decline in the knowledge of traditional home remedies has come about partly because of the astonishing variety of patent medicines and other drugs dispensed by the drugstores in Katmandu. The amount of home industry in the villages, in varying degrees, has decreased over the past five years in respect to clothing, footwear, and headgear, which were formerly manufactured in these communities.

The process of change also has affected patterns of family relationship and community social organization. The extended family, operating as a relatively independent economic unit in which a major proportion of the things required for living were made, is giving way to small families whose members now purchase some of the things they need. Furthermore, there are signs that the social life which used to center in the kinship group or local area is shifting gradually to nonkin groups, or even to the nearby towns of Katmandu, Bhatgaon, and Patan. Perhaps one of the most important changes which has affected the rural community has been the introduction of public education. The hold of the extended family on individual members has weakened, and this de-emphasis seems to be related to broad social and economic changes such as increased mobility and the availability of a wide variety of goods for cash. Movies and other forms of entertainment, now available in nearby towns, have made serious inroads into the social life formerly centered on the activities of the family and the shrine or temple.

Young people, particularly, seem to prefer being entertained rather than to adhere to the older pattern of participating in group recreational activities. The shift is somewhat less marked among older people, but even among them not every one takes the interest he once did in local festivals and other entertainment.

### Land Reform

In 1955 King Mahendra announced the first program of land reform in Nepal's history, which included taxation of bicha land and a tax scale based on the income of holdings. Holdings which yield less than 3,000 rupees are exempt from taxes; the tax on more productive holdings varies from 5 to 27½ percent, the maximum rate applying to holdings on which the annual income exceeds 45,000 rupees. The lack of land records and of an efficient tax collection system makes these laws difficult to enforce.

Any program of land reform which is to be of permanent value will have to include redistribution of land and provision against excessive subdivision. Considering the wide variations in local conditions, and even in language and customs, and the lack of effective government control in many areas, it seems likely that such a program would have to be administered locally. Technical assistance from the central government, in the form of land surveys, for example, might stimulate local initiative in carrying out land reforms.

Greater security of tenure for cultivating tenants is, however, even more important than a redistribution of holdings. Though this reform is an announced government policy, it has yet to be implemented. Also among the recommendations of the government Land Reform Commission in 1953 was abolition of the birta system, and a Birta Abolition Committee was appointed early in the new regime to draw up appropriate measures for this purpose, but nothing has been done as yet to carry out this important reform.

### Improvement of Land Utilization

With present methods of land use the available land in Nepal is quite insufficient for the needs of the people. Even though more than 10 percent of the land is cropped—a fairly high percentage in comparison with other mountainous countries—crop land per capita is only about half an acre. As most of it is of low productivity, production is inadequate even at the present very low standards of consumption. For example, although 80 percent of the farm land is devoted to food grains, production falls short of consumption by an estimated ten million tons. The available pasture is insufficient and most of it is heavily overgrazed. Supply of forest produce also is far below the demand, and most of the forests are overexploited. Demands on the agricultural, forest, and pastoral lands, moreover, are likely to increase greatly in the future, since the population of the country is increasing at a rate estimated at little less than one-half million persons annually. The possibility of increasing the area under cultivation, therefore, requires serious consideration.

The land classification map (plate 11, inset) shows four classes of land—wasteland, poor-quality land, medium-quality land, and good-quality land. The wastelands are alpine uplands unsuited to cultivation; the poor-quality land includes steep forested mountains, where cultivation is limited by relief and poor soils, and low mountains susceptible to severe erosion, in which small areas are suitable for cultivation and grazing with conservation practices. The medium-quality land includes deforested mountain areas, suitable for grazing with conservation practices, and well-watered, fertile river valleys suitable for intensive farming. The good-quality arable land consists of the rolling to nearly flat Terai plains, suitable for a wide range of crops, where rainfall is sufficient or irrigation available. This highly generalized
map is based upon available information, but a more detailed survey will be necessary to provide a basis for scientific land utilization.

Barren lands in the mountainous areas offer limited, if any, possibilities for extending cultivation. In forest areas there are undoubtedly some lands which could be cultivated, but there are much larger areas of cultivated land which should be returned to forest in order to afford protection from soil erosion, deforestation, and floods. The total area of forest must be increased, rather than decreased.

Fallow lands in the Terai, especially in the dry western area, offer some opportunity for the extension of agriculture. Extension of irrigation facilities, improvement of dry farming methods, and use of manure and fertilizers would be necessary steps in reducing the acreage of fallow lands.

Though precise figures cannot be determined without more detailed surveys, it is clear that the total land available for increasing the area of cultivation cannot be more than a small fraction of the area already cultivated. Farmers in most parts of Nepal have pushed the limits of cultivation as far as they can with the technological resources at their command. Extension of cultivation, therefore, will be a slow and expensive process, and at best limited in scope. Major increases in production can be achieved only by increasing the productivity of the land already in cultivation.

Only radical improvement in the techniques of land utilization, including more intensive farming as well as a pattern of land use in which all lands are used according to the increased needs of the future, and halt the destruction of the country's natural resources. The misuse of land results in destruction of natural vegetation with consequent severe erosion of the soil, increasingly frequent and destructive floods, covering of large areas in the foothills with coarse sand and gravels, silting up of rivers, lakes, and reservoirs, fall in ground water levels, and gradual desiccation of lands. The damage of these to Nepal's economy every year, in terms of reduced productivity and of physical destruction of life and property, is staggering.

To secure a pattern of land use providing for the greatest possible increase in productivity and for the conservation of soil and water will require reclamation and improvement of idle lands, retirement of certain marginal and highly erodible lands from cultivation, scientific management of forest and grazing lands, and permanent settlement of groups now practicing shifting cultivation. These measures should be combined in an overall plan which will provide suitable alternative opportunities for the persons affected by the alterations.

The improvement of land use techniques—including provision for irrigation, the use of improved seeds, application of manures and fertilizers, scientific crop rotation, control of pests and plant diseases, and efficient forest and pasture management—constitutes an even larger problem than improving the pattern of land use. Some of these are receiving the attention of national leaders.

Foreign Aid

Improvements in Nepalese agriculture, especially the extension of irrigation, are being carried out with the aid of India and the United States. Under the Nepal-U.S.A. Irrigation Fund, one large multipurpose development has been begun in the Rapti Valley, and irrigation projects are under construction in the Bara and Parsa districts (plate 13).

The project in Bara involves the harnessing of three small streams, the Dodhara, the Sirsia, and the Kyasote, and will bring water to 11,600 acres through a canal system some 44 miles in length. Masonry weirs will be used to impound the waters of the Sirsia and the Dodhara; the Sirsia weir is 8,200 feet east of the Parwanipur railway station, and the Dodhara weir about two miles to the northeast. The earthen weir on the Kyasote is east of Chorni Village, a mile and a half north of the Parwanipur railway station.

In the Parsa District, the Tilawe River is to be harnessed approximately four and one-half miles northeast of Parwanipur, and two canals will carry water from the headworks to 13,060 acres of land along 55 miles of canals. This project is of particular significance because it will add at least twelve million pounds of grain to the production of this area. This grain will be used for export to India or be supplied to the deficit areas of Nepal.

The Simra-Jitpur Tube Well is an exploratory scheme in the Bara District to test the feasibility of exploiting underground water resources in areas where there is no alternative. The pioneer project is in an area which is presently thinly populated, but which could support a larger populace if irrigated.

By far the most ambitious project being carried out with United States aid is the Rapti Valley Multipurpose Development, modeled on the Tennessee Valley Authority. This program, a part of the Nepalese government's Five-Year Plan, involves a complete transformation of the social and economic life of the Rapti Valley area, a region in which much arable land has been useless because of the prevalence of malaria. In the period from 1956 to 1958, soil surveys and mapping were completed for an area of 10,000 acres in the Rapti Valley. Malaria was brought almost entirely under control by the spraying of 465 villages. Training and information for farmers in the area and for new settlers are provided by sixteen village workers and three specialists, working in 200 villages. Twenty-two primary schools and fourteen high schools with trained teachers have been opened in the area. A 40-acre demonstration farm is in operation, and a second farm of 1,600 acres has been set up for the production of improved crop strains. Seventeen cooperative credit societies have been established.

The program also calls for forest preservation, wildlife control, irrigation, road construction, and the development of small industry. By 1958, construction of sixteen miles of all-weather road had been completed. In January, 1959, King Mahendra opened the 68-square-mile Mahendra National Park, a wildlife preserve which is accessible by new roads from Katmandu.

The Rapti Valley project will affect the lives of the people in a wide area, not only by increasing the opportunities in the area itself but by producing a food surplus which will help relieve the shortage in the Katmandu Valley, and by providing employment for settlers from overcrowded areas.

India is constructing the Kosi multipurpose project (further described in Chapter 9), and the Indian aid program is concerned with two projects in Pokhara, West No. 3, and two in the Katmandu Valley (plate 13).

The Kosi project will irrigate a total of four million acres, of which approximately one million are in Nepal. The Pokhara projects will result in the irrigation and reclamation of nearly 5,000 acres of land. One, at Vijayapur Lower, will irrigate Aghun Tar and should greatly increase the yields. The other will reclaim cultivable land and irrigate approximately 1,500 acres of dry farming land on the Vijayapur Khola about two miles northeast of the town of Pokhara. These projects should help make up the deficiency of food grains in the Valley.

The Katmandu Valley projects are the Mahadeo Khola
and the Tika-Bhairab. The first will irrigate about 3,100 acres, practically the entire area under cultivation west of Mahadeo Khola, south of Hanumante Khola, and east of Godawari Khola. The Tika-Bhairab development involves the harnessing of the Lele and Naldu Kholas. Some falls will be available to permit the setting up of water mills.

This project will help promote extensive vegetable cultivation in the Patan area in addition to increasing grain yield.

1 The land use map was compiled on the basis of aerial reconnaissance with a 35-millimeter camera from a light airplane. For a detailed description of the method used, see P. P. Karan, "Land Use Reconnaissance of Nepal with Aerial Techniques and Photography," Proc. Am. Philosophical Soc., CIV (2, April, 1960).


3 George V. Bowers, Agricultural Development in Nepal (U.S. Dept. of Agric., Foreign Agricultural Serv., 1953), p. 27. The cattle population has been estimated at 7 million (including 2.1 million cows and 1.2 million buffaloes), sheep and goats at 1.75 million, hogs at 0.14 million, and poultry at 14 million. Statesman's Yearbook 1959 (London: Macmillan and Co.).


11 Bowers, Agricultural Development in Nepal, pp. 24-28, gives a short account of the chief crops of Nepal. The publications by Kihara cited above also give some information on crop distribution. According to more recent estimates, rice occupies 9.6 million acres, millet and maize 2.9 million, and wheat 0.8 million. Statesman’s Yearbook 1959.

12 The tables in this chapter were abstracted from the results of the writer’s 1957 survey (below, note 14). Locations of the ten villages are shown in the sketch map. Data for only five villages are given here. It is well to cast a critical glance at the figures in these tables. They do not profess to be entirely accurate, although they do give a good idea of the land use pattern. The writer was not allowed, in some villages, to make measurements of land by chain and tape, and had to be content with estimates arrived at by pacing. (A field geographer in Nepal always runs the risk of being equated with the tax assessor, especially if he asks questions about land, crops, and productivity!) Some figures were gathered from farmers in ropanis. This local unit of land measurement varies from one part of the Valley to another. Generally, one ropani equals 0.12 acres, but in some areas it may be as large as 0.15, and in others, as small as 0.10. Moreover, a great deal of dependence had to be placed on the accuracy of answers given by the farmers, even though these statements were checked carefully.

13 No complete account of Nepalese land tenure and tax systems is available. For some discussion of land tenure see Y. P. Pant, Planning for Prosperity in Nepal (Katmandu, 1957), p. 47; Ravi S. Sharma et al., The Economy of Nepal (New Haven, Conn.: Human Relations Area Files Inc., 1956), pp. 12-17; and Bowers, Agricultural Development in Nepal.

14 A survey of ten villages in the Katmandu Valley was conducted by the writer in 1957. Results of an earlier unpublished survey in eastern Nepal by Director Chandra Gurung of the Department of Agriculture in the Nepal Government were consulted in this study.
More than any other factor, it is human occupancy which gives character and significance to geographic areas, and the processes behind the distribution of population reveal the essence of geography and history. Even in the rugged landscape of Nepal, the areas which have not been fundamentally altered by man's occupancy are few and remote. Inaccessibility is not a barrier; the agricultural terraces of the high Himalaya attest to this. One may travel for days through inhospitable country, encountering negligible evidence of human life, only to arrive at a tiny fertile valley teeming with people. Nepal is an old land. Centuries of population increases and frequent invasions have given rise to migrations penetrating to every corner of the country capable of supporting life.

The Present Size of Population

Nepal is one of the smallest and most densely populated nations in South Asia. The nation's total population of 8,473,478 is approximately equal to that of Texas or Ohio. Only four American states—New York, California, Illinois, and Pennsylvania—have larger populations. The average of over 151 persons per square mile, nearly half the average density of population in India, is almost three times that of the United States and approximately three times the estimated world average.

The validity of the total population figure is highly dubious. In theory, the technique used for enumerating Nepal's population should provide a nearly perfect census, but in practice the achievement of a detailed and systematic enumeration was rendered all but impossible by the prevalence of illiteracy and by the lack of proper training for the enumerators. The motives of the census workers were mistrusted by the people, and the public response was generally poor. The enumeration was taken in 1952 in eastern Nepal and in 1954 in western Nepal. Though this census, the first ever taken in Nepal, represents a great achievement when one considers the nature of the terrain and the many other obstacles encountered, the population data is meager in detail and relatively unreliable as compared to the census material published in India or Pakistan. Some officials believe that the census failed to list as many as 15 percent of the inhabitants in some areas, and that the enumeration was incomplete in all areas. Thus it is possible that 10 or even 20 percent of the total population is unaccounted for, and that the true population is between ten and twelve million.

Population Distribution

In making population maps of Nepal, the geographer is handicapped not only by the scope and quality of the available census data but by the lack of base maps. Nepal's Department of Statistics has published in the Nepali language the population totals for small administrative units (thums), but no official map delineating the boundaries of the thums has been issued. It was necessary to construct a base map (back pocket) with the help of information obtained from officials in the Department of Statistics at Katmandu, and to measure the areas of the units by planimeter. The choropleth technique was then employed to produce a map of population densities (plate 17) in eleven categories for the smallest mappable administrative divisions. The dot map (plate 18) presents a more nearly accurate impression of population distribution from the standpoint of absolute numbers.

According to the 1952-1954 census data, the average density of population in Nepal was about 154 per square
NEPAL
POPULATION DENSITY
(BY THUMS 1952-1954)

Scale 1 inch to 40 Miles, or 1:2,534,400

Subject data by Nepal Government
Department of Statistics
Base map by Survey of India

NUMBER OF INHABITANTS PER SQUARE MILE

- 0-50
- 50-100
- 100-200
- 200-300
- 300-400
- 400-500
- ABOVE 1000

N.D. — NO DATA
NEPAL
POPULATION
(1952-1954)

Scale 1 inch = 40 miles, or 1:2,536,400

Subject data by Nepal Government
Department of Statistics
Base map by Survey of India

EXPLANATION

Urban Population is Represented by Three Dimensional Spheres.
The Number of People in Towns is Proportional to the Volume of the Sphere.

- 25,000
- 50,000
- 100,000

Each dot (•) Represents 2,000 Rural Inhabitants localized by Thums.

PRAGVYUMA P. KARAN, 1958

60 EAST OF GREENWICH
only about 10 percent of the total land area, however, is devoted intensively to the support of the population. Although the data on land cultivated in Nepal is unreliable, official figures indicate that 6,476 square miles of land was cultivated for food, which means there were 1,272 persons per square mile of cultivated land (0.503 acre per person).

Population distribution in Nepal, as in other nations of South Asia, is extremely irregular. Few parts of the world are more empty than the snow-covered ranges of northern Nepal; few parts are more crowded than the Kathmandu Valley. More than three-quarters of the land area has a population density higher than the national average, but some areas have fewer than 50 persons per square mile. In the major areas of concentration the average population densities range from 500 to 700 per square mile, and there are very high densities in a few small areas of more than 800 per square mile. Such density of rural population is hardly approached in Western Europe or North America; it is equaled only in monsoon Asia and in a few small areas of Africa and the Caribbean. Despite the many empty areas, virtually all of Nepal's space is fully used in terms of the number of people it can support with its present technology. In the mountainous northern province of Jumla, each of the major geographic divisions has an average density of about 300 to 500 persons per square mile, are the Kathmandu Valley with more than 1,900 and the Pokhara Valley with more than 700 persons per square mile. At the political, economic, and cultural heart of the nation, a mere 209 square miles in the Kathmandu Valley—0.4 percent of the total area of the country—contains some 5 percent of Nepal's population, resulting in a density of 1,966 per square mile, which is comparable to the density of population in the Piedmont Plain of New Jersey. The population of Kathmandu's urban area attains a density of 47,783 per square mile, almost twice that of New York City (26,000 per square mile). Outside the Kathmandu and Pokhara valleys the complex population pattern of this area includes fairly dense settlements in the valleys of the Araniko and Bagmati rivers. The remainder of the population is scattered among the countless smaller valleys and basins of the interior; the four-fifths of the country that is too high or too steep for the traditional system of agriculture is virtually unoccupied and used only for its pastoral and forest resources. But even in the most inhospitable mountain areas every patch of arable land has been searched out and settled, so that the most thinly peopled thums have gross densities of 40-50 per square mile. Lightly settled tracts occur within the areas of denser population, but most of the sparsely populated areas occur in four regions: the Great Himalaya, the Inner Terai, the far western Terai (particularly Kanchanpur and Kailali), and Doti and parts of Dailekh and Baitadi. These regions contain sizable tracts of virtually unoccupied territory, and have a population density generally of below 50 persons per square mile.

The river valleys of eastern Nepal, with their moist climate, are heavily populated; the west, with a drier climate, is thinly settled. West of a line running southwest-northeast from Siuraj to Lamjung is a region of dry mountains and valleys that represents little less than half the total area of Nepal; few parts are more crowded than the Kathmandu Valley. More than three-quarters of the land area has a population density higher than the national average, but some areas have fewer than 50 persons per square mile. In the major areas of concentration the average population densities range from 500 to 700 per square mile, and there are very high densities in a few small areas of more than 800 per square mile. Such density of rural population is hardly approached in Western Europe or North America; it is equaled only in monsoon Asia and in a few small areas of Africa and the Caribbean. Despite the many empty areas, virtually all of Nepal's space is fully used in terms of the number of people it can support with its present technology. In the mountainous northern province of Jumla, each of the major geographic divisions has an average density of about 300 to 500 persons per square mile, are the Kathmandu Valley with more than 1,900 and the Pokhara Valley with more than 700 persons per square mile. At the political, economic, and cultural heart of the nation, a mere 209 square miles in the Kathmandu Valley—0.4 percent of the total area of the country—contains some 5 percent of Nepal's population, resulting in a density of 1,966 per square mile, which is comparable to the density of population in the Piedmont Plain of New Jersey. The population of Kathmandu's urban area attains a density of 47,783 per square mile, almost twice that of New York City (26,000 per square mile). Outside the Kathmandu and Pokhara valleys the complex population pattern of this area includes fairly dense settlements in the valleys of the Araniko and Bagmati rivers. The remainder of the population is scattered among the countless smaller valleys and basins of the interior; the four-fifths of the country that is too high or too steep for the traditional system of agriculture is virtually unoccupied and used only for its pastoral and forest resources. But even in the most inhospitable mountain areas every patch of arable land has been searched out and settled, so that the most thinly peopled thums have gross densities of 40-50 per square mile. Lightly settled tracts occur within the areas of denser population, but most of the sparsely populated areas occur in four regions: the Great Himalaya, the Inner Terai, the far western Terai (particularly Kanchanpur and Kailali), and Doti and parts of Dailekh and Baitadi. These regions contain sizable tracts of virtually unoccupied territory, and have a population density generally of below 50 persons per square mile.

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The regional distribution of Nepal's population, in terms of the geographic divisions outlined on the regional map (plate 35), is shown in Table IV. The most thinly settled

![Katmandu's urban area is one of the world's most densely populated places. (Life photograph by Jim Burke; copyright Time, Inc.)](image-url)
of the three grand divisions is the Inner Terai, in which an almost continuous belt of empty land follows the crest of the Siwalik and Churia Hills. The Terai, with a fairly uniform low relief generally about 300 feet above sea level, is the home of more than 30 percent of Nepal's people, but the population is concentrated in the moist eastern and midwestern divisions, where conditions favor the cultivation of rice, sugarcane, and jute. The far western Terai, with its dry climate, is even more sparsely populated than the Inner Terai. In the Himalaya, a mountainous region about 70 to 100 miles in width, the rich alluvial soils of the river valleys favor intensive rice farming, and the empty land occupies the ridge tops and the barren northern ranges. Except for the unparalleled concentration in the Katmandu Valley, the average density of population in the Himalaya is much less than in the Terai, but it presses no less heavily upon the resources of the soil; the population per square mile of cultivated land is almost as high as in the most crowded parts of the Terai plain.

The distribution of Nepalese population is intimately related to the agricultural potential of the land; the most important single factor is not water supply but relief, which determines the extent and the productivity of the land available.

**Population Increase**

The history of population numbers in Nepal is one of the most perplexing problems in its historical geography. Only the roughest sort of speculation can be offered for any time before the twentieth century. There is no way of estimating the population in ancient times, but the gradual absorption and displacement of the older native groups by migrations from India and Tibet, which proceeded for many centuries, may have brought about a slow rise in population.

Estimates as to the size of population on the eve of the twentieth century at best are based on flimsy data, and at worst are fantastic guesses. Around 1901 the population was believed not to exceed four million, but this estimate can be accepted only with great caution. The period since 1900, with relatively stable political and economic conditions, has been one of upward trend in population. In 1920 the population was estimated at 5,537,765, and in 1941 at 6,283,715. The census of 1954 showed a population of about 8,400,000. According to these figures, the population of Nepal has nearly doubled since 1900; though it is difficult to determine how much of this apparent increase is real, it is evident that the improvement in social and economic conditions during this period has been reflected in a considerable population increase.

The increase in population for the period 1920 to 1952-1954 has been plotted in both absolute and relative terms (plates 19 and 20). In general, the absolute increases are small in districts which have low average densities of population, whereas striking gains are recorded in the densely settled eastern mountain districts. In the populous Terai, however, absolute growth and percentile increases have been small except in the eastern districts of Parsa, Bara, Rautahat, and Morang, and in Kanchanpur and Kailali in the west. The eastern Terai districts show high absolute growth, but this represents gains of only 15 to 25 percent in these populous districts. The greatest increases, absolute or relative, occurred in Chisapani, Dandeldhura, Baitadi, Doti, and Dallikh. The increase in Chisapani appears to be due to the growing commercial importance of the district, which is located on the new highway leading into the Katmandu Valley from India. The map of percentile change shows that, in general, the more thinly populated areas have the higher percentile increases.

In order to explain the regional pattern of Nepal's population growth during this period, we would need to know to what extent it has been influenced by regional differences in rates of natural increase and by migrations into areas of new employment opportunities. The available evidence is not sufficient for a detailed analysis. Similarly, it is difficult to project population trends in the absence of birth and death statistics. However, there is little doubt that the Nepalese population is increasing. Some observers estimate this increase to be about 150,000 to 200,000 per year, or a net annual increase of about 2 percent.

**Sex Ratio**

Whatever the inadequacies of the data may be, it is evident that Nepal, like most Himalayan lands, has a deficit of females (plate 21). This phenomenon is apparently most pronounced in the adult population, and it may be best explained by the assumption that in Nepal, as in many areas of high death rate, mortality is markedly higher among females throughout the lifespan. Though vital statistics are absent, the puerperal death rate, for instance, certainly appears to be very high. It is possible, also, that the actual sex ratio is not as high as the figures show, since social and cultural factors might tend to cause underenumeration of females throughout the country.

Neither of these explanations, however, will account for the remarkable regional variations in the sex ratio, which ranges from 95 to 138. In India, also, where the average ratio is approximately the same as in Nepal, there are striking regional differences (in the villages of northwest India there are 895 females per 1,000 males, but in South India, women outnumber men). Regional differences in mortality are too poorly understood to be invoked as a factor in the sex ratio pattern; but regional variations in the outmigration of young males have decidedly accentuated the pattern. Men in Nepal, as in India, find it cheaper and more convenient to leave their families in the countryside to carry on the traditional occupations, while they themselves live in small towns and cities as factory workers and, in some cases, in villages as agricultural laborers. The higher proportion of females in the population of the eastern mountains may be partially explained by the flow of male migrants to India for work or as recruits in the British or Indian army. In pioneering areas of the western mountains the lower proportion of females is related to a heavy migration of men. With the exception of Saptari, Mahotari, and Rautahat, there is a high percentage of males throughout the Terai, which may be explained by the large number of men coming into this area as traders and merchants from adjoining parts of India and from northern Nepal. It is difficult, however, to explain the contrast between Sarlahi, which has the highest sex ratio in the country (138), and the adjoining districts of Saptari, Mahotari, and Rautahat, which have a very high proportion of females. It is possible that the presence of trading centers in Sarlahi has caused a concentration there of male population from the surrounding area.

**Rural Settlements**

The details of population distribution in a geographic area are reflected in the form and arrangement of settlements, and the architecture of dwellings reveals the influence of climate and local resources.

Most Nepalese live in rural settlements. The *Interim Report of the Census* lists a total of 19,819 "villages," but no
definition of this term is given, and such settlements vary widely in both size and morphology, from the compact
group of 500 or more houses in the Terai to the scattered
agglomerated settlement of separate farms in the Middle Himalaya.

In the Great Himalaya the topography has strongly influ-
enced the development of the agglomerated settlement; villages are small, consisting of not more than 25 houses
built on the more or less level ground of the valleys close
to the small plots of cultivated land.8 Houses and fields are
protected from the danger of avalanches and landslides by
wooden or stone fences or by forested slopes. This need for
protection, the scarcity of land level enough for building
and cultivation, and (in the central and western mountains)
the limited water supply encourage the clustering of dwell-
ings and at the same time limit the size of the settlement.

Houses in the western mountain villages are of piled local
slate, with flat roofs constructed of timbers covered with
slate or thick boards (plate 23). They are built close to-
gether, frequently with common walls, and attached houses
may be built around a central courtyard to form a multi-
family dwelling, each family's quarters remaining separate.
The houses are usually of two stories, with storage and
living areas on the ground floor and living quarters above,
reached in the multifamily buildings by ladders from the
courtyard. When an inside hearth is used, smoke escapes
through an opening near the roof, but most cooking is
done out of doors. Dwellings are built on the southern slopes of
the mountains, and oriented to receive as much sunlight as
possible, a factor of importance in this region of bitter cold.
In winter the flat roof holds a thick covering of snow which
insulates against the cold; when the snow melts in spring,
dripping is not concentrated at the corners and development of
gutters at the base of the wall is minimized. In the more
humid eastern mountains the roofs are gabled but low
enough in pitch to hold a snow cover in winter, and have
overhangs to protect the walls from heavy rains.

A peculiarity of the settlement pattern in this region is the
"twin settlement" used by some small communities. A
second village, similar in architecture and plan to the home
village, is occupied by all or part of the group at certain
seasons, supplementing the land available for cultivation and
pasture. The two villages, though perhaps not very distant
from each other, may have a difference of some weeks in
growing seasons if one is on a slope with northern exposure
and the other has a southern exposure; after the planting
season has ended at the southern settlement, a part of the
group may go to the northern settlement to plant a second
crop. This arrangement also provides some protection against
the decay of waterways, for water may be available at one
site when the supply has failed at the other.

The dispersed settlement, consisting of a group of more
or less isolated farmsteads, is characteristic of the Middle
Himalaya and the Inner Terai.9 The land is limited in
productivity, and the distribution of available water is un-
even. The farmer usually builds his house on the hillside
above the land he is cultivating, and about a dozen dwellings
may be scattered over an area of 25 to 35 acres. This type
of settlement is most common in the rugged and forested
western mountains, where clearings are small.

The characteristic dwelling in the Inner Himalaya and
the Mahabharat Range is the double-roofed house with
walls of piled slate chinked with mud and finished with a
plaster of the red lateritic soil common in the river valleys.
The roof is usually hipped and thatched with rice straw, but
in some sections may be of slate with a simple gable. Either
style of roof has an overhang to protect the walls during
the monsoon rains. In the rainy eastern region the roofs
often have a pitch of 45 degrees or more, but are less steeply
sloped in the drier areas. Window frames are of wood. As
in the Great Himalaya, the houses are usually of two stories,
with the lower floor given over to storage and stable.

In a survey of 143 farms in five villages of the Katmandu
Valley, about three-fourths of the family dwellings were
found to be constructed of mud, and the remainder of brick.
Two-story houses were most common except in the village
nearest the capital, where three-story dwellings were the
prevailing type and several four-story houses were also
found. Each of the villages had a few one-story dwellings.

In the central and eastern sections of the Inner Himalaya,
especially in the Katmandu and Pokhara valleys, wider land
areas are available, and dwellings may be partly scattered in
separate fields and partly grouped. A hamlet of five or
six houses may be surrounded by scattered farmsteads. In
and near the Katmandu Valley the climate is milder and timber
more abundant; the older houses are built of wood on stone
foundations, and newer construction is of brick, though the
dwellings are similar in general plan and roof construction
to the stone houses described above.

At elevations above 5,000 feet, a relatively flat river valley
may accommodate a more compact village, but in the hot
and sultry lower valleys such flat land can more profitably be
used for rice fields.

Between Pokhara and the main stream of the Kali Gandak,
the poorer farmers—in this area mostly Brahman rice
growers living in the valley bottoms—build "round houses"
of piled stone with thatched roofs. These houses, which are
actually elliptical in plan, are less expensive to construct
than the rectangular ones.

The compact village, with all of the dwellings concentrated
in a central site, is the characteristic rural settlement of the
Terai, where the terrain is comparatively level and the land

Dwellings in the dispersed settlement may stand at some
distance from each other or in small groups.

This thatched two-storied house is the home of an average
farmer near Katmandu.
NEPAL
RURAL SETTLEMENT TYPES

Scale 1 inch to 40 Miles, or 1:2,534,400

Base map by Survey of India
Compiled from large scale Survey of India maps
and field reconnaissance

AGGLOMERATED
SETTLEMENTS
WITH
SOME
AGGLOMERATIONS
COMPACT
MAIN AND COMPACT
DISPERSED

HOUSE TYPES

1. Gable or Flat roof stone house
2. Thatched Hipped roof stone house
3. Thatched Ridge roof mud or wattle house

ALBERS CONIC PROJECTION
more uniform in productivity.10 In the eastern Terai the villages are comparatively large; the area of 25 to 35 acres which in the Himalaya might be occupied by a dozen families on scattered farms here might contain more than 500 closely built houses. The elevated areas lying above the flooded fields must accommodate a large number of cultivators, each of whom may be working a number of tiny holdings scattered in the expanse of low-lying rice paddies.

In the drier regions of the Terai—the midwestern and far western divisions—the villages are smaller and less widely separated than in the east. In an area with few sources of water, houses may be clustered about a village pond; a higher water table with more numerous wells may permit the development of scattered outlying hamlets apart from the compact village.

The development of compact settlements is encouraged in some sections of the Terai by the presence of wild carnivorous animals in the thick sal forests. Social and cultural factors, among them the strong superstitions among Hindus concerning new sites for housing, also play a part in the tendency toward nucleation.

In the Terai the dominant house type is rectangular and gabled, constructed of wooden posts supporting beams upon which the bamboo framework of the roof rests.11 Walls are of wattle—grass fastened to the external wall braces and plastered with mud mixed with straw. The roof is steep, which should be classified as small towns because of their characteristic urban functions. Among these are Biratnagar, Birganj, and Bhairawa (Simra). The growth of commercial towns in the Terai is inhibited by the presence of several Indian towns at roadheads or railheads near the border.

Unlike American cities, which are of comparatively recent development, Nepalese towns are quite complex in origin, function, and morphology. The Katmandu Valley towns—Katmandu, Patan, and Bhaktapur—as urban centers, but there are several settlements in the Terai which should be classified as small towns because of their characteristic urban functions. Among these are Biratnagar, Birganj, and Bhairawa (Simra). The growth of commercial towns in the Terai is inhibited by the presence of several Indian towns at roadheads or railheads near the border.

Urban Settlements

Nepal is a nation of more or less self-sufficient villages. The need for urban services is not great, and there are few urban places. The Interim Report of the Census lists only Katmandu, Lalitpur (Patan), and Bhaktapur (Bhaktapur) as urban centers, but there are several settlements in the Terai which should be classified as small towns because of their characteristic urban functions. Among these are Biratnagar, Birganj, and Bhairawa (Simra). The growth of commercial towns in the Terai is inhibited by the presence of several Indian towns at roadheads or railheads near the border.

Unlike American cities, which are of comparatively recent development, Nepalese towns are quite complex in origin, function, and morphology. The Katmandu Valley towns—Katmandu, Patan, and Bhaktapur—grew as politicoeconomic centers of the kingdoms or principalities of local chiefs and were therefore surrounded by walls, within which the houses were huddled close together. Their original function was to control the neighboring territory, but the obvious advantages of security drew to these fortified centers other functions like handicrafts, trade, and commerce.

The settlement usually grew up around the temples; the location of Katmandu on the holy river Bagmati gave it added religious importance. The annual visits of pilgrims to its Hindu temples and Buddhist shrines have provided practical material, because it is easier to apply to a steep roof and, having no channels to funnel the rainwater, allows it to trickle gently to the ground.

Thatched “round houses” are occupied by the poorer farmers of a Pokhara Valley settlement. (Geographical Review)

A large compact village in the Terai, surrounded by cultivated fields, some of which have been flooded by monsoon rains.

The Terai towns—Biratnagar, Birganj, and Bhairawa—are more recent in development and differ from the older classical towns of Katmandu Valley not only in architecture, morphology, and street layout, but in origin as well. These Terai towns are essentially overgrown villages whose growth has been fostered by active commerce between India and Nepal, and during the past half century by the development of factory industry. These three Terai towns are served by airlines, and Birganj lies on the main railroad and highway link connecting Katmandu Valley with India. Biratnagar, an important industrial center, lies but six miles from Jogbani, a railhead in India, and Bhairawa is about five miles from the Indian railhead of Nautanwa. These Terai towns resemble the small towns of the Ganga Valley in morphology and layout.12 For instance, they are characterized by the absence of clear-cut functional zones, although a business section may be distinguished in the central part of the town. This central business district goes by the name of bazaar. The bazaar of Birganj and Biratnagar are greater in size and commercial importance than that of Bhairawa. Surrounding the bazaar are residential zones with retail shops scattered among them. Industrial areas are not distinct. These Nepalese towns have no “civil lines” (settlements added to old Indian towns during the British rule) with broad, paved tree-shaded roads and the bungalows of officials.
SOME RURAL HOUSE TYPES

A. GREAT HIMALAYAN REGION

- Two-storied, stone, stone slab flat roof (Arid Western Himalaya)
- Stone walls, slate roof (Humid Eastern Himalaya)

B. MIDDLE HIMALAYAS

- Well-to-do: Two-storied, stone, hipped roof
- Poor: Stone wall, thatched-roof, round house

C. TERAI

- Well-to-do: Mud walls, tiled ridge-roof
- Poor: Mud or wattle, thatch roof
Katmandu, the classical city of ancient Nepal, provides a curious profile of Nepal's cultural history. It represents the heroic and medieval ages of Newar civilization, typifies the Hindu influence in Katmandu Valley, and is a relic of the Rana heyday. In certain functions, too, it reflects the modern institutions of the twentieth century.

The origins of Katmandu are unknown but very ancient. The Hanuman Dhoka or Temple Square with the old palace and the surrounding temples forms the nucleus of the town (plate 24). In this central area there are more temples than homes, more gods than humans. The temples and pagodas rise roof upon roof to the sky, and there are countless shrines, each with a lingam inside and an adoring bull lying before it, large Garudas—bird gods—with collars of snakes and beautiful folded wings, and elephant gods—the wise Ganeshas—with their trunks worn smooth by fondling human hands.

Details from temple carvings. The elephant god is Ganesh, a son of Siva. He is a wise god and a bringer of good luck.

The temple roofs are supported by slanted beams sculptured into many-armed and many-headed deities, painted in luminous blue and vermilion, ocher and yellow and white. Each beam is held in place by a sloping member carved with minute care to depict the rites of procreation. These motifs are everywhere in Katmandu, in each pagoda and temple. They were designed to frighten away the goddess of lightning, a virgin, and to strengthen the holy in rejecting temptation. They render Kinsey and Freud superfluous, and banish prudery and smut!

Like many other sacred Hindu sites, Katmandu lies on a sacred river, the Bagmati, which at Pashupatinath (on the northeast edge of the town) narrows and curves around the sacred hill where the holiest and largest Hindu temple in Nepal is located. At Pashupatinath the curving bank of the Bagmati is lined with ghats—great flights of steps leading down to the sacred stream from the massive gilt-towered temple of Lord Pashupatinath. The cobbled lanes approaching the temple are crowded with priests, mendicants, and cows, with touts who offer to "guide" the visitor to the city's most sacred places, and with their pilgrim clientele. The children of the priests play among the crowds, lambs trot about in the lanes, and mingling with them all are the sacred bulls of Lord Pashupatinath.

Brilliantly painted carvings on the roof beams of a medieval temple in Katmandu.

To the northwest is the Buddhist temple of Swoyambhunath, and all around the city are Buddhist shrines visited by votaries from various parts of Nepal. In its urban landscape and architecture, Katmandu shows a curious blend of Hinduism and Buddhism.

The business section is roughly coincident with New Road (Judha Sadak), including the adjacent older sections. The statue of Judha Shamshere Rana stands in the central place. In this business section the low-ceilinged ground floor is usually a retail shop, the upper floor residential, with elaborate lattice-work balconies and windows. To the north and east, near Hanuman Dhoka, the business section declines in importance—the retail shops are replaced by grocers and small merchants, squatting on the steps between the stone animals of the temples, selling cloth, grain, salt, rice, flour, and green vegetables.

To the southeast is Singha Durbar, the enormous palace maze in which all government departments operate. A little to the north of Singha Durbar is the Tri Chandra College, and across the Rani Pokhari (lake) from the college is Durbar School. Southwest of this educational-administrative section is the Parade Ground, which separates it from the older part of the town. The local topography has favored the spread of the city in all directions but the south, where the wide Bagmati forms a barrier to further expansion. The town has expanded considerably to the east, especially along the road leading to the airport. The comparatively modern residential-business section of the east side is known as Delhi Bazar.

Quite distinct but adjacent to the town proper is "King's Way"—a grand street lined with shade trees and large palaces in separate gardens. This section contains the Royal Palace (Narayan-Hiti), palaces of princes and wealthy Ranas, and clubs. The Royal Hotel, a converted Rana palace with minarets and cupolas, a marble terrace with a fountain, and bathroom fixtures flown in from abroad, is the rendezvous of Katmandu's diplomatic corps, the Ranas, and the International Club. Half a mile from this oasis of excellent food and witty talk the streets become narrow and crooked, and in the heart of the slum degenerate into dirty bylanes with courtyards serving as public sewers.

Katmandu lies like a gleaming sword along the north bank of the Bagmati. Among the pink houses and narrow lanes where 105,000 people live in medieval squalor rise 40-odd palaces of the Ranas with their Versailles-Buckingham architecture and gardens, and the countless tired pagodas, like a Hollywood dream of far Cathay.

For centuries the administrative and cultural heart of the Himalayan kingdom, a goal of both Hindu and Buddhist pilgrims, a Hindu capital built upon the remains of the ancient Newari civilization, Katmandu presents an urban landscape of tremendous complexity and innumerable contrasts.
The King and Queen ride through the Hanuman Dhoka, the heart of the old city. (Life photograph by Jim Burke; copyright Time, Inc.)

New Road, in Katmandu’s business section. The monument in the foreground commemorates an earthquake.

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1 This figure is from the 81-page mimeographed report, Census of Population (edited by Howard J. Komin, United Nations statistical expert), which was published by the Nepal Government in late 1958. This final report was not available in the United States at the time of writing, and other population figures used in this chapter and in the preparation of the maps are from The Interim Report of the Census of Nepal (Katmandu: Dept. of Statistics, 1955).

2 According to the Interim Report, 15,000 operators visited a total of 1,755,546 houses in Nepal and the entire nation from “Terai to the Himalaya on the Tibet borders and from Mechi to Mahakali was visited during the specified time, and the census was taken by going from home to home and from village to village.” The difficulties encountered, however, are also described, and the resulting errors in the census are explicitly admitted.

3 Much experimentation preceded the adoption of the specific density categories employed. Nepal, with its extreme variation in population density, presents a difficult problem in categorization. The final selection was based on the conclusion that the chompleth map should delimit important natural and cultural areas and emphasize certain critical population areas.

4 In the construction of the dot map the best guide to the location of population within a thum was the topographic sheet (1 inch to 4 miles) and aerial photographs. Outline maps of the individual districts and their thumbs at first prepared on tracing paper. These outlines, of the same scale as the sheets, were superimposed upon them and dot maps were made to work out preliminary distribution patterns.

5 For general discussion see Toni Hagen, “Regions and Populations of Nepal,” Geographica Helvetica, XII, 4 (1957), 22-33.

6 Compiled from the Interim Report of the Census. See plate 35 for boundaries of these divisions.


8 Information on the settlement types and dwellings of this region is drawn chiefly from the reports of Jiro Kawakita in H. Kihara, ed., Peoples of Nepal Himalaya (Kyoto: Flora and Fauna Research Society, 1957), pp. 26-42.


13 Probably as early as sixth or seventh century B.C. According to legend, it was founded by King Gunakamdeva.

14 This element in the religious art of Katmandu is an indication of the dominance of the Tantric cults (see Chapter 8). “The carving of erotic images or of Mithuna couples was due to the impact of Vajra and Sahaja symbolism on medieval Brahmanical art and ritual. There is neither carnality in love nor yet squeamishness about sex in the Tantrika sculptures. They show men and women in an infinite variety of embraces, which symbolise the spiritual ecstasy of the soul merging with the Divine.” Radhakamal Mukerjee, The Culture and Art of India (New York: Frederick A. Praeger, 1959), p. 280.
Cultural Diversity

Nepal apparently was populated mainly by large-scale migrations, over a period of many centuries, from all of the surrounding areas. The intermixture of Mongoloid groups from Tibet with Indo-Aryan people from northern India has gone far to break down homogeneity of race, and has produced an extremely complex cultural, linguistic, and religious history. Nepal has no distinct races, in the strict sense; on the other hand, the great variations of environment in this country of contrasts and the difficulty of communication between different regions have preserved distinctions of language, culture, and even of physical characteristics between population groups. Though the unification of the kingdom took place late in the eighteenth century, some of the tribal organizations have remained more or less intact. Some ten or twelve major ethnic groups, and a number of smaller ones, are represented in the population. This situation raises many questions of interest to the geographer which cannot at present be answered even in part, so scattered and inadequate is our knowledge of the Nepalese population.  

As a basis for studying the process of acculturation in Nepal, it would be valuable to map ethnic groups in areas of extensive acculturation; this would require a detailed survey of cultural characteristics, and criteria for distinguishing between ethnic groups should be developed on the basis of statements of members of the dominant group and of the minor groups. The role of pilgrimage to holy places in culture contact and culture change might also be a fruitful subject of study in Nepal. 

A number of questions, some of which were pointed out in the preceding chapter, are raised by the Nepalese population pattern, and the study of Nepal's cultural geography is relevant here also. Regional and ethnic differences in natural increase should be determined, and the causes of any significant differences investigated. For example, the role of polygamy in bringing about differences in the rate of population increase should probably be studied.  

A comprehensive description of Nepalese pastoral life and movements is also needed, as are other studies of the economic and social life of the people. With the information now available, we can only survey briefly the major ethnic groups distinguishable in the population, and their regional distribution. All of these groups are of more or less mixed origin, and the lack of information on their history, customs, and social organization makes clear distinctions difficult.  

Race, Caste, and Tribe  

Certain regional characteristics of physical appearance may be distinguished in the Nepalese population, probably corresponding roughly to the areas of Tibetan and Indian migration and the degree of intermixture between these peoples. People with dark skin and hair and brown eyes tend to predominate in southern Nepal, and fair (yellowish) coloring is regarded as characteristic of more northerly lands. Stature is, in general, greater in the south than in the north. The prevailing brunettenss of the south includes many small groups of medium-colored and fair people; in the predominantly yellowish-white region of the north there are many who display brunette qualities. In general, the Mongolian element is dominant in the Great Himalayan area, and the Indo-Aryan is indigenous in the southern area along the border of India. In between, there has been considerable intermingling of the Mongolian and Indo-Aryan strains. In addition, there are small remnants of the Dravidian group which may have formed the original population of Nepal. The Nepalese tribes vary in the extent to which they have maintained their distinctness of language and culture and their unity of social organization. Though each has its home district where most of its people live (plate 23), most of them are also to a greater or lesser extent dispersed over the country. This dispersion and mixture of the tribes apparently has facilitated the spread of the caste system, which, with the penetration of the country by Hindu culture, has been gaining in influence in Nepal for several hundred years. A curious example of this phenomenon may be observed in the Himalayan region. Here the caste system at present is loose and ill defined and apparently foreign to the social tradition of the native tribes, but appears nevertheless to be gaining ground; with the physical isolation of this region it seems quite possible that the caste system will gain strength in the Nepal Himalaya as it weakens in the Ganga Valley of India. 

Although tribal organizations are quite different in their social structure and function from castes, the two systems have tended to become fused in Nepalese society. A Nepalese asked to name the inhabitants of his village will give a list in which the names of Nepalese tribes and Hindu castes are intricately mixed. All these groups are popularly spoken of as "castes" and the various tribes are considered to have differing status in the caste structure, though except for the high caste groups it is not possible to rank the tribes exactly as to their position in the social scale.
The Newars, who have been under the influence of Hindu culture for about fifteen centuries, have developed a complex and rigid system of occupational castes. Outside the Kathmandu Valley, however, individuals of a given tribe are generally regarded as belonging to the same caste. In some regions where a number of tribes live together in the same communities, the occupational status and relationships of persons of different tribes seem to justify referring to the system as a caste society, but this is not true of all regions where tribal groups are mingled.

The social organization of the Nepalese tribes has not been adequately studied, but each tribe is divided into a number of clans or "thars," many of which are exogamous. Each clan is divided into kindreds or "gotras" which are strictly exogamous. This tribal organization is a deterrent to the growth of caste distinctions within the tribes, since endogamy is essential to the development of a caste group.

The racial origin—real or imaginary—of a Nepalese social group is of primary importance in determining its status; Indo-Aryan ancestry has been a source of prestige in Nepal for centuries, Hinduism having been increasingly dominant in religion and the ruling families having been of Indo-Aryan and Hindu background. As in India, the priestly caste of Brahmans are theoretically at the summit of the caste structure, and Brahmanic caste rules have tended to preserve the integrity of this group, which is of predominantly Indo-Aryan origin. Just below the Brahmans in the social scale, and considerably more powerful in the economic and political life of Nepal, are two groups which may be regarded as both tribes and castes—the Chetris and the Thakurs. The present royal family and many of the noble families are members of the Thakur group, who are less numerous than the Chetris and claim descent from the Rajput dynasties who ruled western Nepal prior to the unification of the country in the eighteenth century. The Thakurs are predominantly Mongolian in appearance and resemble the Magar and Gurung people of central Nepal, whose ruling class they formed before the Brahman migration. The Chetris also assert the Indian origin of their ancestors. Their physical characteristics, though they differ somewhat from those of the hill tribesmen, are perhaps as much Mongolian as Indian. Their name is a corruption of the Sanskrit Kshatriya, meaning warrior, which is applied to the second highest Hindu caste. The ancestors of the Chetris are believed to have been two groups who were granted status in this high caste by the early Brahan immigrants: an ancient Indo-Aryan tribe of western Nepal called the Khas, who intermarried with the Rajput refugees at the time of the Moslem conquest; and the offspring of Brahman immigrants and the women of the western hill tribes. Though the original home of both Thakur and Chetri tribesmen was in the hills of central and western Nepal, both groups are widely scattered today. They have been granted extensive landholdings in all parts of the country, the Thakurs having been the political and the Chetris the military leaders of the nation for five centuries. Both groups are devoutly Hindu in religion and comparatively strict in the observance of Hindu customs and caste rules.

Also widely scattered are the "menial tribes," including the Damai (tailors and musicians), Kami (blacksmiths), Sunnar (goldsmiths), Kumbhar (potters), Pore (sweepers), and Sarkhai (shoemakers). These low-caste occupational groups correspond in status to their counterparts in India; the people themselves are closer to the Indians in appearance than are the Nepalese hill tribes, and may have retained the marks of their Indian origin by virtue of their low caste, as the Brahmans have retained theirs for the opposite reason. Members of these groups are confined to their crafts and may not be warriors; men of the fighting classes do not eat in their company.

The remainder of the Nepalese tribes are of intermediate caste status, and their precise ranking, which in any case cannot be exactly determined, need not concern this discussion.

In general, the hill tribes of Nepal are of Mongoloid origin, and probably are mainly immigrants from Tibet. To varying degrees these people have come into contact with Indian immigrants. In the Kathmandu Valley and in southern Nepal, the physical and cultural signs of such contact are more discernible than elsewhere; in the northern mountains close to the Tibetan border, the Indian influence on physique, language, religion, and customs is slight or absent.

**Distribution of Tribal Cultures**

The Newars, believed to be the original inhabitants of the Kathmandu Valley, are an ancient people of unknown origin. Though they are said to be related to the Nairs of southern India, there is little evidence for this, and authorities differ as to the degree of their kinship to Indo-Aryan peoples. Their language is of the Tibeto-Burman group, though it differs considerably from the other Tibeto-Burman languages of Nepal. Their cultural similarity to the people of India may be explained by the greater accessibility of the Kathmandu Valley as compared to the rest of Nepal. What is known as Nepalese art—metalwork, painting, sculpture, architecture, and literature—from about the thirteenth to the nineteenth century was entirely the work of the Newars. Their material culture was archaic in some respects and of remarkable maturity and accomplishment in others. To those who have seen the Newar towns of Kathmandu, Patan, and Bhatgaon, it is astonishing that so advanced a civilization could be supported by an agriculture without plow or animal traction and entirely dependent on human labor.

The Newars are concentrated in and near the Kathmandu Valley, where they constitute a large proportion of the population, but being the principal indigenous mercantile group in Nepal, they also are dispersed to some extent. Most villages in central Nepal, it is reported, have small Newari trading communities. They are divided into Buddhist and Hindu groups and have a complex social organization.

The Gurkha soldiers of the Nepalese army, as well as of the British and Indian armies, have for many years come chiefly from the Gurung and Magar tribes of central Nepal, the Gurungs being especially renowned as warriors. The Gurungs, a pastoral people closely resembling the Tibetans,
The Gurungs are a pastoral people closely resembling the Tibetans, the Gurungs being especially renowned as the first Nepalese to come into contact with Hindu immigrants from India. Less Mongoloid in appearance than the Gurungs, Rais, and Limbus, they are more Hindu in culture, and in their customs and ceremonies are very similar to the Chetris.

The major tribes of the eastern mountains are the Limbus and Rais (known collectively as Kirantis), the Sunwars, and the Tamangs. There has been considerable intermixture between the Kirantis and the Sunwars. The Sunwars occupy mainly the valleys of the Likh Khola and Tamba Kosi rivers; the Limbus, the most easterly section of the Himalaya; and the Rais, the region just west of the Arun River. The Tamangs, believed to be among the earliest settlers in Nepal, are a smaller group living mostly on the southern slopes of the Great Himalaya to the north and east of Katmandu Valley.

A number of ethnic groups, of whom the Sherpas are the best known, are lumped together under the name Bhotia. The Bhotias constitute the most recent element in the Tibetan migration into Nepal, and live mainly close to the Tibetan border in the upper reaches of the river valleys. They are very close both in their physical appearance and in their culture to the Tibetans across the border.

The Tharus, widespread in the Terai area, are regarded as an aboriginal race, possibly Dravidian, whose ancestors were driven into the Terai by the Aryan and Mongolian invaders. In their appearance they are very different from the Mongoloid tribes of the Himalaya, but as a result of intermarriage have acquired some Mongolian features.

Religion

Religious differences, which are of great social, economic, and political significance in Nepal, introduce another element of complexity into the country's human geography. The distribution of religious groups (plate 26) does not follow the lines of tribal divisions; many of the tribes are divided as to religion.

The division of the Newars into Buddhist and Hindu groups with separate social organizations has already been noted. These two groups occupy a common territory in the Katmandu Valley. Among the hill tribes, on the other hand, such religious divisions are related to locality and seem to be the outgrowth of differences in the degree of contact with Hindu influences from southern Nepal or the Katmandu Valley. The Tamangs, for example, who occupy the lower slopes near the Valley, are Hindus, but another group of Tamangs who live in the high mountains of the Langtang area are Lamaists. The Gurungs are similarly divided, those living at higher elevations in the northern part of the Gurung territory being known as Lama-Gurungs.

No sharp line can be drawn, however, between Hindu and Buddhist groups in Nepal, for in many places the two faiths have become more or less fused, the beliefs and practices as well as the gods and shrines of both being equally honored by the people. The fusion between Buddhism and Hinduism in Nepal was facilitated by the early triumph of Tantrism, a tradition common to both religions, which in its popular
NEPAL

RELIGIOUS GROUPS

Scale 1 inch to 40 Miles, or 1:2,534,400

Subject data by Nepal Government
Department of Statistics
Base map by Survey of India

THE CIRCLES ARE PROPORTIONATE TO THE POPULATION OF EACH DISTRICT

KATMANDU VALLEY
1. Kathmandu
   - Urban Area
   - Rural Area
2. Lalitpur
   - Urban Area
   - Rural Area
3. Bhaktapur
   - Urban Area
   - Rural Area

LEGEND
- Hindu
- Buddhist
- Moslem & Others
form stems to draw upon sources older than either of thesefaiths—the cults of the phallus and the primordial mother,
and the heritage of magic and charms from primitive folk
religions. In Buddhist thought the Tantric theme was as-
associated with the rise of the Vajrayana cult within Mahayana
Buddhism; in Nepal and in northern India, the triumph of
Vajrayana led to the synthesis of Buddhism with the Tantric
worship of Hinduism, and in many centers to the extinction
of Buddhism in name.19 The outlines of this synthesis,
which took place between the tenth and twelfth centuries,
are still discernible in the religious art and customs of Nepal,
predominantly in the Kathmandu Valley.
Nepalese Hinduism is similar to that of northern India, the
worship of Siva and the Tantric cults being its dominant
themes. The religion of the ruling class since the Gurkha
conquest of 1769, Hinduism claims more adherents in Nepal
than any other faith (plate 27). Its most devout practitioners
are the high-caste Brahmans, Chetris, and Thakurs.20
Mahayana Buddhism, at one time the dominant religion
of Nepal, is now limited to the high Himalayan valleys near
the Tibetan border (plate 28). Within the area of Buddhism
two regions can be distinguished on the basis of ritual and
belief. The northern region is in general the zone of
Lamaistic Buddhism very similar to that practiced in Tibet.
To the south of the Great Himalaya, Buddhism is strongly
influenced by Hinduism, even to the point of synthesis. In
the Kathmandu Valley and adjacent areas to the north there
is a complex blending of the two, and many deities are
worshiped by Hindu and Buddhist alike.

From the beginning of the Christian era until the four-
teenth century the Kathmandu Valley was a center of Bud-

The wife and daughter of the Chini Lama (so called because
his grandfather came from China), who is Lama of the
Bodhnath temple near Katmandu.

Language and Literacy

Illiteracy is almost universal in Nepal. Although no exact
figures are available, estimates of the literacy rate range from
2 to 9 percent. Moreover, the people speak a large number
of mutually unintelligible languages. The principal language
of an ethnic group is further subdivided into numerous sub-
languages and dialects, and most of these are spoken lan-
guages only.23 The diversity of language creates serious bar-
riers between peoples and plays a significant role in promoting
regional sentiment. The lack of a national language under-
stood by all also makes the reduction of illiteracy far more
difficult than in a country with a common language, and
retards any government effort to improve public health and
economic welfare through educational programs.

The languages spoken in the Terai and lower Himalayan
valleys belong to a single language family, the Indo-Aryan
(inset, plate 25). There are similarities in syntax and fre-
quently in vocabulary throughout these languages, which ap-
pear to have a common origin. In the Himalayan region,
especially the northern section, the languages are of Tibeto-
Burman origin. In a few areas there are scattered remnants
of the Munda languages (a division of the Austro-Asiatic
family), such as Khampa and Thami. Kawakita notes the
existence of a Thakali language, quite different from any
other Nepalese tongue, spoken by people of the same name
in the upper Kali Gandak Valley of north-central Nepal.24

The Hindu temple of Pashupatinath on the bank of the Bagmati,
an ancient place of pilgrimage dedicated to Siva.
NEPAL MOSLEMM POPULATION

THE CIRCLES ARE PROPORTIONATE TO THE MOSLEMM POPULATION OF EACH DISTRICT

- Below 100
- 100 to 250

SUBJECT DATA BY NEPAL GOVERNMENT
DEPARTMENT OF STATISTICS
BASE MAP BY SURVEY OF INDIA

ALBERS CONICAL EQUAL AREA PROJECTION
The Indo-Aryan languages spoken in Nepal Himalaya are designated as the Pahari group. These Indo-Aryan languages were probably brought into Nepal from the west, along the hills, and from the plains on the south. Today an unbroken chain of Indo-Aryan dialects, showing certain common characteristics and merging by almost imperceptible degrees one into the other, stretches from Ilam-Morang to Kanchanpur-Dandeldhura. The Nepali (or Gurkhali) language, spoken in the lower Himalayan valleys, has certain features in common with Hindi. Nepali, which is the language of the courts, has been officially adopted as the national language. It has borrowed words from the Burman languages and now presents a mixed character, but Nepali, spoken as a second language by many of the people, seems to be gradually replacing the tribal languages in some areas.

Educational Program

In 1953, the government appointed a National Education Planning Commission, charged with surveying the educational situation in Nepal and making recommendations for government action. According to the commission's estimate, 3.5 percent of Nepalese school-age children were then enrolled in 1,320 Nepalese school children in their open-air classroom. (United Nations)

schools, of which more than a thousand were English schools, modeled on those of India. These schools had about 58,000 pupils, and their graduates were qualified for clerical employment with the government. Tri-Chandra College in Katmandu, affiliated with Patna University, headed the English school system. Sanskrit schools, in which instruction is given in the mother tongue but the chief emphasis is on the study of Sanskrit religious writings, numbered over 200 and had nearly 7,000 students. Graduates of these schools might attend Nepal Sanskrit College, also in Katmandu. About 7,000 pupils were enrolled in 49 Basic Education schools, which follow the Gandhian plan, with a curriculum for rural village life and centering on craft work. Schools of all these types were receiving some government support.

In its report, delivered in 1955, the Planning Commission recommended the establishment of a system of government-supported National Schools whose curriculum would be uniform, except that vocational training would be adapted to local conditions. Instruction in Nepali (the official national language) would begin in the first grade, and instruction would be exclusively in Nepali by the end of the second grade, even in areas where Nepali is not spoken. Universal primary education was emphasized as the most important objective of the program, although establishment of high schools in each district and a National University were also recommended. The goals suggested were voluntary universal primary education by 1975 and compulsory universal primary education by 1985. Second in importance only to primary education in the commission's recommendations was universal literacy, the program calling for literacy classes for 100,000 adults per year by 1965.

Information available on the progress of the program is fragmentary. By 1958, a College of Education had been established, and 200 student teachers were in their second year of the five-year degree course. Mobile training centers had given eight-month courses to about 1,500 primary teachers. An adult literacy program had been launched and over 400 adult schools opened. New primary schools and high schools have been opened in some districts, but figures on the number of schools and students are not available.
who conquered Nepal in the eighteenth century. Cf. Chapter

The Southwestern

H. Kihara, ed., Peoples of Nepal Himalaya (Kyoto: Fauna and

The Nepal Society, p. 72.


Maron et al., p. 69.


Adam, "The Social Organization and Customary Law of the

Nepalese Tribes," p. 546; see also J. Kawakita in Kihara, ed., Peoples of

Nepal Himalaya.

See D. R. Regmi, "The Antiquity of the Newars of Katmandu,"

Jour. Bihar Research Soc., XXXIV (1948), 49-58, and his Ancient

and Medieval Nepal (Katmandu, 1952), pp. 143-47. See also K. P.


Proc. Asiatic Soc. Bengal, XIX (1923), 456-560; and the article by C. Haimendorf cited above.

The material culture of the Newars has been studied by Marguerite

Lobiger-Dellenbach. For published material, see bibliography. See also

Puna H. Bajräcarya, Newar Marriage Customs and Festivals,


The term Gurkha in English has come to apply to all

Nepalese soldiers—members of the "Gurkha battalions" in the British

Indian Army. Properly it is restricted, however, to the western tribes

who conquered Nepal in the eighteenth century. Cf. Chapter II, and

Maron et al., pp. 61-62.

Maron et al., pp. 70-71.


Northeby and Morris, The Gurkhas, pp. 256-58, H. R. K. Gibbs,
The Gurkha Soldier (Calcutta: Thacker, Spink, 1944), p. 27.

A number of informative and colorful popular books on the

Sherpas have been published since the conquest of Everest in 1953.

A selection of these is listed in the bibliography.

Maron et al., A Survey of Nepal Society, p. 78. Some anthropolo-
gists, however, regard the Tharus as a Mongolid people. See D. N.

Majumdar, The Fortunes of Primitive Tribes (London: Universal


H. W. Tilman, Nepal Himalaya (Cambridge, Eng.: Cambridge


Kihara, ed., Peoples of Nepal Himalaya, p. 81. See also Jiro

Kawakita, "Influence of the Himalayas in the Human Ecology of


1 The ethnographical study of Nepal is only beginning. Trust-

worthy ethnological material may be found in W. Brook Northey and

C. J. Morris, The Gurkhas, Their Manners, Customs, and Country

(London: The Bodley Head, Ltd., 1928); Leonard Adams, "The


Anthropologist, XXXVIII (1936), 533-47; Ferdinand E. Okada,

"Ritual Brotherhood: A Coersive Factor in Nepalese Society," South-

western Jour. Anthropology, XIII (1957), 212-22; Jiro Kawakita, "Some

Ethnographical Geographical Observations in the Nepal Himalaya," Japanese


2 Stanley Maron et al., A Survey of Nepal Society (New Haven,

Conn.: Human Relations Area Files Inc., 1956), pp. 126-35; see also

Christoph von Fürer-Haimendorf, "Elements of Newar Social Struc-


3 H. Kihara, ed., Peoples of Nepal Himalaya (Kyoto: Fauna and


4 Maron et al., Survey of Nepal Society, p. 72.

5 Maron et al., p. 69.


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Majumdar, The Fortunes of Primitive Tribes (London: Universal


17 H. W. Tilman, Nepal Himalaya (Cambridge, Eng.: Cambridge


18 Kihara, ed., Peoples of Nepal Himalaya, p. 81. See also Jiro

Kawakita, "Influence of the Himalayas in the Human Ecology of


9 Disease and Diet

Nepal is one of the world’s few remaining redoubts of pestilential disease, and the incidence of dietary deficiency diseases is also undoubtedly very high. Malaria, smallpox, cholera, tuberculosis, typhoid, dysentery, and diarrhea, as well as beriberi and other diseases of vitamin deficiency, are widespread throughout Nepal (plate 30). There is no medical survey for the whole of the country, and the regional studies are limited in number and scope. In the past there has been no system of collecting vital statistics, and practically none of the country’s doctors have the facilities for modern diagnosis. Analysis of the geographical distribution of disease is therefore extremely difficult.

Ninety-nine percent of the population of Nepal, according to one recent estimate, is without adequate medical care. In 1953, there were only fifty licensed medical practitioners, of whom ten were doctors of medicine, in the entire country, and most of these were concentrated in the Kathmandu Valley. There are ten inadequately staffed and equipped hospitals, with a total of 355 beds, in the Kathmandu Valley. In other areas the situation is still worse; much of the country is without medical services of any kind, and there are but twenty-four small medical establishments with a total of 305 beds along the Indian border.

Malaria

Malaria is the number one killer in Nepal, and the rugged mountains are no barrier to this swiftly traveling disease. The conditions under which the disease-carrying mosquitoes breed and thrive have been created by man in some parts of the country, where irrigation canals, rice terraces, and embankments impound the stagnant water essential to mosquito life. In other regions, particularly in the swampy Terai, nature has favored the vicious little insect.

Malaria is chiefly a rural disease, and its greatest concentration is in the Inner Terai, where it constitutes a major health problem. The prevalence of the disease on the southern border has had considerable political significance. "Sundown in the Terai," one writer says, "has brought to an end more attempted raids into Nepal and has buried more political hopes than will ever be known." It has been suggested that the form in which the disease appears in the Terai is particularly malignant, but avol, as it is called in that region, seems to be no more severe in its effect than elsewhere and responds to quinine. One indigenous tribe of the Terai, the Tharus, seem to be immune to the disease, but it is said that if they go elsewhere, they become as susceptible as others.

The vast majority of the population are not immune, however, and the debilitating disease takes its toll not only in terms of human lives, but also in terms of reduced production of foodstuffs. Its presence makes much of the potentially productive land of the Inner Terai uninhabitable, and reduces the efficiency of all agricultural labor. Dramatic evidence of this is found in the report that the rice harvest in East Bengal, Pakistan, increased by 543 pounds to the acre after an intensive antimalaria campaign.

Under the auspices of the United Nations and the International Cooperation Administration of the United States a program of malaria control is currently being carried out in Nepal. If successful, it could greatly improve the health and food situation of the country.

Tuberculosis

Respiratory diseases account for a great deal of illness and death among the Nepalese. Asthma is quite common and tuberculosis is a major problem, second perhaps to malaria. In contrast to the ordinarily rural nature of malaria, tuberculosis is a disease which seems to flourish when isolated rural people are brought into towns and cities. Opinions differ as to how much the low standard of living contributes to the prevalence of tuberculosis. No matter what the cause, tuberculosis is most prevalent in the Kathmandu Valley, and seems to be increasing alarmingly there.

The climate of much of Nepal, particularly the low, wet, tropical Terai, is ideal for the development and spread of tuberculosis. The disease is less prevalent at higher altitudes. Diagnosis is difficult, and treatment expensive. Preventive measures such as improved living standards, improved medical care, and vaccination are needed. Poor living standards and medical care are a part of the total economic picture, and there would seem to be little hope of dramatic change in the near future.

Typhoid

The incidence of typhoid is not nearly so great as the unsanitary water supply and unhygienic living conditions would lead one to expect. It has been maintained that the disease is so widespread that most Nepalese infants suffer from it and so acquire an immunity which often lasts throughout their lives. Adults do contract the disease, however, and the rate tends to rise during seasons when the water supply is bad. The means of controlling typhoid are already known—chlorination and protection of water supply, the hygienic disposal of excreta, the control of flies through insecticides—but cultural and economic factors will delay concerted attack against the disease.

Intestinal Disease

The various intestinal disorders associated with the "fees to mouth short circuit" are of general incidence in Nepal. Dr. Taylor reports that of 785 patients examined in central Nepal, 121 had amebiasis. He concludes that "the principal health problem of the hills of Nepal is amebiasis and there is a correspondingly high incidence of other intestinal infections."

Diarrhea, dysentery, and similar diseases are to be expected in Nepal. In the interior, the common place of defecation is where paths cross streams, and although the water is usually quite clear and sparkling, it is more often than not
This government dispensary in Pokhara is operated by a medical officer with two years training in nursing and pharmacy. (Geographical Review)

contaminated. There are no filtration systems to supply water to the villages, and the Nepalese do not add chemicals nor boil their water before consumption. There is no doubt that these diseases kill on a gigantic scale in Nepal, and that they contribute greatly to the high infant mortality.

Many of the same measures which prevent tuberculosis apply equally to the control of intestinal diseases, but such measures are hard to enforce in a poor country. DDT control of such insect carriers as the housefly would help in prevention, and widespread distribution of sulfa drugs under proper supervision would lead to control and cure.

Cholera

Cholera is an epidemic disease which rapidly strikes down an unprotected population. It has been all but banished in many parts of the world, but in Asia it is still a menace. The poor state of Nepal's medical services was clearly revealed in 1958 when an outbreak of the disease in Calcutta was accompanied by its appearance in Nepal. The government has a small building in Katmandu which serves as the Cholera Hospital, and a few trained personnel. There was a shortage of distilled water for the lifesaving intravenous injections and no still for its production. Thousands are reported to have died, but as a result of the epidemic, many Nepalese have defied their superstitions and come forward to receive inoculation. Many more must receive it or the toll will be higher next time.

Leprosy

The highest rates of leprosy infection occur in warm and humid places of dense population; in Nepal, leprosy is most common in the eastern Terai and the eastern mountain valleys. The disease is somewhat less prevalent in the western half of the country. The epidemiology of leprosy is still to some extent obscure. However, it is believed that undernourishment and dietary deficiencies may favor the onset of the disease, and it also appears that light-skinned peoples, like the Mongoloid tribes of Nepal, are more susceptible to leprosy than the dark-skinned races. The conditions surrounding the prevalence of leprosy in Nepal seem to be similar to the pattern observed in other areas of the world where the disease is common. Segregation of lepers, together with long-range improvements in nutrition and hygiene, will be necessary to stamp out leprosy in Nepal.

Dietary Diseases

In common with the inhabitants of other tropical regions, the Nepalese suffer from an insufficient and ill-balanced diet. The reasons for this are manifold: besides climatic factors, there are the very dense population, the inadequate transportation system, illiteracy and a general lack of education, and food habits and customs growing out of religious taboos.

The calorie content of the Nepalese diet is estimated to be about 28 percent below the minimum requirement for good health (2,800 calories per average man daily). A diet survey of the Katmandu Valley, including urban and rural areas, revealed that 40 percent of the families consumed insufficient food to provide the energy for daily activity.

The shortage of food is, of course, more severe in poor crop years than in good ones, but it is always present. The region simply does not produce enough food for its growing population; per capita production of cereals has evidently declined in recent years. It should be noted that total production is not available for consumption; there must be savings for seed and the livestock population must be fed. The supply of food available for human consumption is further reduced by destruction in the fields by wild animals, insects, and cattle; other losses occur after harvesting through deterioration, insects and rodents, and damage in transportation and storage due to poor facilities. In times of scarcity, moreover, the well-to-do buy for "security" purposes and the amounts available for the masses are further reduced.

In addition to quantitative shortages, there are qualitative deficiencies in the Nepalese diet. Particularly in the Terai and the rice-eating Himalayan valleys, the diet has grave deficiencies in calcium, fats, proteins, and essential vitamins.

The influence of dietary deficiency on the geography of disease should be measured not only by the prevalence of specific deficiency diseases such as beriberi, pellagra, and dropsy but by the incidence of those diseases to which such
deficiency contributes. It is not possible to discuss all the dietary afflictions here, but certain of them may serve as illustrations.

Beriberi is easily preventable, but it is a poor man's disease and usually runs its full course without the benefit of treatment. Because of the lack of medical facilities, it is difficult to measure the precise incidence of this disease, but in the eastern Terai it is very high. In the wet inundated areas of the Kosi River whole families and not infrequently entire villages are affected by beriberi in some degree. The prevention is simple: supplements to the basic rice diet or, failing in that, greater emphasis on retention of the nutrient values of the rice itself.

Cases of chronic diarrhea of obscure etiology which do not respond to any present treatment and in which the patient slowly wastes away or dies are not uncommon in Nepal. Improvement of diet effects a cure in the early stages of these disorders, but in the later stages of the disease, changes in diet have little or no effect.

Certain afflictions of the eye, sometimes resulting in total blindness, are considered by most authorities on Nepalese and tropical medicine to be results of vitamin deficiency. The incidence of partial blindness and defective eyesight is not known, but it seems highly likely that the literacy program of the Nepalese government will reveal that many Nepalese are suffering from defective vision.

The list of diseases of dietary etiology is a long one and includes many which have not been mentioned here. As previously noted, the mortality from all these disorders, great as it undoubtedly is, does not represent the main contribution that food deficiency makes to the total mortality in Nepal. The indirect cost, chiefly in the form of lowered resistance to diseases of infectious origin (such as tuberculosis, leprosy, influenza, and pneumonia) and also in the form of inefficiency in food production and food distribution (which produces a vicious circle) is much greater.

Experiments in the United States and Canada have demonstrated that even slight deficiencies in essential nutrients in an apparently well-fed population can markedly lower resistance to disease, complicate pregnancy and childbirth, endanger the health of children, and even significantly reduce the loss of nutrients in the growing, milling, storing, washing, and cooking of rice.

The preponderance of rice in the diet is to be explained in large measure by the unavailability of other foods. It is often assumed that Hindus and Buddhists do not eat meat because of religious taboos. Actually, these foods are not plentiful for reasons other than religion, and it may be that the taboos exist because of nonconsumption, not vice versa. When such foods are obtainable, they are consumed by substantial numbers of Nepalese Hindus and Buddhists.

Regardless of attitudes or requirements, meat is scarce in most tropical areas. In hot climates, animal foodstuffs are highly perishable. Also, livestock raising is hazardous; the continuous high temperature affects adversely the development and performance of most present breeds of cattle and, to some extent, other livestock as well. Too often in Nepal, as in other tropical areas, cattle are expected to obtain all their feed from pastureage. Especially in the densely populated areas, they are not given enough of other kinds of feed, and the pastures themselves are not sufficiently improved. In addition, cattle diseases and parasites abound in Nepal. These conditions not only reduce the supply and quality of meat, but do the same for milk, and milking practices are far from efficient in Nepal.

Of the two basic food problems in Nepal—the deficiency in calories and the deficiency in particular food elements—the first seems more difficult to remedy. A great increase in the total production of food is an economic task of major magnitude. But to improve the nutritive quality of the food available might be less costly and should be both practical and effective. The protein and other deficiencies cannot be easily eliminated. But they can perhaps be overcome by improved processing, distribution, and preparation of the foods now available, together with the addition of strategic food elements of small bulk but major dietary importance, some of them possibly synthetic. Systematic planning and rigorous public education, together with an effort to push total production as fast as possible, should reduce greatly the dietary factor in Nepalese mortality.

**Public Health Program**

As yet, Nepal has no separate Ministry of Health. The World Health Organization and the United States Operation Mission to Nepal are helping to develop a public health...
program. In view of the economic and demographic conditions, the need is for quick and inexpensive techniques, most of which await scientific development: some way to prevent malaria inexpensively, a simple vaccination for tuberculosis, chemical specifics for diarrhea and dysentery, and cheap synthetic foods which could be manufactured in huge quantities and widely distributed.

Improvement of public health in Nepal must be a process of improving economic conditions, changing the social institutions, improving general hygienic conditions, and altering popular habits. This may seem too slow a process. But the wholesale application of the latest scientific achievements would produce a sharp decline in the incidence of disease and consequently in mortality. A drastic decline in disease and deaths would mean a drastic increase in population. Therefore, unless permanent changes were soon made in the economic organization and social institutions—in the entire pattern of Nepalese life—a considerable decline in disease would render the shortage of food and other commodities even more severe. A continued low death rate without a modern economy is inconceivable.
Knowledge of the rock types and geological formations of Nepal and their associated minerals is meager. The area covered by systematic mapping is extremely small, and such studies have been attempted by Swiss, American, and Indian geologists only recently in certain selected areas.\(^1\)

However, the present knowledge of the geology of Nepal indicates that the major portion of the Nepal Himalaya consists of metamorphic and igneous rocks which include mostly gneisses, granites, and schists of different ages. The sub-Himalayan ranges are made up predominantly of sedimentary rocks such as sandstones and shales of the Tertiary period. Coal seams of Eocene age up to eight feet in thickness are present, minerals associated with igneous and metamorphic rocks, therefore should be among the natural resources of Nepal.

Previous to the exploratory work of Toni Hagen, the results of which are not yet published, discoveries of minerals were a matter of pure chance. The feudal rulers of the past followed a policy of seclusion, and foreign scientists were not permitted to enter the country. Most of the known deposits were discovered accidentally, worked by primitive methods, and abandoned when good quality sources were exhausted. Numerous old abandoned mines are seen in Nepal, and it has been suggested that Nepal exported some copper and iron during Malla times.\(^2\)

**Chief Mineral Occurrences and Their Development**

The administration of the mining industry of Nepal is under the Nepal Bureau of Mines. The distribution of known deposits is shown on plate 31. Coal, iron, mica, copper, and cobalt have been found to exist in various parts of the country, but proven reserves are small and often of poor quality.

As far as is known, the coal reserves of Nepal are small. In 1932, a British geologist, T. Sutton Bowman, examined coal deposits near Chatra on the Kosi River in eastern Nepal, and reported that the area along the great Boundary Thrust Fault was favorable for coal deposits. Coal outcrops have been noticed by the Swiss geologist Toni Hagen in the Chitawan district along the Boundary Fault. However, all rocks in this area have been folded, faulted, and compressed to such an extent that it is doubtful if a bed of commercially workable coal exists in this zone.

Coal seams of Eocene age up to eight feet in thickness with about 31 percent carbon, 36 percent ash, 12 percent moisture, and 21 percent volatile matter have been discovered recently near the base of the Mahabharat Range, in the Salyana district.\(^2\) Beds of peat are frequent at various levels in the Katmandu Valley, particularly to the north of Katmandu, where it is used for both brick and lime kilns.

American geologists attached to the United States Operation Mission have made preliminary investigations of iron ore deposits to the southwest and southeast of Katmandu.\(^3\) The ore is dominantly hematite with slight magnetic qualities which indicate that magnetite or other minerals are associated with it. However, because of the geologic structure of the area (a system of folding, followed by reverse faults and thrust planes where large displacements have occurred from north to south) the probability of large ore bodies is slight. During the formation, the tectonic movements probably crushed or covered any existing deposits, but it is possible that at the point where forward movement stopped, ore formations were left in a parallel lenticular structure.

Floats of hematite were discovered by American geologists on Lothar Khola bed, a tributary of the Rapti, near Kandrang Garhi about forty miles west of Katmandu.\(^4\) The quantity and quality of the ore is not precisely known, but it has a magnetic property in varying degrees. The ores of this area are associated with pyrites.

Mica deposits have been located at several places in Nepal, and the Nepal Mica Company has exploited the deposits in Katmandu Valley, east of Nibuwagaon. The mica-bearing pegmatites vary in thickness from six inches to five feet and are composed of quartz, feldspar, mica, tourmaline, and garnet.\(^5\) To the east of Nibuwagaon are the Sindhu-Dhuseni and Chaukibhangyang mica deposits, which are of poor quality.\(^6\) Better quality ruby-colored mica occurs at Jyamire in the same vicinity.

Little is known of the copper ores of Nepal, beyond the fact that they are associated with the ores of cobalt and nickel, and have been worked on a small scale at various places. Copper float ore has been noted near Jugedi. The water-worn copper ore is malachite green; it is composed of malachite, chalcopyrite, and enough chalocite to make it of relatively high grade.

Cobalt is known to occur at several localities in western Nepal, including the relatively large deposits at Tamgas, Netadurling, and Samar Bhamar about 135 miles west of Katmandu and 50 miles north of the Indian border. Judging from the many abandoned pits and adits, now for the most part under water, extensive workings existed in this region in the past.\(^7\) Of these three deposits, the occurrence at Samar Bhamar seems promising.

In addition to the main minerals noted above, dolomites and dolomitic sandstones are of frequent occurrence throughout the whole length of the Himalaya, although only the significant deposits can be shown on the map. There are extensive dolomites in Salyana district and limestones at Bhanse in Katmandu Valley. Friable white quartzite of glass sand quality occurs at Ranunita in Dailekh district, and baryte veins are known to occur at Khandandara in Puthan district. Small known deposits of gold, lead-zinc, sulfur, platinum, and salt peter are shown on the map.

Economically speaking, most of the deposits noted above (with the exception of those in the Katmandu Valley) seem unsuited for large-scale mining development; most are small deposits of medium or low quality ores, and are located in areas where access would be difficult and transport costly. In addition, as a result of the highly faulted and folded geological structure of the country, continuous deposits of minerals such as coal are unlikely. Thin, discontinuous seams located in inaccessible areas are not at present worth exploit-
NEPAL
MINERALS AND POWER

Subject data by Nepal Government, U. S. Operation Mission and India Aid Mission

THARU PROJECT

KATMANDU VALLEY

KIBHANGY

DU-DHUSENI

MINERAL OCCURRENCES

THE SOLID BLACK CIRCLES REPRESENT DEVELOPED INSTALLED CAPACITY, OTHERS REPRESENT PLANNED CAPACITY OF THE NEW HYDRO-ELECTRIC PROJECTS UNDER CONSTRUCTION OR INVESTIGATION.

PROPOSED DAM

MINES

THE CIRCLES ARE PROPORTIONATE TO THE CAPACITY OF EACH POWER STATION.

MINERAL OCCURRENCES

Beryllium (Ba)
Co Cobalt
Copper (Cu)
Dolomite
Glass Sand
Gold
Iron
Lead (Pb)
Limestone
Mica
Peat
Platinum
Saltpetre
Sulfur
Zinc (Zn)

EXPLANATION

ALBERS CONICAL EQUAL AREA PROJECTION

EAST OF GREENWICH

20° 21° 22° 23° 24° 25° 26° 27° 28° 29° 30° 31° 32° 33° 34° 35° 36° 37° 38° 39° 40°
Geologist Toni Hagen at the mouth of a small metal mine, one of many old and abandoned mines seen in Nepal Himalaya. (United Nations)

It is possible that future improvement of transportation facilities may make the known deposits economically valuable.

Possibilities for extending mineral reserves depend on the discovery and development of new deposits and improved recovery from deposits now exploited by primitive methods. Both offer some hope, although the major contribution must be expected from discovery and new development. The prevailing dense forest cover, the rugged terrain, and the complicated geological structure have made geological mapping and discovery of new mineral deposits a difficult task. Geophysical prospecting, which has assisted greatly in discovery of mineral deposits in other parts of the world, offers promise of mineral discoveries. Geochemical methods, developed especially in the Soviet Union, appear suitable for prospecting gold, zinc, chromium, copper, lead, tungsten, and nickel. However, it is doubtful that any large deposit of real significance will be found. The small mines of a variety of minerals situated in almost every region of Nepal are at least an indication that conditions are somewhat favorable for new discoveries of moderate size. Given economic stimulus, the possibility of future mineral discovery and exploitation appears fair. But there is slim prospect for Nepal's amassing adequate foreign aid (both financial and technical) to prospect and develop new deposits.

Extraction of minerals by the primitive methods used in Nepal is wasteful. Improvements in mining methods may save labor and materials, and may result in more complete recovery of the mineral. Better processes of ore concentration are also needed.

Power Resources

Coal and hydroelectric energy are the main power and fuel resources for Nepal. Almost complete absence of petroleum is a distinctive feature. Since large reserves of good quality coal are lacking, hydroelectric plants promise to be the basic source of Nepal's energy production.

According to the Swiss geologist Toni Hagen, Nepal has "the greatest hydroelectric potential in the world." Undoubtedly for its small area, Nepal has a comparatively high hydroelectric potential. The mountainous surface of the country and the moderately high precipitation favor the development of waterpower in almost every district. The systems of the Sapt Kosi in the east, the Narayani and its large tributaries in the central region, and the Karnali in the west flow from their sources in the snowclad Himalaya through mountainous terrain affording many promising sites for power development. Because of the lack of statistics concerning river flow, no estimate of the amount of potential power is available, however. It should be kept in mind that much of the waterpower potentially available in Nepal cannot now be developed economically, because it is too far from markets, or calls for too great an expenditure in development. Because of the lack of capital, and because technological resources are not sufficient either to harness the power or to use it if available, there has been little waterpower development. The total installed hydroelectric capacity is only 1,350 kilowatts—all of it being concentrated at two places in Kathmandu Valley. The plant at Pharping, about seven miles south of Kathmandu, has capacity of 450 kw., and the one at Sundarijal, eight miles north of the capital city, 900 kw. Actual hydroelectric production is far less than that indicated by the authorized capacity of the two power plants. The Sundarijal plant was installed about 22 years ago and Pharping 45 years ago; these two plants are far from meeting the requirements of Kathmandu Valley today.
NEPAL INDUSTRY

Scale 1 Inch to 40 Miles, or 1:2,534,400

Subject data by Nepal Government

EXPLANATION

- Food processing
- Cotton
- Jute
- Match
- Sugar
- Cigarette
- Mica processing
- Plywood and furniture
- Saw mills
- Woolen mills
- Bristol factories
- Cotton textiles
- Power generation
- Chemicals
- Miscellaneous

Locations for future Industrial Development
THE DISTRIBUTION OF TOTAL NATIONAL SUBSCRIBED CAPITAL AMONG VARIOUS INDUSTRIES

1. Jute mills
2. Cotton mills
3. Food processing industries
4. Power plants
5. Plywood and furniture
6. Sugar mills
7. Cigarette factory
8. Match factories
9. Chemical Industry
10. Miscellaneous industries

TOTAL NATIONAL SUBSCRIBED CAPITAL (NEPALESE) Rs. 27,98,000

THE CIRCLES ARE PROPORTIONATE TO THE AMOUNT OF SUBSCRIBED CAPITAL INVESTED IN INDUSTRY IN EACH OF THE MANUFACTURING CENTERS. (Figures in Nepalese Rupees.)
There also are small plants producing both hydroelectric and thermal power in the vicinity of Biratnagar. These plants, having a total capacity of 2,000 kw., supply power to the industries at Biratnagar.

Nepal has a very ambitious plan (unfortunately not backed by adequate capital and technical personnel) to develop waterpower resources. Six main power projects, in addition to the Kosi project in cooperation with India, have been planned in various parts of the country under the nation's five-year plan of economic development. The programs under the five-year plan were scheduled to commence in 1956, but frequent changes in administration kept the entire plan in abeyance until 1959. The government elected in April of that year has now begun to carry out the development program.

The Kosi project, situated in Morang District, is being constructed by India, and when complete will generate 1.8 million kw. According to agreement between the governments of Nepal and India, Nepal is to get 10,000 kw. at the powerhouses free of cost for use within its territory. The project may supply almost all of eastern Nepal and solve the power and fuel, which will be remedied if the planned power projects are developed.

Besides these two industrial centers, there are a number of other towns where smaller concentrations of industry exist. Katmandu, with plywood and furniture manufacture and

Manufacturing Industry

The handicrafts are more widespread and at present are probably more important in Nepal than modern factory production. Although modern factories are found at various centers in the eastern Terai, the country cannot be classified as industrialized.

House, small-shop, and bazaar production are widespread, and account for most of the goods produced. There is no way of estimating the total output of such goods, nor the number of shops or people involved. The shops are numerous, but each employs only from one to about ten persons, and the percentage of the total population so engaged is very small. The tools and devices used in such production are simple and mostly man-powered. Products are diverse, including many types of textiles, metalware, leather goods, ceramics, and wooden articles; quality ranges from very high to poor. The poor grades are normally for local use.

Although the factory system in Nepal is over half a century old, the factories are of types common to nonindustrialized areas, employing relatively simple processes, usually completed within a single plant. There is no complex division of labor, nor is the value added by the manufacturing process high. The total number of factories in the entire region is small, and the wage earners (approximately 20,000) make up only a small fraction of the total population. The amount of subscribed capital invested in industry is about $4,000,000.

In terms both of subscribed capital and number of factories, Biratnagar is the outstanding manufacturing center in the nation (plates 32 and 33). Jute, cotton, sugar, matches and processed foods are the chief products of Biratnagar industries, which are based on local raw materials and designed to meet the needs of the local market in the eastern Terai.

Birganj ranks next to Biratnagar in industrial importance, producing miscellaneous consumer goods similar to those of Biratnagar. Birganj has the advantage of being located on the railroad and the main highway linking Katmandu with India. Its chief industrial handicap is the lack of cheap power and fuel, which will be remedied if the planned power projects are developed.
MICA processing, is possibly the most important of these minor centers. In terms of capital investment, Nepal's largest industry is jute manufacture, cotton manufacture and food processing occupying second and third positions respectively (plate 33). These three represent three-quarters of the total capital invested in Nepalese industry.

The existing industries of Nepal do not take full advantage of the raw materials available. Forest products like timber, grass, drugs, and herbs have not been utilized industrially. No factory has been established to process the available raw wool. Several industries using local raw materials can be established in the near future under a plan of industrial development. These locations and possible industries are shown on plate 32, inset.

Increased industrialization in Nepal is regarded as a means of raising the standard of living, of becoming less dependent upon imports of finished goods, and of developing a more stable economy. But the nation has relatively little in the way of mineral wealth upon which to base industrialization; it is not an agricultural surplus area; its people are not experienced with machines, nor are any considerable number of them skilled factory workers (though they are apt students when given the opportunity). The purchasing power of the mass of the population is almost nil, and Nepal finds it very difficult to break into already established markets in India. Transportation, both rail and highway, is very poorly developed in much of the country. The Nepalese frown upon foreign investments for fear of economic imperialism, yet local capital hesitates to invest in industry because returns do not come quickly enough and are not immediately as large as those from agriculture. The instability of the government and of the general political situation also deter both local and foreign investors. Despite these handicaps and despite the fact that the region has had no gradual development from small-shop production toward industrialization, Nepal desires to become industrialized in the shortest time possible, telescoping into a few years advances which took the great industrial powers at least a century to achieve.

1 Toni Hagen, the Swiss geologist, is now engaged in systematic geological mapping of the country as a part of the United Nations' technical assistance program.
6 Sanford, p. 11.
7 Sanford, pp. 16-20.
10 Sanford in his report points out the wasteful mining practices in detail.
11 Sanford, p. 32.
13 The following section is based on unpublished material obtained from the Nepal Government.
11 Transportation and Trade

A map showing Nepal's transportation gives the impression of adequate, well-coordinated roads and mountain trails (plate 34). Actually the inferiority of the roads and trails, in both coverage and quality, may be better imagined than described. There are only about 100 miles of good all-weather paved roads and only about 50 miles of railway, of which the 29 miles between Raxaul and Amlekhganj are most important. Most of the paved roads are in Kathmandu Valley and connect the city of Kathmandu with India. Other regions are physically detached from the Kathmandu Valley and from each other as far as surface transportation is concerned. This lack of transportation hinders the movement of surplus food from the Terai to the deficit mountain districts. The Terai areas export rice to adjacent parts of India, but the food deficit in the Kathmandu Valley often must be met by importation of rice by air from India.

Besides hindering the development of trade and industry, the absence of interregional transportation is Nepal's great handicap in welding the country into one nation. The groups living in outlying areas regard themselves more as Gurungs, Magars, Limbus, and Tharus than as Nepalese. It would be difficult to conceive of a pattern of internal transport which would more seriously hinder the achievement of political unity and coherence than does that of Nepal. Most of the overland routes of travel from Kathmandu to outlying districts go across the Indian border, through Indian territory, and back into Nepal. As a result of the slow and scanty transport development, the regions lying beyond Kathmandu Valley and adjacent areas may be said to be outside the effective national territory of Nepal from the point of view of political control.

The high cost of coolie or pack animal transport on the mulepaths and narrow trails of the mountains severely restricts the radius of trade as well as the variety of market goods in most of Nepal. The Terai, having a comparatively level surface, traditionally relies upon carts drawn by animals. The rivers of Nepal are not navigable; even in the Terai, seasonal drought and shifting river channels make navigation impossible except by small country boats at certain seasons.

Railways

Nepal's first railway, now called the Nepal Government Railway (two feet six inches narrow gauge) was opened for traffic in 1927 (plate 34, inset). Martin and Company, who constructed the railway, operated it as agents for the government until 1933. The line is 29 miles in length from Raxaul at the Indian border to Amlekhganj near the foothills.

The narrow gauge station of Raxaul is about two furlongs from the North East Railway (metre gauge) station of the same name in India, and is located in the midst of a built-up area. The most important town on the line is Birganj, where the headquarters and workshops of the railway are situated. From Birganj the railway runs on a very narrow embankment right up to Simra, 16 miles from Raxaul. At Simra begins what is called the forest section (13 miles).

Considering the availability of money and materials, the condition of the railway is reasonably good. The goods traffic is steadily increasing with the development of Kathmandu Valley; passenger traffic is declining slightly, perhaps as a result of increasing air travel between Simra and Kathmandu.

The narrow gauge line has actually been sheltered from the competition of the highway, which is in bad condition and not maintained the year round. Even so, the road traffic up to Simra and the air traffic from Simra to Kathmandu are potential threats to the economy of the railway. Though no figures are available, present traffic demand would appear to justify conversion to metre gauge, which would permit direct connection with the North East Railway and thus save both the time and expense of transshipment. All the passenger cars are fully packed the year round, and the third-class passengers especially travel in a state of much discomfort. If the system is not converted from narrow to metre gauge, it will be essential to double the service, which now is only one train per day.

To integrate the country's transport system, railways must be extended as far into the interior as practicable, and should be linked by ropeways with interior commercial centers other than Kathmandu. The government's Rapti Valley Project (described in Chapter 6) will have to be served by a railway line soon, and an extension of the line from Amlekhganj to Hetura, headquarters of the Rapti project, is proposed. There is also a prospect of further extension westward along the Rapti Valley as far as the border of Nawalpur.

Airways

Air transport in Nepal started in 1950 with the construction of a fair-weather airstrip at Gauchar, Kathmandu, and the inauguration of weekly Patna-Kathmandu DC-3 service by the former Indian National Airways Company. Since then, with gradual development of the Kathmandu airfield, the frequency of the service has been increased to six times

In the mountains of Nepal the only travel routes are narrow trails like this one, clinging desperately to almost perpendicular rock walls. (United Nations)
NEPAL TRANSPORTATION

Scale 1 inch to 40 Miles, or 1:2,534,400

Base map by Survey of India
Subject data by Nepal Government

ROADS & TRAILS
- ALL WEATHER PAVED HIGHWAYS
- FAIR WEATHER UNPAVED HIGHWAYS
- MOUNTAIN TRACKS
- MOUNTAIN TRAILS
- PLANNED HIGHWAYS
- PAVED
- UNPAVED
- JEEP TRACKS (DIRT WIDE)
- ALL WEATHER PAVED AND UNPAVED HIGHWAY UNDER CONSTRUCTION

RAILWAYS, AIRWAYS, & ROPEWAY

PRAVUMNA P. KARAN, 1988

ALBERS CONICAL EQUAL AREA PROJECTION
a week. Until 1956, the airstrip was semiconcrete, and not usable during the monsoon; except for these short breaks, the service has been regularly maintained. The scheduled international service is operated by India. Internal scheduled air service was also introduced by India, and is now operated by the Nepal government. This service is expanding gradually with the construction of fair-weather airstrips in other parts of the country. At present there is air service between Katmandu and Simra, Pokhara, Bhairawa, and Biratnagar, covering a total of 360 air miles (plate 34). Extension of air service to Dang and Nepalganj in the near future is planned.

A new fair-weather airstrip has been opened at Narayangarh under the auspices of the Rapti Valley Development Project. The full potential of this airstrip will be realized with the development of the Rapti Valley which is already under way. There are four airfields in the flat Terai belt—at Simra, Biratnagar, Bhairawa, and Nepalgunj—and four in the mountains at Katmandu, Pokhara, Dang, and Narayangarh. Four others are to be added at Janakpur in Mahotari, Rajbiraj in Saptari, and Dhangarhi in Kailali, all in the Terai, and one in the mountains at Surkhet in Dailekh. The penetration of the interior mountains is limited by the scarcity of potential sites for the airstrips. The United States has undertaken to aid in the development of Nepal’s air services by supplying airplanes and help in the construction of new airstrips, including one at Mustang near the Tibetan border.

**Ropeways**

The ropeway, an electrically operated aerial cableway similar to a ski lift, on which the cargo is transported in baskets, serves to link the Katmandu Valley with the railway, over the mountainous terrain which intervenes. Nepal’s one existing ropeway, owned and operated by the government, was put into commission in 1924 over the 14-mile stretch from Dhursing to Metatirth. In 1956 it was extended from Metatirth to Bhanjar, a distance of four miles. From Dhursing, the ropeway is connected with Amlekhganj, railroad of the Nepal Railway, by road. Incoming goods are transported by rail up to Amlekhganj and from there by road to Dhursing for shipment over the ropeway. Goods must be handled several times in addition to being transshipped at Raxaul. In order to reduce handling and consequent delays, it is proposed to extend the ropeway up to Amlekhganj.

The original capacity of the ropeway was 8 tons per hour, but constant wear and tear without replacement of moving parts has reduced the capacity to 5.6 tons per hour. The ropeway has served the Katmandu Valley well, operating when necessary as much as 20 hours per day. It presently operates for approximately 12 hours per day, transporting on the average 60 tons of goods daily.

Approximately 225 tons of goods are imported into the Katmandu Valley daily, and as the requirements of the country are growing, the ropeway will be unable to handle the increased freight. The present rate of increase of imports to the Valley is 10 tons per day per year, with the prospect of an increase of 50 tons per day per year within a period of five years. The construction of the proposed cement factory at Hetuara will add to the transport load.

**Roads**

Until 1956 Katmandu had no surface vehicular communication with the rest of the world. The high ranges and swift mountain streams are the chief barriers to the development of roads, especially those of an east-west axis. Another feature contributing to the inadequacy of the road system, both as to coverage and quality of service, has been the indifference of the feudal Rana government, which followed a purposeful policy of seclusion and hence discouraged the development of transportation facilities. Since 1951, the more enlightened government now in power has assumed the responsibility for the building of new roads and the improvement of the existing system. In 1955 the King announced a program of building new "motorable roads linking the hill districts with the Terai." However, Nepal has neither the resources nor the technical abilities to build the extensive 4,000-mile system of longitudinal and lateral roads envisaged in the Five-Year Plan. The plan called initially for the construction of 900 miles of roads linking Katmandu with adjacent districts, but little has been accomplished up to the present.

Some of the existing roads and trails and the proposed highways are shown on plate 34. The Tribhuvan Raj Path, linking Katmandu with India, is Nepal’s chief artery of trade, commerce, and intercourse with the outside world. It was completed in 1956 with the assistance of India. A number of fair-weather unpaved roads serve the Terai, connecting trade centers with railheads in India. The almost complete lack of roads in mountain areas is obvious from the map. The only available means of communication in these mountain regions of Nepal are the narrow mountain foot trails. In the high Himalaya the trails shown on the map are narrow paths clinging desperately to almost perpendicular rock walls. The turbulent mountain streams crossing these trails are often bridged by trees felled across the water. Vivid accounts of travel on such trails are given by Himalayan explorers. Northward, most of these mountain trails lead into Tibet across passes through the Great Himalayan Range, the most important of which are indicated on the map. In general,
since 1952. In contrast, exports of pentine, and catechu. Raw jute has been an important export from eastern India. The principal articles of export from Nepal into India are rice, husked and unhusked, food grains, mustard, rapeseeds, and other oilseeds, cattle, sheep and goats, hides and skins, ghee, timber, cardamoms, red pepper, turmeric, musk, borax, turpentine, and catechu. Raw jute has been an important export from eastern Terai, though the quantity has declined since 1952. In contrast, exports of oilseeds have been increasing. The chief imports are cotton piece goods, cotton yarn, woolen cloth, shawls, flannel, silk, salt, spices, sheet copper and other metals, tobacco, petroleum, provisions, and chemicals. The agricultural products of the Terai and the goods coming from the mountains on roads and trails flow to the trade centers of the Terai, located on highways leading into India.

Trade Centers

The trade centers of Nepal are located chiefly at the junctions of transport routes and at points of transshipment. Changes in the mode of transportation have given rise to many new trade centers at points where goods must be shifted from freight car to wagon, from wagon to coolie or pack mule. At the trade centers in the Terai along the Indian border, for instance, the load is shifted from the Indian railroads to Nepalese highways, and vice versa. In the mountains there are several trade centers where goods are shifted from muleback to coolies.

The foreign trade of Nepal is carried on across the Himalaya with Tibet, and along the extensive line of the southern frontier with India and with other foreign countries through India. Nepal has very little direct commerce with foreign countries other than India because of the unstable currency which necessitates payment in Indian currency, the small size of Nepal’s demand for goods manufactured outside India, and the dependence on Indian railways and ports for shipments from abroad.

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The Katmandu market is the most active center of trade. The Katmandu market is the most active center of trade.
times. The new Tribhuvan Raj Path and airplane services have brought Katmandu much closer to India, increasing the commercial importance of this city.

The Himalayan trade centers are chiefly important for trade between Tibet and Nepal, which is largely confined to the products of Nepalese and Tibetan agriculture; to some extent they also serve as centers of entrepot trade between India and Tibet. The principal imports from Tibet are shawl wool, salt, borax, musk, yellow arsenic, gold dust, antimony, and medicinal herbs. The exports into Tibet include utensils of copper, bell metal, and iron; Indian cotton piece goods, tobacco, coconuts, and hardware.

The extent of Nepal-Tibet trade is not exactly known, and since the opening of the land route to Tibet through Darjeeling, it has declined considerably. The chief route, northeast from Katmandu following a tributary of the Kosi, passes the frontier town of Kodan; another route starts from Katmandu, follows the main eastern stream of Gandak, crosses the frontier at Rasua Garhi, and ultimately reaches Tibet.

Both these routes are extremely difficult. The only beasts of burden available are sheep and goats, and practically everything but grain and salt is carried by men and women. (The Bhotias carry enormous loads. Although 80 pounds is the regular load, it is by no means uncommon for a man to carry 160 pounds on his back, supported by a strap across the forehead.)

The merchants of Chainpur, Baitadi, Jumla, Dana, Chautara, Charikot, Dingla, and Taplejung have branch establishments higher up in the mountains near the Tibet border, where they meet the Bhotias who bring down borax, salt, and wool from Tibet; chilli, turmeric, ginger, tea, and forest products are exported. Much of this trade is carried by coolie or mule between the Great Himalayan passes and Nepalese trade centers.

The importance of entrepot trade between India and Tibet through Nepal has declined considerably. Tibetan trade has now shifted to Indian border towns such as Kalimpong, Darjeeling, and Gyantse, in Sikkim, because of better transport through these places. The direct commercial routes between India and Lhasa, the chief center of Tibetan trade, are much shorter and better than the age-old routes across Nepal Himalaya. The new Peking-Lhasa route has further detracted from the volume of Nepal's trade with Tibet. Since 1951, there is increasing effort to orient the trade and economy of Tibet toward China proper from Nepal and India.

It seems likely that even the local trade along the Nepal-Tibet border will decline in time, because of the political situation in Tibet and the permanent natural difficulties of routes across the Great Himalaya.

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1 This section is based on information obtained from the Nepal Government. Some information on Nepalese transportation is published in Economic Survey of Asia and the Far East, 1957, VIII (Bangkok: United Nations Dept. of Economic Affairs, 1958).
5 This summary is based on information gleaned from various issues of The Indian Trade Journal, published by the Ministry of Commerce and Industry, Dept. of Commercial Intelligence and Statistics, New Delhi.
Geographic Regions

On the basis of the varied geographic phenomena described in the foregoing chapters, Nepal may be divided into several major regions, each characterized by a homogeneity of human activity which manifests the relationship between the cultural and the natural landscape. Within each of these regions, smaller and more distinctly homogeneous subregions can be discerned (plate 35).

The system of geographic regions used here establishes three distinct land areas—the Himalaya, Inner Terai, and Terai—and distinguishes within each of these major divisions three geographic regions. The boundaries between these nine geographic regions are drawn primarily on the basis of district or thum (county) borders. In part this is for convenience, but on the whole these borders mark differences in climate, terrain, and vegetation, as well as cultural dissimilarities with regard to land use and population density. The principal merit of such a system lies in its more precise presentation of the facts of geographic diversity.

The first primary division, Himalaya, is adjacent to the plateau of Tibet, and its distinctive characteristic is its mountainous base. Lofty peaks of the Great Himalayan Range dominate the northern interior. It is divided by the Kosi, Kali, and Karnali river systems, and the valleys of these rivers and their tributaries are the chief areas of settlement and human occupancy. In its original state, much of the region was densely forested, but human settlement slowly encroached upon these forested areas, and more recently commercial forestry has made further inroads. In the lower elevations much of the forest cover has been destroyed, but virgin forests of pine, fir, and larch still flourish in the interior, especially in the west. Cool to extremely cold winters are also a distinctive feature, and the upper courses of the river valleys—the chief centers of settlement—have short growing seasons. This means that the Himalayan farmers are limited to one crop per year—potatoes, barley, or wheat. Rough terrain and harsh climate call for ruggedness and persistence on the part of these mountain folk. The inhabitants of these valleys are often inclined to think of themselves as brave, energetic, virile, in contrast with the indecisive and unaggressive Terai settlers.

The complex forest-covered Churia Hills and their enclosed valleys, despite the difficulty of clearly delimiting them, form the second primary division, the Inner Terai. These hills are not so forbidding as the mountains of the north. However, from time immemorial they have served as barriers between the fertile Himalayan valleys of the north and the Ganga Plain of India. The Inner Terai, subdivided into three geographic regions, east, central, and west, is a very sparsely populated area, with no large villages.

The third primary division, Terai, contains but 17 percent of the national area and has 28 percent of the country's population. This narrow belt, 10 to 20 miles wide along the Indian frontier, is economically the most valuable region of Nepal. Here the rainfall varies from 80 inches in the east to about 40 inches in the west. The average density of population per square mile increases from 83 in the far western Terai to 327 in the eastern Terai. These differences in population density from one geographic region to another in the Terai do not reflect any substantial contrast in the stage of economic development, but rather reveal variations in the population-supporting capacity of the land. The humid eastern Terai, with its greater rainfall, has a larger arable area and grows a variety of crops, including rice, jute, tobacco, and sugarcane. It produces large quantities of rice and other cereals, and its surplus is exported to India. The far western Terai, with less rain, has a limited extent of arable land. Its dry, dusty landscape stands in contrast to the green of the eastern Terai.

The eastern part of the Nepal Himalaya is a mountainous land, and in the north it is cold, forest covered, and forbidding. Its humid climate distinguishes it from the western part. As population pressures have increased, the eastern Himalaya has gradually been penetrated by settlement despite the harsh environment. Comprising 10,483 square miles, it had a population in 1955 of 1,814,458, a density of 173 persons per square mile.

The densely peopled valleys of the eastern mountains are sharply segregated from each other by the mountains. The climate in the lower courses of the rivers is warmer, and the human occupations there are quite different from those of the interior. The peaks of the Great Himalaya appear as a long white massif on the skyline when observed from one of the valleys.

In general, forests and wooded slopes dominate the local landscape. In remote areas of the interior and on very steep slopes, the forests have been virtually untouched by man. Conifers—spruce, fir, larch, and Nepalese pine—dominate the forests. Commercial lumbering has developed in the last five decades. The logs, cut in the interior and floated down the streams, find a ready market in India. Where excessive cutting or forest fires have occurred, second growths have developed, but these are not considered valuable timberlands.

The eastern mountains have served for centuries as a pioneer land for both Nepalese and Tibetans. The land-hungry squatters who migrated into this virgin region have cleared the forests by fire—a practice common elsewhere in the Himalaya. From this method of clearing the land has evolved a distinctive rural economy. As one plot of land becomes infertile, the settlers move on to deplete another.

Generally these people—shifting farmers as well as sedentary—cultivate hardy cereals. Handicapped by the bitterly cold winters, they work hard during the short summers to produce millet, barley, wheat, and, in recent decades, potatoes. Those farmers who have been fortunate enough to obtain possession of suitable valley floors cultivate quick-maturing varieties of rice. At lower altitude, the warm bottom lands of the river valleys are more suitable for rice farming, whereas the steep mountain slopes are given to corn, millet, or potatoes. Specialized occupations such as the raising of yak or sheep are often carried on. In general the
GEOGRAPHIC REGIONS

Scale 1 Inch to 40 Miles, or 1:2,534,400

Base map by Survey of India

NEPAL

GEOGRAPHIC REGIONS

A. HIMALAYA
1. EASTERN MOUNTAINS
2. WESTERN MOUNTAINS
3. KATMANDU VALLEY

B. INNER TERAI
4. EAST INNER TERAI
5. CENTRAL INNER TERAI
6. WEST INNER TERAI

C. TERAI
7. EASTERN TERAI
8. MIDWESTERN TERAI
9. FARWESTERN TERAI
economy is self-sufficient, though farmers obtain necessities in exchange for their agricultural products or wool. To a large degree such self-sufficiency is the result of the lack of transportation facilities in the mountainous interior, where dependence must be placed on trails.

Despite the lack of well-developed commercial life, the eastern mountain region contains a few such large settlements as Ilam, Dhankuta, Bhojpur, and Ramechhap, most of them located at valley junctions of streams and trails.

Western Mountains

The western part of the Nepal Himalaya, drained by the Kali and Karnali river systems from north to south, is a complex mosaic of mountains whose extremely irregular surface configuration can be appreciated only from the air.

The terrain of the region is made up of numerous mountain spurs and valleys extending from the Great Himalaya. Rugged interstream divides separate relatively deep valleys, some of which have broad flood plains in their lower courses which are important for agricultural use.

In the well-watered inner valleys and lower hill slopes the cultivated fields contrast with the forests and bare rock summits of the Great Himalaya. The natural vegetation is the heaviest to be found anywhere in Nepal, and the land has not been cleared as extensively as in the eastern mountains. Because of its drier climate, this region is not so densely populated; man has put only the moist lands under cultivation, and in most areas the forests remain. The southern sections of the river valleys have a nearly subtropical climate, which makes possible the cultivation of rice and is the desired crop, proportionally it is less important than wheat, but in the barley predominate among the field crops. Although rice is raised on the dry hillsides. Millet and barley are also produced, and wheat is the main winter crop.

Though the area is sparsely settled, its population is diverse in origins and culture. Narrow mountain trails are the chief means of communication between the isolated village communities; here and there are but a few short stretches of mountain road. The dependence upon foot trails and the rigors of the mountain terrain have produced some of the world’s most skilled mountain porters, and transporting goods on their backs has long been one of the important occupations of these people.

Katmandu Valley

The Katmandu Valley, some 209 square miles in area, is the most distinctive geographic region in Nepal Himalaya. It is the heart of modern Nepal; it has the largest city, the chief cultural center, the only institution of higher education in the nation. It also has the greatest contact with the outside world. Mountains, not quite as high as elsewhere, but difficult to cross, surround the valley and bar easy access. The Mahabharat Range, which encloses the valley, is traversed by a single automobile road, which was built recently.

Within these barriers the inhabitants of the valley have developed a way of life which makes as intensive use of land as may be found anywhere in the world. This geographic aspect of the Katmandu Valley is as impressive as the congestion of people. The average square mile must provide food for 1,966 people. Only the valley bottom is level, and hillside have been laboriously terraced. The rice fields and the brick houses of the Katmandu Valley villages give a superficial impression of prosperity to the visitor, but in reality the economic condition of the farmer is unhappy.

The venerable temples and pagodas and the closely packed farmhouses of the villages attest to centuries of human occupation, and wherever topography and water supply permit, all of the Valley is an intensive garden. Few places on earth are more productive, and few support so many people on so little good land. Where irrigation water is unavailable, the rainfall alone may suffice for rice, the dominant crop on wet lowland fields. Corn is raised on the dry hillsides. Millet and barley are also produced, and wheat is the main winter crop.

The basis of this dense population and intensive land use lies partly in the climate. Precipitation averages 57 inches, falling mostly in summer. Snow and freezing temperatures are rare, and the growing season normally extends through out the year. Mountains to the north keep out the cold air masses from Tibet, but those to the south are not high enough to stop rain-giving monsoon winds. With temperature and moisture so favorable to agriculture, the high humidity of the summer is unfavorable for man. Winters are raw and chilly, summers hot and sticky.

Minerals, especially mica and iron ore, occur in modest abundance in the Valley or in the encircling mountains, but coal is lacking.

Nepal’s largest city and national capital, Katmandu, with a population of 105,000 lies in the center of the Valley on the banks of the Bagmati River. The ancient town was built under the early dynasties to control the neighboring territory, and its street pattern and urban landscape somewhat resemble those of other ancient cities. Nepalese culture originated in the Valley, whose Newar occupants developed an elaborate and original style of art and architecture several centuries before Christ. Administration, commerce, and cultural activity are the city’s chief functions today.

Katmandu is changing. The city is now linked with India by an automobile road and by modern air transport, and the impact of the outside world is being felt by Katmandu and its people.

East Inner Terai

This region comprises the Sindhu and Udaipur districts, and within an area of 1,650 square miles contains 195,564 people, or 119 people per square mile. The forested steep slopes of the mountains limit cultivation to a few hillside patches of barley or corn. The low-lying areas are wet and malarial. Though the mountains are not extremely high, they serve as the boundary of the region and tend to isolate it from the rest of the country.

This is the area of Nepal’s fine forests. Rapid cutting has denuded some hillsides, but on others, good stands remain. Pines are found on the higher slopes, and there are mixed coniferous and deciduous forests on the intermediate slopes. At lower elevations there are some broad-leaved hardwoods. Limited lumbering operations are carried on, but much of the more marketable timber is in inaccessible locations. An annual rainfall of 60 to 70 inches makes this an excellent area for permanent forest supply, and with adequate conservation and replenishment the region could become an important supplier of timber to India.
The east Inner Terai is isolated and lacks real economic potential except in forestry. The farmers living in the valleys are almost cut off from their countrymen. Settlement has made little mark on the landscape; the greater part of the region is sparsely peopled, and only one settlement, Udaipur Garhi, is of importance.

Central Inner Terai

The central Inner Terai, which separates the densely populated eastern Terai from the equally crowded Himalayan valleys of the north, has an area of 2,399 square miles and a population of 217,061, a density of only 90 per square mile, the lowest in Nepal except for the 83 of the far western Terai. But the data on rural population densities are misleading, for some sections of Chisapani and Chitawan with good agricultural possibilities have several hundred people per square mile, while the still-forested mountains are nearly empty. Besides the ribbons of alluvial materials along the river valleys, most of the terrain is made up of hill slopes, and the amount of good agricultural land is therefore limited.

The region is drained by the Narayani and its tributaries, and includes the level Rapti Valley. The main obstacle to the intensive use of the region is the humid climate and the widespread incidence of malaria. The Rapti Valley development scheme has been planned to increase colonization of this area through resettlement of peasants from more crowded areas.

Chisapani Garhi, which lies on the main automobile highway linking Katmandu with India, is the only settlement of more than local importance.

West Inner Terai

Dang and Deokhori districts, with an area of 700 square miles and a population of 89,367, a density of 128 per square mile, constitute one of the smallest geographic regions of Nepal. In certain sections the hill slopes have a dense forest cover, and the malarial valley floors have not been completely used by man. However, with expanding population pressing upon the means of subsistence, it is expected that rice culture will extend in time over the valley bottoms, even those now stony, choked with debris, and subject to flood. Some of the valleys are surprisingly dry, perhaps as a result of rain shadow. Torrential rains result in severe erosion which has removed soil from the steeper slopes. Soil conservation and sound agricultural practices are needed. Barley, corn, wheat, and rice are the chief crops. In general, crops and agricultural practices resemble those of the central Inner Terai, but the percentage of land under cultivation is greater.

As far as the eye can reach from practically any point, the most characteristic appearance of the landscape is that of rounded topography with open forest. There is no major settlement; the area is sparsely settled, the valley of the Rapti in Deokhori being the most populous locality.

Eastern Terai

The region which extends from Morang to Parsa has a population density of 327 per square mile, more than double the national average density of 154. A combination of geographic factors, in the widest sense of the word, contributes to the importance of the eastern Terai. Climate and terrain have made it an extremely rich agricultural land; it is a vital commercial region with easy access by road and rail lines (Indian terminals at the border) to adjacent parts of India.

The rainfall of 50 to 70 inches is adequate and dependable. Before man occupied the area, most of the surface was covered with a dense tropical forest, patches of which still remain in the northern part adjacent to the mountains.

Rice is the staple food and the characteristic crop wherever soil and water permit. Almost everywhere rice occupies at least half of the cultivated land, more commonly two-thirds, and in some areas all of the land. As one flies over Saptari, Morang, Parsa, or Bara, he is impressed with the intensity of land use. Depending upon the season, the rice fields present a mosaic of green or brown landscape. In most years, this region has surplus rice for shipment to India.

A variety of other crops are grown. Among these, sugarcane and jute are most important economically. Crops of lesser importance are tobacco, tea, oilseeds, and millet. Nearly two-thirds of the land, it is estimated, raises a second crop each year. Two successive harvests of rice are common.

The two large industrial centers of Birganj and Biratnagar are located in this region. The jute, cotton, and food processing industries of the region combined constitute nearly three-fourths of the total industrial development of the nation. These industries are based on local raw materials and Biratnagar waterpower and steam-generated electricity supplies the power. Agriculture supplies the major basis of livelihood in the eastern Terai, as it does in other parts of Nepal, but large settlements like Biratnagar, Birganj, Jaleshwar, Jhapa, and Hanumandragar reflect the commerce and industry of the region.

The moist climate, relatively level land, and the distinctive rural economy give geographic uniqueness to the area and set it apart from any other region. The rice culture is similar to that in the midwestern Terai or Katmandu Valley, but the long moist season permits two successive crops, in contrast to one in the other regions. The people of this region are less Mongoloid in appearance than are the hill tribes, and their culture reflects their closer contact with northern India.

Midwestern Terai

The districts of Palghi, Majhkhanda, Khajahani, and Siuraj contain 345,281 people in a total area of only 1,176 square miles—a density of 294 per square mile.

The terrain is flat and agriculturally usable, but the rainfall is lower than in the major rice-growing regions. No one can travel from east to west in the Terai without observing the geographic variations in both environment and crops. This is a region of wheat, rice, millet, corn, and barley. Vegetables are grown in great variety.

The great bulk of the people live in compact villages near the fields. The traveler in this region is rarely out of sight of a group of houses, and a market village is hardly more than a day's journey from any point. The larger villages are linked by cart roads, which are dusty most of the year and muddy during seasons of rain.

Far Western Terai

The geographic contrast continues along lines defined by rainfall. To the west, with diminishing rain, the landscape becomes brown—green fields are replaced by dusty plains. Here rainfall is limited and uncertain. Wheat and millet are the chief grains. Rice is grown in the few well-watered areas. Some summers bring excessive rain with resulting flood, to be followed in the succeeding year by a severe drought. The far western Terai has a marginal climate. In many years the precipitation is so low that crops fail. Valley bottoms are irrigated wherever feasible, and water conservation techniques are generally needed.
Forests, which once covered the entire region, are found now in only the more inaccessible areas. Their cutting is related partly to the demand for lumber in the adjacent Indian market, but in many areas the steep hillsides have been burned over to clear land for farming for a time, then to be abandoned. The deforestation of the hillsides in the far western Terai has led to erosion, which, in turn, has buried the region with layers of coarse debris.

A detailed map of population distribution (plate 17) reveals great inequalities in human occupancy. The few farmed areas, as those in Banke, are almost as crowded as parts of the eastern Terai. Elsewhere, sparse population reflects limited land use possibilities. The maps of population and cultivated land correspond closely (plates 17, 18, and 12).

Several of the large settlements, including Gauri Phanta, Chandan Chauki, and Nepalganj, are located near the Indian railroad terminals. These centers dominate the trade and commerce of the region as well as those of the mountains to the north.

A small land of great diversity is Nepal!
A Selected Geographical Bibliography

There is no geography of Nepal in English or Nepali, other than small booklets used as texts in Nepali high schools. While specific geographic writing on Nepal is meager, a large number of books and periodical articles with geographic bearing are available. The following list includes only a selected number of significant books, articles, maps, and government reports. No attempt has been made to list here all the published material. With a few exceptions, references cited in the text are not repeated in this list.


Maps

The most useful are the Survey of India map sheets (twenty-eight in all) on scale of 1:253,440 (1 inch to 4 miles) published between 1928 and 1930 and based on the first regular survey of Nepal in 1924-1927. The Survey of India has also published a skeleton map of Nepal (1:500,000) showing contours and drainage. These maps are difficult to obtain; American scholars can consult them in the Library of Congress. A map of Nepal (1 inch to 12½ miles) showing relief and communication has been published by Mahlipur Branch Press (Saharanpur, U. P., India) and is available from all booksellers in Katmandu. There are some errors in contours and general location on this map. Recently the Survey of India completed the aerial mapping of the entire country, and a new map of Nepal based on this Survey may be available in the near future.

Official Publications

The following publications by the Government of Nepal report current developments and provide data of interest to geographers. Most of these are available in the Library of Congress.

Nepal News Bulletin. Published since May, 1952, by the Department of Publicity. Irregular, but generally one is published each month.

Gazette. Published weekly in Nepali.


Books, Journal Articles, and Other Publications

Only a few of the following selected list of slightly over 200 titles (out of the writer's over 1,000 entries on Nepal) are primarily geographical, but all contain material useful in understanding Nepal's physical and cultural pattern. Some good studies on Nepal have been published in the French, German, and Russian languages. The French and German sources easily available to scholars in major American libraries are listed here, but the Russian language source materials, not commonly available to American readers, are purposely omitted.

To facilitate use, titles are listed under five sections: general, physical geography, social and economic geography, historical and political geography, and mountaineering. Listings under mountaineering provide valuable regional description of the land and contain a diversity of useful geographic material.

GENERAL


Leschlag, Erika, Erika and the King. New York: Coward McCann, 1938. A delightful narrative of the King of Nepal's struggle for freedom from the Rana Prime Minister and the author's (a gynecologist treating the Queen) contribution to it. See also, With the King in the Clouds. London: Hutchinson, 1958.


Bibliography
**BIBLIOGRAPHY**

**HISTORICAL AND POLITICAL GEOGRAPHY**


**Nepal's New Era.** *Far Eastern Survey,* Vol. 28 (October, 1959), pp. 150-56. There is a good deal of information, but poorly organized and repetitive.

**Meille, Pierre.** "Le problème des états himalayans." *Politique étrangères,* 17e année, No. 6 (January, 1951), pp. 470-86.


**Ancient and Medieval Nepal.** Katmandu, 1952. The best academic treatise.


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