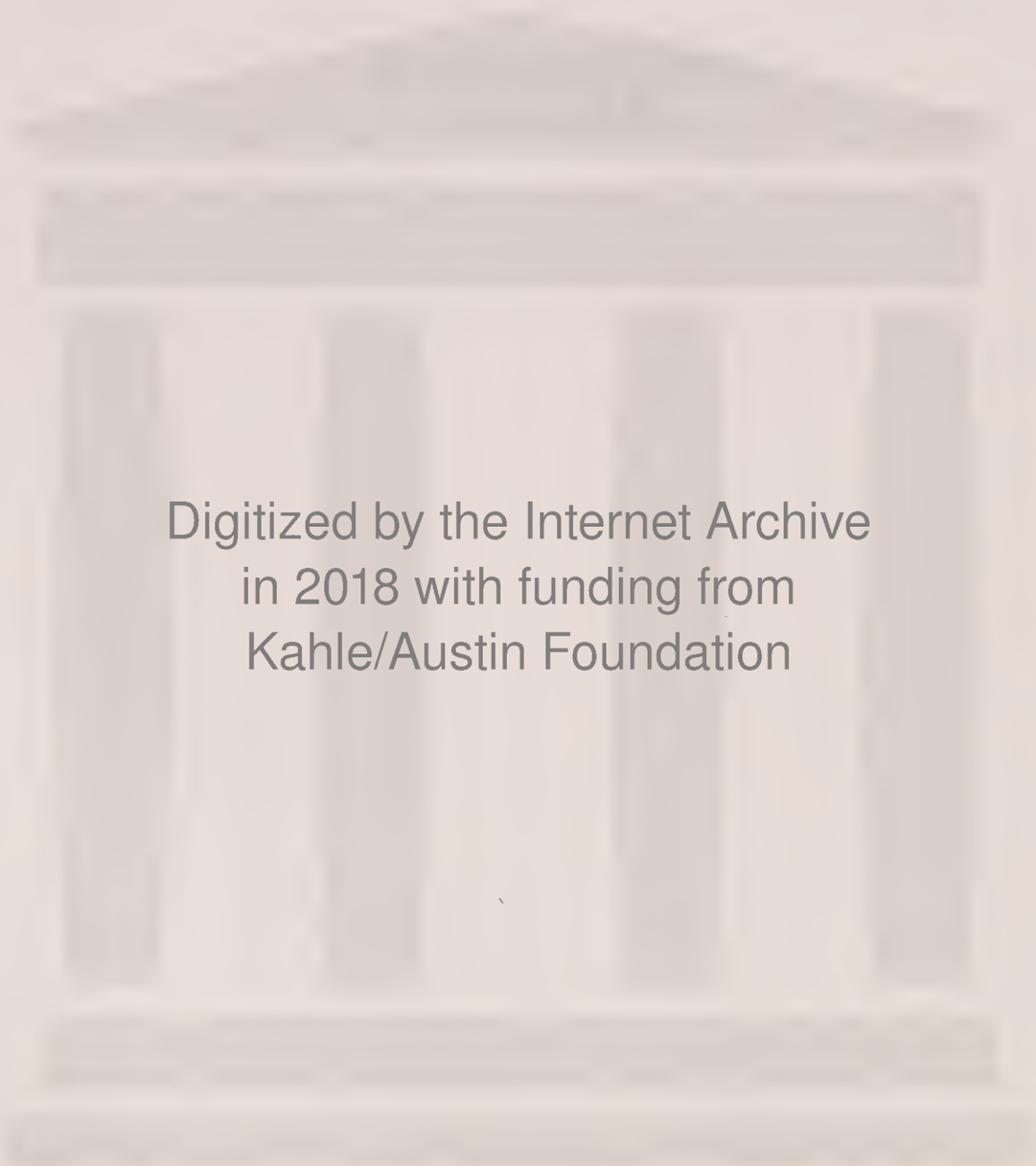
A GEOGRAPHY OF PAKISTAN

K U KURESHY



A GEOGRAPHY OF PAKISTAN

by

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PREFACE

There has been a marked paucity of geographical literature on Pakistan. Whatever works existed became out-of-date after the severance of the eastern wing of the country in 1971. A need is felt, therefore, to make a re-appraisal of the country's physical characteristics, its resource base, and its distributary services. The present work seeks to furnish a composite picture of the geographic personality of the country.

Geographic works of this nature generally analyse the existing situation and the processes that have been at work in the past. Some difficulty was experienced by the present writer in analysing trends because some of the past data were available only for combined Pakistan, which included East Pakistan until December 1971. Sifting the data for the present territorial entity of the state sometimes proved problematic. To avoid confusion, figures for the pre-1971 Pakistan (comprising East and West Pakistan) have been labelled 'combined Pakistan', and the term 'Pakistan' reserved for the present territorial extent.

Written principally for college students, the book is intended to be of use both to students of geography and to the general reader. However, the treatment is such that it can be profitably used by students of higher secondary classes, under the guidance of their teachers. Some of the details presented in the book may be ignored in order to adjust to the requirements of this level of instruction.

K. U. Kureshy
Lahore
March 1976.

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1. HISTORICAL INTRODUCTION

Pakistan came into being as a sovereign independent state on 14 August 1947, as a result of the successful struggle of the Muslims of British India for recognition as a separate nation. Division of the sub-continent of India into two nations, one Muslim and one non-Muslim, had been opposed on the basis of the 'unity' of India. But the 'unity' of India was superficial, and the outcome of British rule. It did not have any long-term historical basis. Historically, India, a vast area of 1.2 million sq. miles, had been a land of disunities and diversities. In the course of its long history, dating back to about 400 B.C., nine different large and small empires had ruled in the sub-continent. Of these, only four (the Mauryan, Tughluk, Moghul and British) ruled substantial areas. In the years preceding 1947, the Muslim people of eastern and western India for the first time made a united effort to free themselves from the authority of Delhi and established an independent state. The unifying force in this struggle was the Islamic religion.

MUSLIM RULE IN INDIA

Muslims invaded the sub-continent about the beginning of the eighth century A.D. and Mohammad bin Qasim conquered Sind in A.D. 712. Muslim rule was then extended north to Multan in the Punjab. At the beginning of the eleventh century, Mahmood of Ghazni made several successful military incursions into the Indo-Gangetic Plain and other parts of India. Lahore then became the centre of Muslim culture. Under the Ghauri dynasty, toward the end of the twelfth century, Muslim rule was also extended to Bengal. The Delhi Sultanate was established by the beginning of the thirteenth century and during the Moghul period (1526–1857) almost the whole subcontinent came under Muslim rule, giving way in the mid-nineteenth century to the British. The distribution of population in the sub-continent, by religions, was such that the Muslims were in a majority in the western and eastern sectors, distant from the seat of government at Delhi.

THE STRUGGLE FOR INDEPENDENCE

The Muslim resurgence in India started with the Aligarh Movement, the purpose of which was to rehabilitate, through Western education, the economic and social status of Muslims, with a view to ultimate political emancipation. Aligarh Muslim University and other Muslim educational institutions were established and the All India Muslim League founded in 1906.

The first political success for the League came in 1909 when, under the Minto-Morley Reforms, Muslims were conceded the right of a separate electorate. During and immediately after World War I, many Muslims supported the Congress of India and its non-violent anti-British movement under the leadership of Mahatma Gandhi. However, this unity was short-lived. The Nehru report, outlining the future constitution of independent India, proposed to take away from the Muslims the right of a separate electorate. In 1929 the All Parties Muslim Conference enunciated what came to be known as the 'fourteen points', affirming the supremacy of Muslims in the Muslim majority provinces of India and safeguarding their rights in those provinces where they were a minority.

The idea of a separate Muslim state was first put forward by Allama Iqbal, the great poet, in his address to the All India Muslim League at Allahabad in 1930. Later, at the time of the Round Table Conferences of 1930–2 in London, Choudhri Rahmat Ali urged the Muslim delegates to abandon the idea of a federal government of a combined India, and instead press for a separate homeland for Muslims, for which he coined the name *Pakistan*.[1] In 1940, the All India Muslim League, meeting at Lahore under the presidentship of Quaid-i-Azam Mohammad Ali Jinnah, adopted what is popularly known as 'the Pakistan Resolution'. This advocated independent states of Muslims in the Muslim majority blocks in the west and east of India. Later, in 1946, it was resolved to have a single Muslim state comprising these two territories. In the general elections of that year, candidates of the Muslim League achieved an unprecedented success, establishing beyond doubt the representative character of the League for the Muslims of the subcontinent and the strength of the Muslim desire for a separate homeland.

In that same year (1946) a British Cabinet Mission arrived in India and, after discussions with political leaders, put forward a plan for the transfer of power. This scheme proposed three autonomous zones of provinces in a united India: a western zone including N.W.F.P., the Punjab, Sind and Baluchistan; an eastern zone including Bengal and Assam; and a middle zone comprising the rest

[1] '*Pakistan* did not originally have any territorial significance at all. It is a word that was adopted to express an idea and an ideal. When that ideal was achieved the name was applied to the territory also.' Statement of the Foreign Minister of Pakistan, U.N. Security Council, 16 January 1948, quoted in K. Sarwar Hassan, *Documents on the Foreign Relations of Pakistan*, Karachi, 1966, p. 444.

of India. This plan was accepted by the Muslim League but rejected by Congress. Ultimately, after further negotiations, and with the mutual agreement of the Indian National Congress and the Muslim League, Britain made the declaration on 3 June 1947, partitioning India between Hindus and Muslims.

According to this plan, the provinces of the Punjab and Bengal were to be divided into contiguous Muslim and non-Muslim majority areas. It is generally presumed in Pakistan, on the basis of some evidence,[1] that the Boundary Commission, under the chairmanship of Sir Cyril Radcliffe, was influenced by the advice of Lord Mountbatten, the last Governor-General of India, to award an area of about 5,000 sq. miles in the Punjab, which should have formed part of Pakistan on the basis of contiguous Muslim majority areas, to India in order to retain the 'solidarity' of the communication and irrigation systems. Nonetheless, these systems were disrupted, creating the canal water dispute between India and Pakistan. The boundary award also provided India access to Kashmir by allocating to that country most of the Muslim majority district of Gurdaspur, giving rise to the so-far unresolved Kashmir dispute between India and Pakistan.

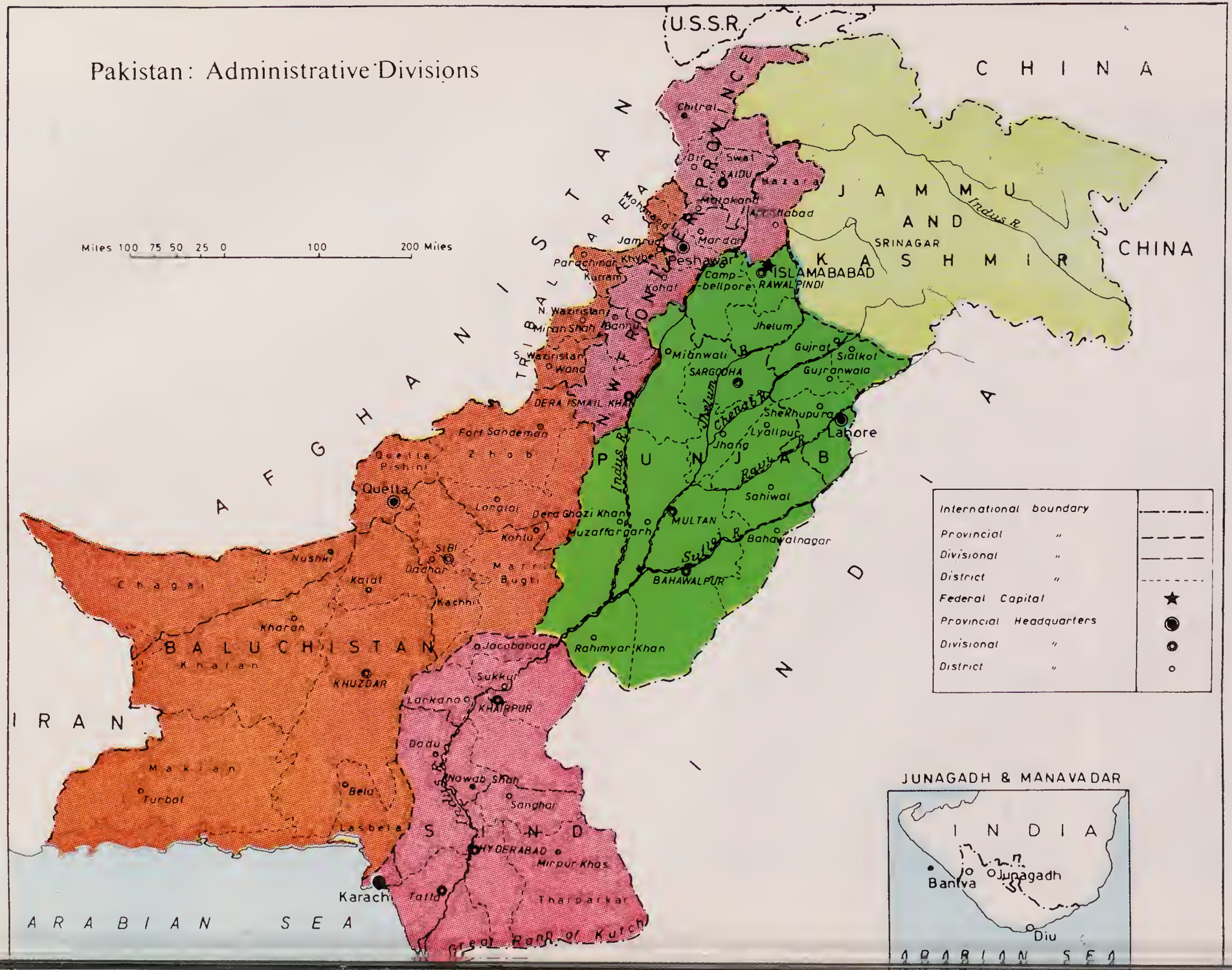
Pakistan emerged on the political map of the world on 14 August 1947 with Karachi, the birth-place of the Quaid-i-Azam, as its capital.[2] The western and eastern wings of the country, separated from each other by a distance of about 1,000 miles, came to be known respectively as West Pakistan and East Pakistan. West Pakistan consisted of the provinces of the North West Frontier (N.W.F.P.), Baluchistan, Sind, West Punjab (later known as Punjab, Pakistan, to distinguish it from Punjab, India), and the small princely states of Chitral, Dir, Swat, Amb, Kalat, Lasbela, Kharan, Bahawalpur and Khairpur. The states of Junagadh and Manavadar acceded to Pakistan but, as with a large portion of the states of Jammu and Kashmir, were occupied by India. East Pakistan included East Bengal and the greater part of the district of Sylhet. The eastern wing constituted about 15 per cent of the total area of Pakistan but contained about 54 per cent of the total population of the country.

INTERNAL PROBLEMS AND THE SECESSION OF EAST PAKISTAN

The Constitutent Assembly took a long time to draft a constitution for the new state. Promulgation of the constitution in March 1956 was followed in October 1958 by a military revolution under General (later Field-Marshal) Mohammad Ayub Khan and a second constitution in 1962. Towards the end of 1968 the popular movement against the dictatorship of Ayub Khan gained momen-

[1] Sir Leonard Mosley, *Last Days of the British Raj*, London, 1962, p. 140.

[2] In 1959 Islamabad was selected as the site of the new capital.


Pakistan: Administrative Divisions
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C H I N A
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A F G H A N I S T A N
I R A N
I N D I A
A R A B I A N S E A
J A M M U
AND
K A S H M I R
SRINAGAR
ISLAMABAD
RAWALPINDI
Peshawar
Chitral
Swat
Saidu
Hazara
Malakand
Abbottabad
Mardan
Jamrud
Parachinar
Khyber
Kurram
Kohat
Camp-bellpore
N.W.F. PROVINCE
N. Waziristan
Miran Shah
Bannu
S. Waziristan
Wana
TRIBAL AREA
DERA ISMAIL KHAN
Fort Sandeman
Zhob
Quetta Pishin
Quetta
Loralai
Dera Ghazi Khan
Kohlu
Sibi
Dadhar
Marri Bugti
Nushki
Chagai
Kalat
Kachhi
Kharan
B A L U C H I S T A N
Khatan
KHUZDAR
Makran
Turbat
Bela
Lasbela
Karachi
Jacobabad
Sukkur
Larkana
KHAIRPUR
Dadu
Nawab Shah
Sanghar
S I N D
HYDERABAD
Mirpur Khas
Tatta
Tharparkar
Great Rann of Kutch
Jhelum
Mianwali
Gujrat
Sialkot
SARGODHA
Gujranwala
Chenab
Jhelum R.
Sheikhupura
Lahore
Lyallpur
Jhang
Ravi R.
P U N J A B
Indus R.
Sahiwal
MULTAN
Muzaffargarh
Bahawalnagar
Sutlej R.
BAHAWALPUR
Rahimyar Khan
International boundary
Provincial "
Divisional "
District "
Federal Capital
Provincial Headquarters
Divisional "
District "
JUNAGADH & MANAVADAR
I N D I A
Banlva
Junagadh
Diu
ARABIAN SEA

1972–3 the trade balance was positive for the first time in many years. Diplomatic recognition of Bangladesh in February 1974, and the probable resumption of relations with India, can be expected to restore some of the former channels of trade. Pakistan in the early seventies is recovering economically from the shock occasioned by severance of the eastern wing.

POLITICAL DIVISIONS

The official name of the state is Islamic Republic of Pakistan, with Islamabad as its capital. Karachi was the capital from 1947 to 1959. The state comprises four provinces, Baluchistan, North-West Frontier Province (N.W.F.P.), the Punjab and Sind. Their respective capitals are Quetta, Peshawar, Lahore and Karachi.

For administrative purposes, each province is divided into a number of commissioner's divisions, each division into districts, and each district into *tehsils*. In N.W.F.P., there are five agencies, in addition to districts (For details see fig. 1).

Part I

Physical Characteristics

2. THE FACE OF THE LAND

Pakistan covers an area of 310,403 sq. miles[1] of which 183,840 sq. miles in the north and west form mountainous terrain and tableland. The remaining 126,563 sq. miles comprise a flat gradational surface.[2]

The lofty Himalayan mountains in the north of Pakistan, which extend eastward to form the northern rampart of India, are the 'girders of Asia's structure.' Their formation is explained as follows. In pre-Himalayan days, the area was occupied by a long, narrow, shallow sea, the Sea of Tethys, lying between two continents of ancient hard rocks, Angaraland to the north, and Gondwanaland to the south. (The plateau of Central Siberia and parts of the great plain of western Siberia are remnants of the northern block, and the Deccan and Arabian Plateaux remnants of the southern.) Sedimentary materials were deposited layer upon layer in the Sea of Tethys, the sandy materials forming sandstone, while organic remains, such as shells and the bones of sea animals, became limestone. As the northern and southern continental blocks were drawn toward each other by movements of the earth's crust, the rocks in the sea of Tethys were compressed and contorted into fold mountains (fig. 2).

[1] *Census of Pakistan*, 1961, Vol. 1, Table 1.

[2] Approximate values computed from 1:1 million maps.

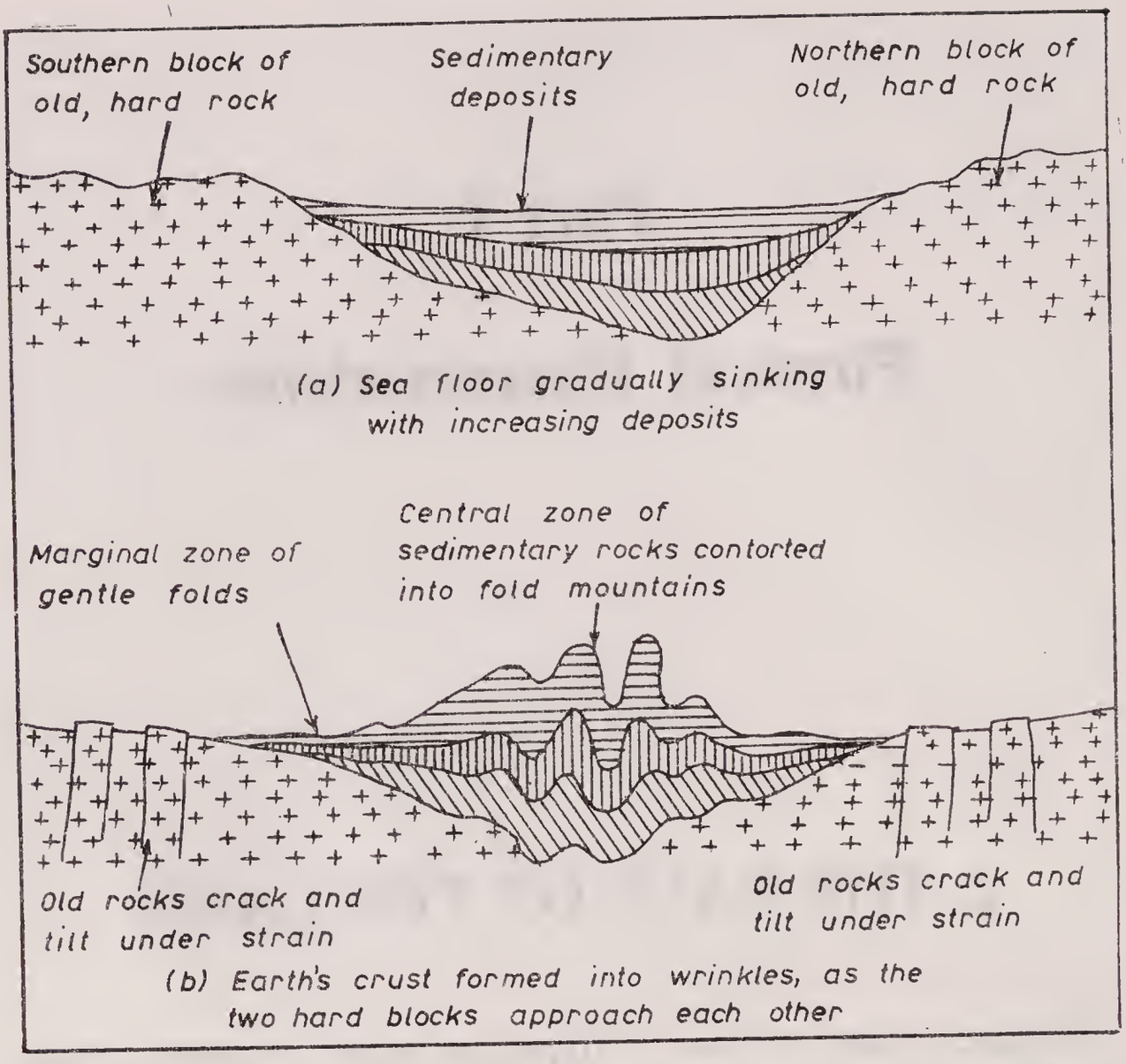
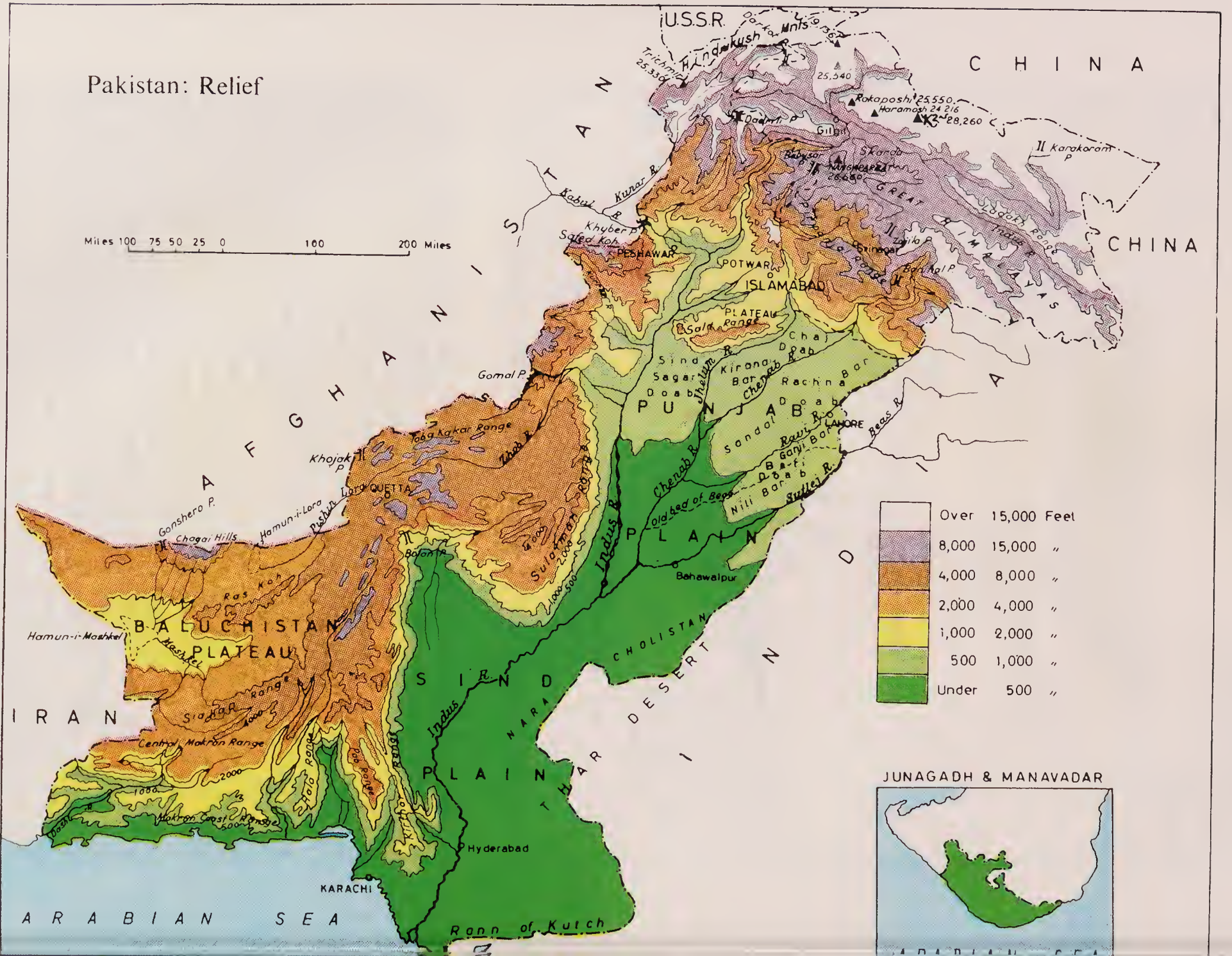


Fig. 2 Diagram illustrating the formation of fold mountains

The uplift of the mountains continued in several intermittent phases, separated by long periods of time. Some of the upheavals were more pronounced than others. In the first major upheaval, the central axis of ancient sedimentary and crystalline rocks of the Himalayas was formed. The Murree sediments of the Potwar Plateau were formed in the second. In the third phase, the central part of the Himalayan system was further elevated and the outlying zone of the Siwaliks created.

The mountain-building movements were associated with subsidence of the northern part of the Deccan block, creating a deep trough. This trough began to be filled rapidly with sediments as a result of the increased erosive and carrying power of streams descending from the newly elevated mountains. The fracturing of the fold mountains still in the process of formation, may also have added to the amount of material to be transported. The weight of the sediments themselves may have depressed the earth's crust, creating the trough. In any case the deposition formed the second great feature of the sub-continent, the Indo-Gangetic Plain. The


Pakistan: Relief
U.S.S.R.
CHINA
AFGHANISTAN
IRAN
INDIA
ARABIAN SEA
Miles 100 75 50 25 0 100 200 Miles
Darkot Mts 19,360
Trichmir 25,338
Hindukush
25,540
Rakaposhi 25,550
Haramosh 24,216
K2 28,260
Karakoram P.
Gilgit
Skardu
Baltoro
Nanga Parbat 26,660
GREAT HIMALAYAS
Indus R.
Zoji La P.
Srinagar
Banihal P.
Khyber P.
Safed Koh
Kabul R.
Kunar R.
PESHAWAR
POTWAR PLATEAU
ISLAMABAD
Sakesar
Sala Range
Chaj Doab
Sind Sagar Doab
Jhelum R.
Kirana Bar
Chenab R.
Rachna Bar
PUNJAB PLAIN
Sandal Bar
Ravi R.
LAHORE
Beas R.
Gomal P.
Khojak P.
Toba Kakar Range
Zhob R.
Gonshero P.
Chagai Hills
Hamun-i-Lora
Pashin Lora
QUETTA
Ras Koh
Hamun-i-Mashkel
BALUCHISTAN PLATEAU
Mashkel
Siahan Range
Central Makran Range
Makran Coast Range
Dasht R.
Bolan P.
Sulaiman Range
Khirthar Range
Indus R.
Old bed of Beas
Chenab R.
Ganji Bar
Bari Doab
Nili Bar
Sutlej R.
Bahawalpur
SIND PLAIN
CHOLISTAN
NARA
THAR DESERT
Hyderabad
KARACHI
Rann of Kutch
Over 15,000 Feet
8,000 15,000 "
4,000 8,000 "
2,000 4,000 "
1,000 2,000 "
500 1,000 "
Under 500 "
JUNAGADH & MANAVADAR
ARABIAN SEA

thickness of the sediments beneath the Plain has been variously estimated to be between 6,500 and 15,000 feet (fig. 3).

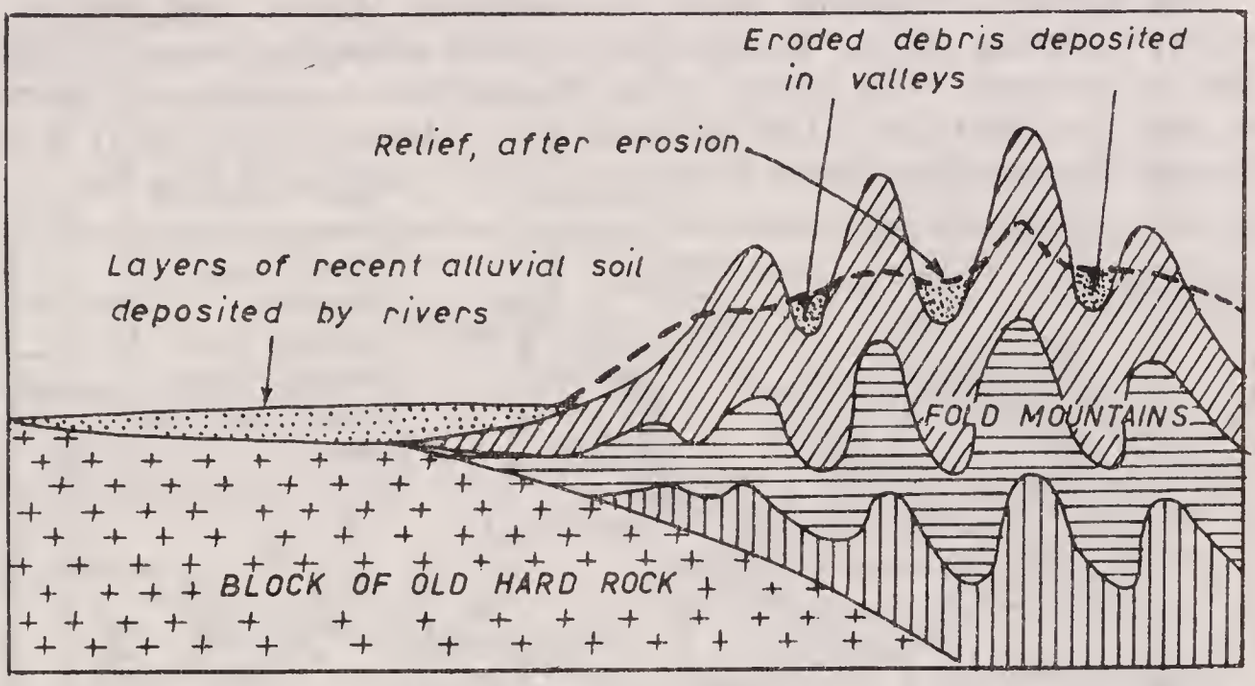


Fig. 3 Diagram showing the erosion of fold mountains and the formation of alluvial plain

MAJOR PHYSICAL DIVISIONS

The present study divides the country into five major physical divisions: the Himalayas; the Hindu Kush and the western bordering mountains; the Baluchistan Plateau; the Potwar Plateau and the Salt Range; and the Indus Plain (fig. 4). Within each of these there are a number of sub-divisions. For example, the Indus Plain includes the Upper Indus Plain, the Lower Indus Plain, and the Eastern Desert. Similarly, these divisions may be further sub-divided. Thus the Upper Indus Plain comprises: the Interfluves (*doabs*); the Himalayan Piedmont; and the Derajat or Sulaiman Piedmont. Still lower in the hierarchy, for example, are the individual doabs: Sind Sagar, Chaj, Rechna, Bari doabs, and the Bahawalpur Plain.

The Himalayas

The Himalayas comprise a series of ranges: (1) The Sub-Himalayas, 2,000–3,000 feet; (2) The Lesser Himalayas, 12,000–15,000 feet; (3) The Central or Great Himalayas, average altitude, 20,000 feet; (4) The Inner Himalayas or Ladakh Range; and (5) The Trans-Himalayan or Karakoram Ranges. Most of the zones 3, 4 and 5 lie in the state of Jammu and Kashmir, large parts of which are occupied by India and are therefore excluded from the present discussion.

The *Sub-Himalayas* or *Siwaliks* extend over the southern part Hazara and Murree and include the hills of Rawalpindi and the

Pabbi Hills. Subjected to great strain and stress during the mountain-building period, the Siwalik rocks are much faulted, with many inverted or reverse folds and a high degree of dissection in the Pabbi Hills, where the material is unconsolidated.

The *Lesser Himalayas* occur in northern Hazara and Murree, where the main range, Dunga Gali, attains a height of over 15,000 feet in the north. The Dunga Gali descend into a number of spurs in the Murree Hills. The hill-station of Murree (7,445 feet) is a spectacular one-hour drive from the capital, Islamabad (fig. 5).

Fig. 5 Northern Mountains

The Hindus Kush and the Western Mountains

The *Hindu Kush* branch off from the Himalayas at the Pamir Knot, where the borders of Pakistan, Afghanistan, U.S.S.R., and China meet. Whereas the strike of the Himalayas is northwest–southeast, that of the Hindu Kush is north–south. Peaks like Sad Istragh (24,170 feet) and Tirich Mir (25,263 feet) are capped with perpetual snow and ice. Several ranges branch south through Chitral, Swat

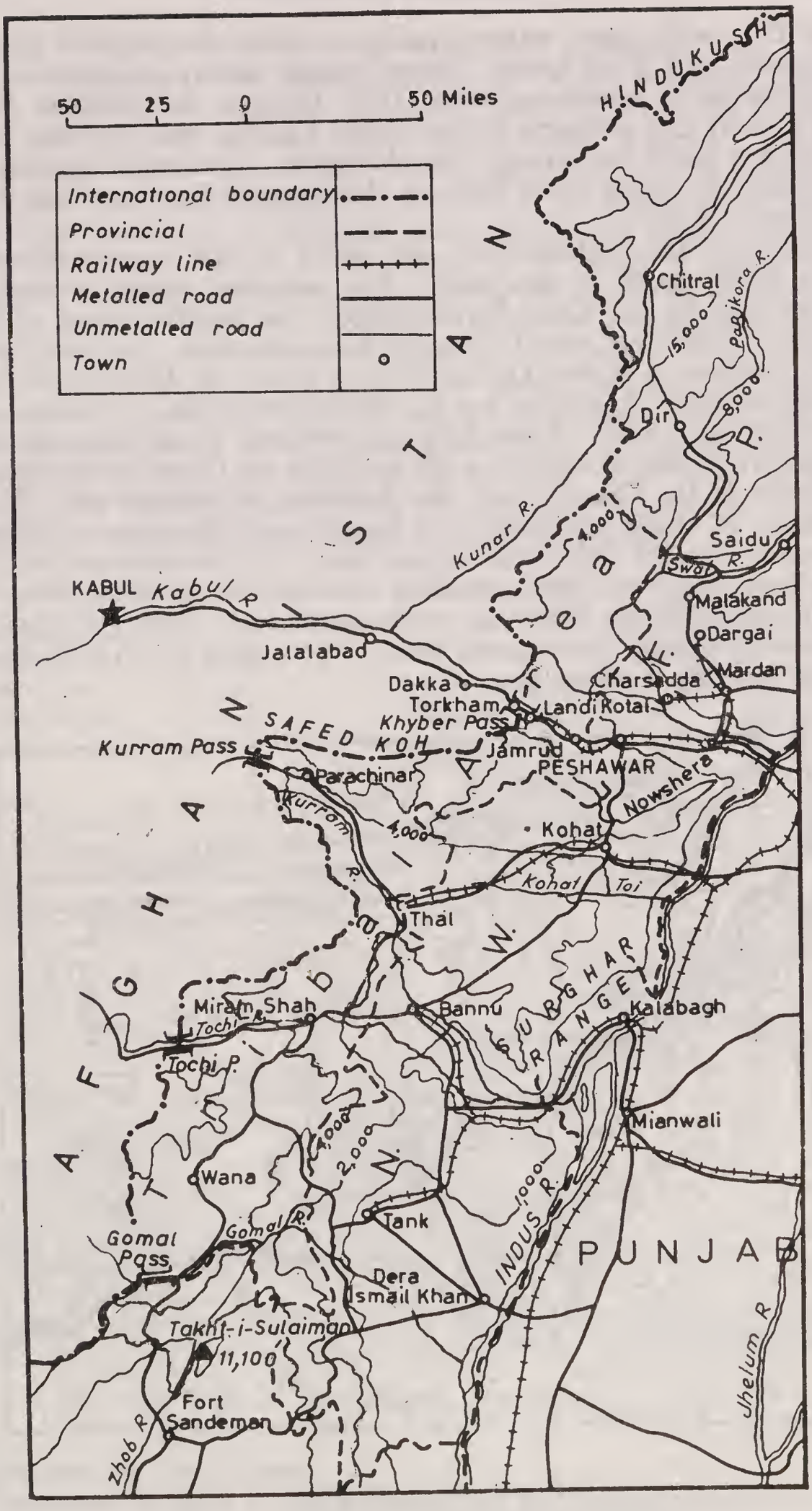


Fig. 6 Western bordering mountains

and Dir, with deep, narrow valleys along the Chitral–Kunar, Panjkora and Swat rivers. Some passes permit communication. Abbottabad is connected with Gilgit through the Babusar Pass, the Lowari Pass connects Peshawar and Chitral, and the route from Chitral to Gilgit lies through Shandur Pass. Southward the altitude decreases to 5,000–6,000 feet in Mohmand Territory and the Malakand Hills.

South of the Kabul River, the strike of the ranges changes from north–south to west–east. The west–east strike is strongly represented by the *Koh-i-Sofed Range.* The general height of this range is 12,000 feet, with the highest peak, Sakaram, rising to 15,620 feet. Outliers in Kohat District have a height of 3,000–5,000 feet. South of the Koh-i-Sofed are the *Waziristan Hills,* with the same east–west alignment. These hills are traversed by the Kurram and Tochi rivers, and bounded on the south by the Gomal river (fig. 6).

South of the Gomal river, the *Sulaiman Mountains* run for a distance of about 300 miles in a north–south direction. Takht-i-Sulaiman (11,295 feet) is the highest peak. At the southern end are the Bugti and Marri Hills, draining westward to the Bolan River.

The low *Kirthar Hills* run north–south and form the western boundary of the lower Indus Plain. The Hab and Lyari rivers drain into the Arabian Sea.

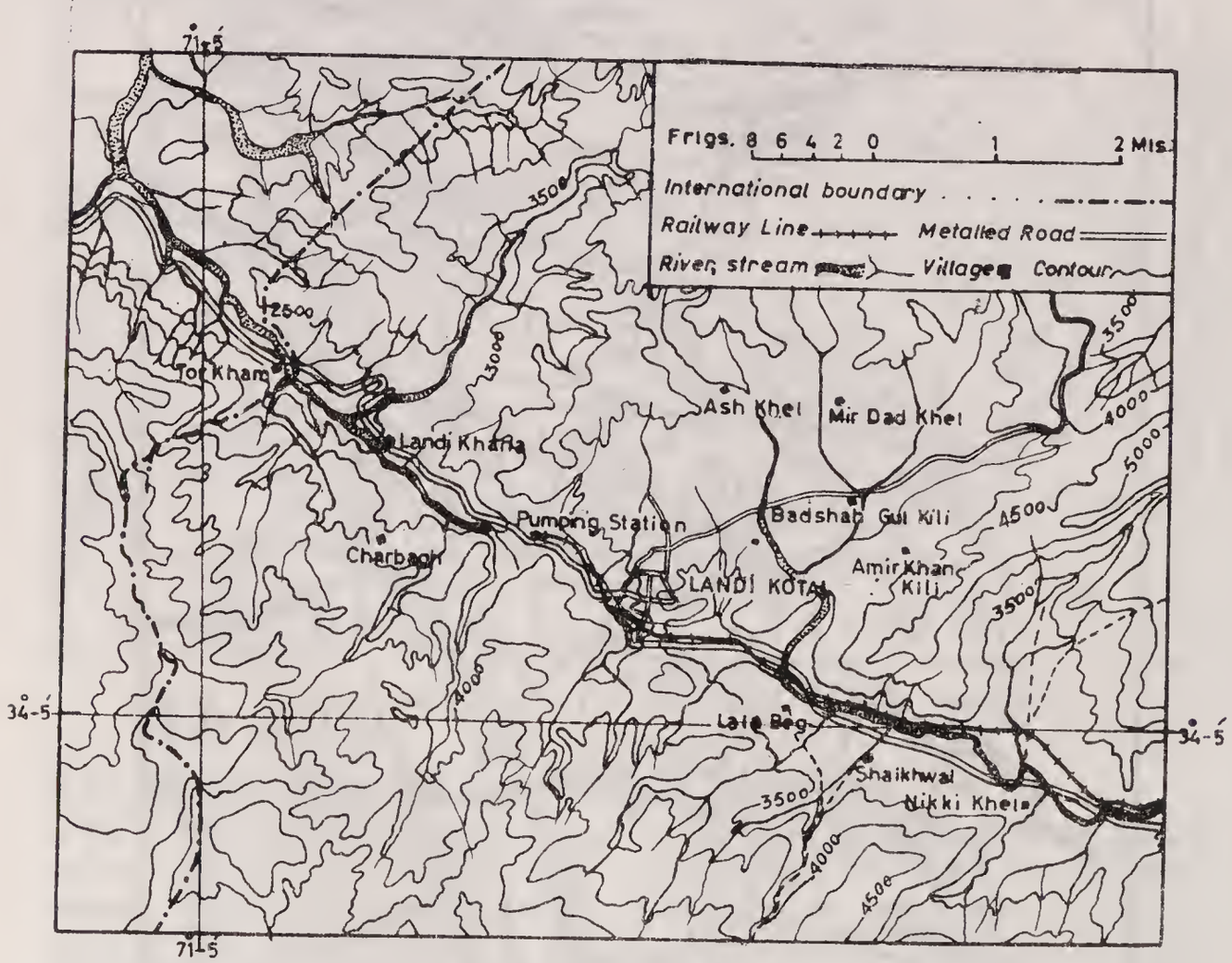


Fig: 7 Khyber Pass

Passes through the western bordering mountains are of special geographical and historical interest. Comparatively broad passes, which are not difficult to traverse, occur south of the Kabul River. From north to south these are: Khyber, Kurram, Tochi, Gomal, and Bolan. The *Khyber* is sufficiently wide for the passage of troops, only 3,500 feet high at Landi Kotal, its highest point, and leads to the fertile Vale of Peshawar at the head of the Indo-Gangetic Plain. The total length of the Pass is 35 miles of which 25 (Jamrud–Torkham) are in Pakistan, and the remainder in Afghanistan (fig. 7). The *Tochi* pass connects Ghazni in Afghanistan with Bannu in Pakistan via northern Waziristan. The *Gomal* Valley provides a route from Afghanistan to Dera Ismail Khan. The *Bolan* Pass follows the river of the same name and connects the Kachhi-Sibi Plain with Quetta. From Quetta a route goes to Chaman on the Pak-Afghan border, and thence to Kandahar. The route from Kandahar to Central Asia avoids the Hindu Kush which, after traversing northern Pakistan, continue into Afghanistan.

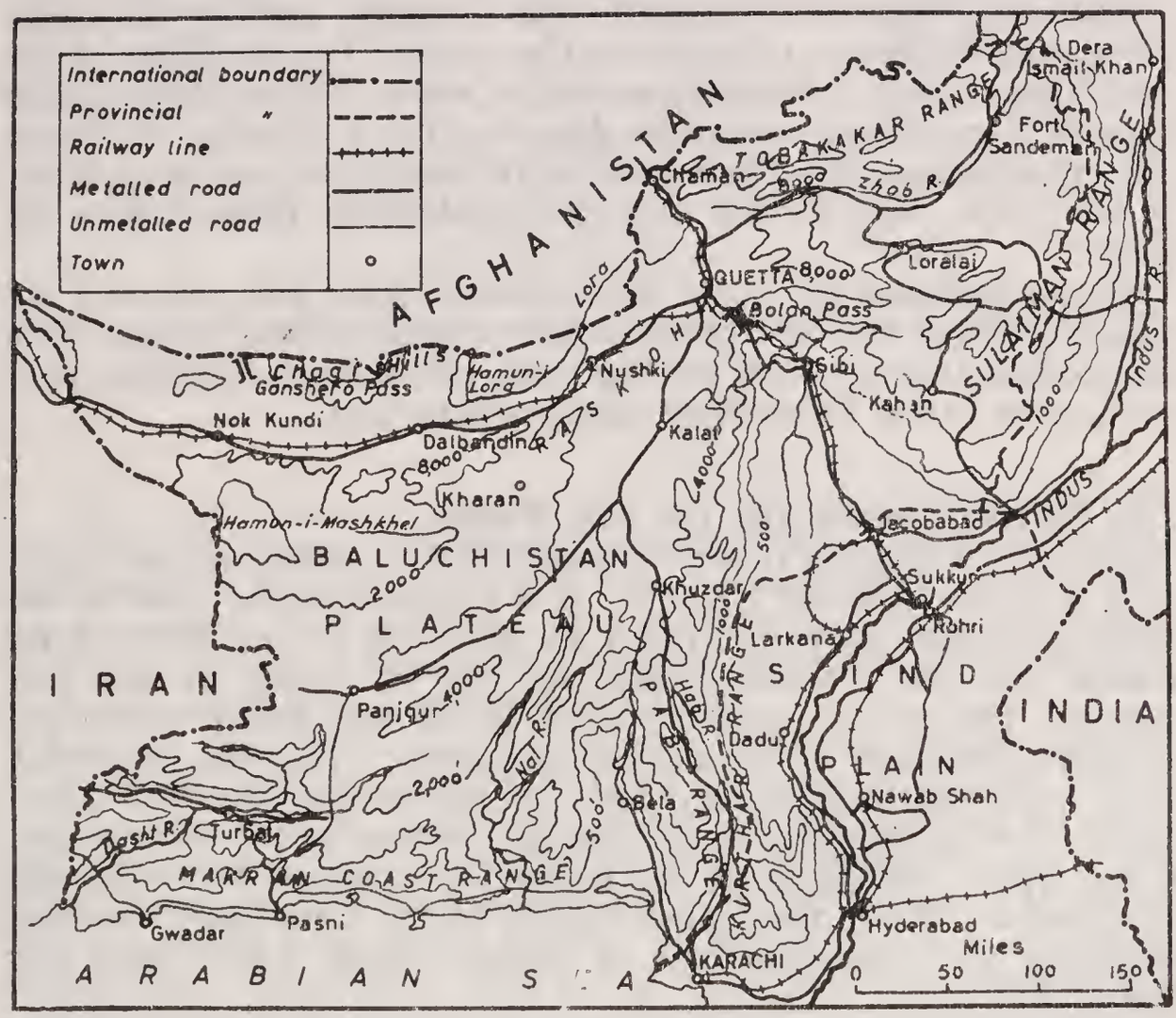


Fig. 3 Baluchistan Plateau

The Plateau of Baluchistan

The extensive plateau of Baluchistan has an average altitude of

over 2,000 feet, and is sharply divided from the Indus Plain by the Sulaiman, Kirthar, and Pak Ranges. It includes a great variety of physical features (fig. 8).

In the north-east, the *Zhob-Loralai Basin* forms a lobe surrounded on all sides by mountains. To the east and south lie the Sulaimans, which join the central Brahui Range near Quetta. The small Quetta Basin is surrounded on all sides by mountains, namely Zarghun, Takatu, Khalifat, Chiltan, and Murdar Ghar. In the north and north-west, the lobe is bordered by the Toba Kakar Range, the western extension of which is known as the Khwaja Amran Range.

The general terrain of north-western Baluchistan comprises a series of low-lying plateaux, some of which are separated from one another by mountain ranges. The *Ras Koh Range* in the east runs northeast–southwest. The *Chagai Hills* form the border with Afghanistan for some distance. This region is a true desert, an area of inland drainage and dry lakes (*hamuns*), the largest of which is Hamun-i-Mashkel, some 54 miles long and 22 miles wide.

Southern Baluchistan includes the Sarawan area in the north and a vast wilderness of ranges in the south. The backbone of the mountain system of Baluchistan is the *Central Brahui Range,* which runs in a northeast–southwest direction for a distance of about 225 miles between the Zhob River in the north and the Mula River in the south. The Central and Coastal *Makran Ranges* lie to the south.

Along the coast are large areas of level mud flats forming the coastal plain or enclosed plains bordered by sandstone ridges. This arid coastal tract provides another route into the sub-continent, connecting the Lower Indus Plain with southern Iran.

The Potwar Plateau and the Salt Range

The Potwar Plateau is an area of about 7,000 sq. miles with an elevation of 1,000–2,000 feet (fig. 9). It is bounded on the east by the Jhelum, on the west by the Indus, on the north by the Kala Chitta Range and the Margalla Hills, and on the south by the Salt Range. The gradual northern slope of the Salt Range makes the southern boundary of the Potwar ill-defined. The plateau slopes from north-east to south-west and, with the exception of the south-eastern portion draining to the Jhelum, belongs to the Soan Basin. It is a typical 'bad-land', cut up by deep-set ravines, known locally as *khaderas*. Above the broken surface of the Soan Basin rise the limestone and sandstone hills of Khairi Murat, Kheri Mar and Kala Chitta.

The *Salt Range* is a feature of great geological interest since it presents a complete geological sequence from earliest times. The steep southern face, rising to about 2,000 feet, also evokes interest. It is an example of a 'dislocation mountain'. 'Its orthoclinal outline suggests that these mountains are the result of a monoclinal uplift

combined with vertical dislocation along their southern border which has depressed the other half underneath the plains.'[1]

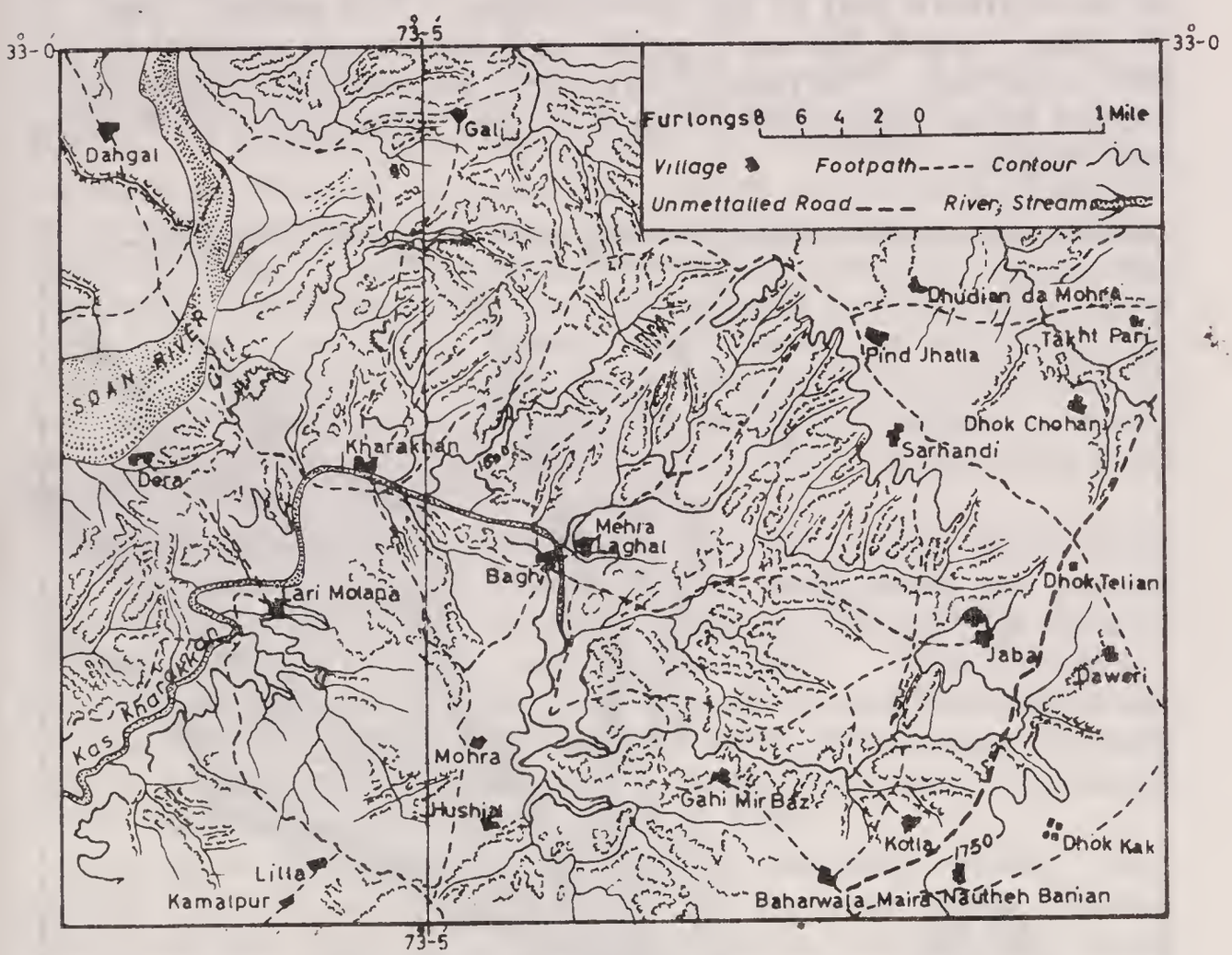


Fig. 9 Potwar Plateau

The range begins in the east near the Jhelum in the Jogi Tilla and Bakralla Ridges, and comprises parallel ranges of low, flat-topped hills enclosing small intermontane valleys, basin plains, or plateaux, and a number of saline lakes. Two of the larger lakes are Khabeki and Kallar Kahar. At Kalabagh the range crosses the Indus and then continues south-west into Bannu District.

Between the Indus and the western bordering ranges lie the *Trans Indus Basins,* including the Vale of Peshawar, the Kohat Valley, and the Bannu Plain. The Vale of Peshawar is hill-girt on all sides, except in the south-east where the Kabul River makes its way to the Indus. It spreads over the Peshawar and Mardan Districts. The Kohat Valley includes most of the District of Kohat, but is bordered by rugged hills. The Bannu Plain is 800–1,500 feet in elevation and is surrounded by hills, except in the south-east, where the combined Kurram and Tochi stream provides an opening toward the Indus. A narrow opening also exists towards D. I. Khan, through the Pezu Gap between the Bhittani and Marwat hills.

[1] D. N. Wadia, *Geology of India,* London, 1926, p. 275.

The Indus Plain

The Indus Plain forms the western part of the Indo-Gangetic plain of the northern part of the sub-continent. The general slope of the plain towards the sea is gentle, with an average gradient of one foot to the mile. The plain is featureless, but elements of microrelief assume great importance because of their relationship to flooding and irrigation.

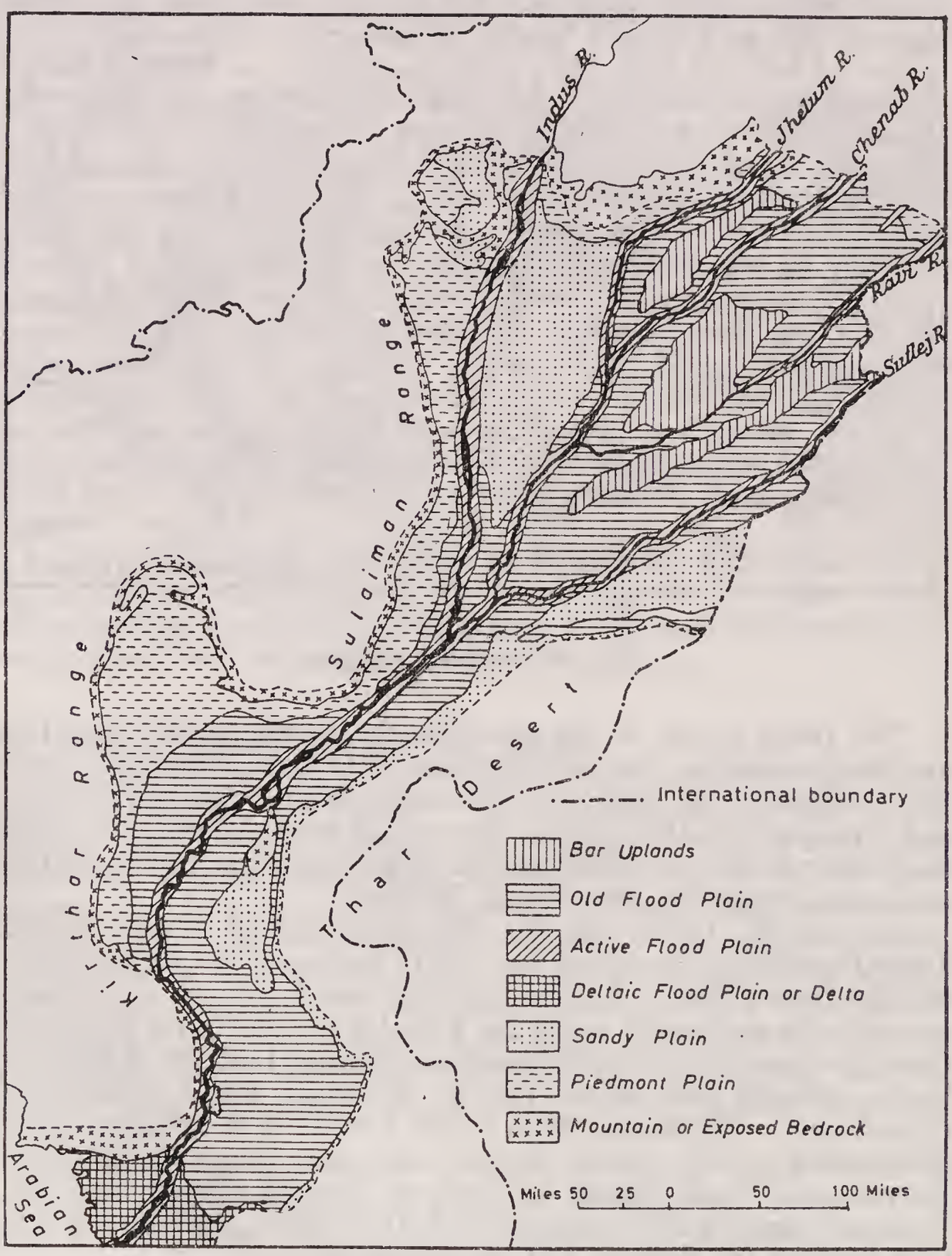


Fig. 10 Indus Plain: Land forms

MICRO-RELIEF

Five distinct micro-relief landforms have been recognised. These are: active flood plain; meander flood plain; cover flood plain; scalloped interfluves; and tidal delta and deltaic plain (fig. 10).

Active flood plain is variously known as *bet or khaddar* land. It lies adjacent to a river, and is inundated almost every rainy season. It is often called 'the summer bed of rivers'. The area is the scene of changing river channels, where erosion and deposition go on simultaneously. During the low-water season, the surface of the land can be seen scarred by numerous active or abandoned channels. Embankments or bunds have been built in many places along its outer margins to protect neighbouring areas from floods. The soils of the active flood plain are coarse-textured sand and silt. Active flood plain is found along all the rivers, except the lower half of the Ravi. Along the Indus this belt is quite wide from Kalabagh to the Delta.

Meander flood plain usually adjoins the active flood plain and is somewhat higher. It also occurs away from the present course of the river on the site of old channels. Identifying features are bars, meanders, levees, and ox-bow lakes. Relief is only a few feet, and soils differ because of diversity in materials deposited. The meander flood plain is widespread along the Jhelum, Chenab, and the upper reaches of the Ravi. Along the Indus, it is absent above Muzaffargarh, but widespread in Sind.

Cover flood plain consists of recent alluvium spread over former riverine features. The alluvial deposits have resulted from sheet floodings. The boundary between the meander flood plain and the cover flood plain is not sharp; the two often merge together. Because of the varying speeds of the flood waters at different locations and differences in the time of deposition, frequent changes of soil texture are noticeable. The cover flood plain is the most extensive of the plain areas in Sind, Bahawalpur, Ganji bar and Rechna doab.

Scalloped interfluves or *bars* are found in the central, higher parts of the Chaj, Rechna and Bari doabs, but in the Sind Sagar doab appear to have been covered by sand. Their boundaries are mostly formed by river-cut scarps, often over 20 feet high. Low sand or earth dunes appear on their southern ends. The soils of the scalloped interfluves are relatively uniform in texture over considerable distances, and the material is old alluvium or aeolian in origin.

Tidal Delta and *Deltaic plain*. The lower delta area is frequently inundated by tidal floods, creating saline waste-lands and tidal mud-flats. The Deltaic plain extends north to Thatta in an intricate pattern of low features formed by the many distributaries of the Indus. Its soils vary in texture from place to place.

THE UPPER INDUS PLAIN

The Upper Indus Plain differs from the Lower Indus Plain in that major tributaries (Jhelum, Chenab, Ravi, and Sutlej) divide the land surface into several interfluves or doabs. In the Lower Indus Plain there is but one large river, the Indus itself. The two plains are separated by a narrow corridor near Mithankot where the Sulaiman Ranges approach the river. The Upper Indus Plain is subdivided into four large doabs, plus the Bahawalpur Plain, and the Derajat or Sulaiman Piedmont.

The Sind Sagar Doab or *Thal Desert* (7.9 million acres) lies between the Indus and the Jhelum–Chenab, south of the Salt Range. About 80 per cent of the area is a gently undulating sand plain, with some *tibbas* or sand-dunes, the number and size of which increases from west to east. Here and there are narrow belts of level land (*patti*) between the sand hills.

The Chaj Doab (3.2 million acres) has as its central part the Kirana *bar,* above which rise some low bedrock hills known as the Kirana Hills. These outcrops are composed of old rocks similar to those of the Aravalli Hills in India. Narrow flood plains along the Chenab and Jhelum constitute 25 per cent of the area.

Rechna Doab (7.0 million acres) differs from the Chaj and Bari Doabs in that its northern and central parts are devoid of scalloped interfluves. This occurs only in the south in the Sandal *bar*. The bedrock hills near Chiniot, Sangla and Shah Kot in central Rechna Doab are similar to those of Chaj Doab.

Bari Doab (7.2 million acres) has extensive areas of cover flood plain and scalloped interfluve. The interfluve between the Ravi and the old course of the Beas is called Ganji Bar, while the high land between the old course of the Beas and the Sutlej is known as Nili Bar. These *bars* are long and narrow, and have some highly impermeable alkaline soils, locally known as *bara* soils. The Sutlej cover flood plain has a number of channelways, the longest and deepest of which is the old abandoned course of the Beas.

The Bahawalpur Plain is grouped with the doabs because the riverine tract, known locally as Sind, is followed by an upland identical with the *bars* of the doabs. The north-eastern part is a cover and meander flood plain, the central part is a sand hill plain which has been largely levelled and irrigated, and the south-western portion is the cover flood plain of Dera Nawab. The area is a reclaimed part of the Thar Desert. Along its southern border is the Ghaggar channelway, a depression 3 miles in width.

The Derajat or *Sulaiman Piedmont* is seamed with numerous streams and torrents, as is also the Himalayan Piedmont on the northern border of the Indus Plain. The land here varies between flat and gently undulating, and the rivers have a comparatively steep gradient. The riverine tract, known locally as Sindhu, is narrow (fig. 11).

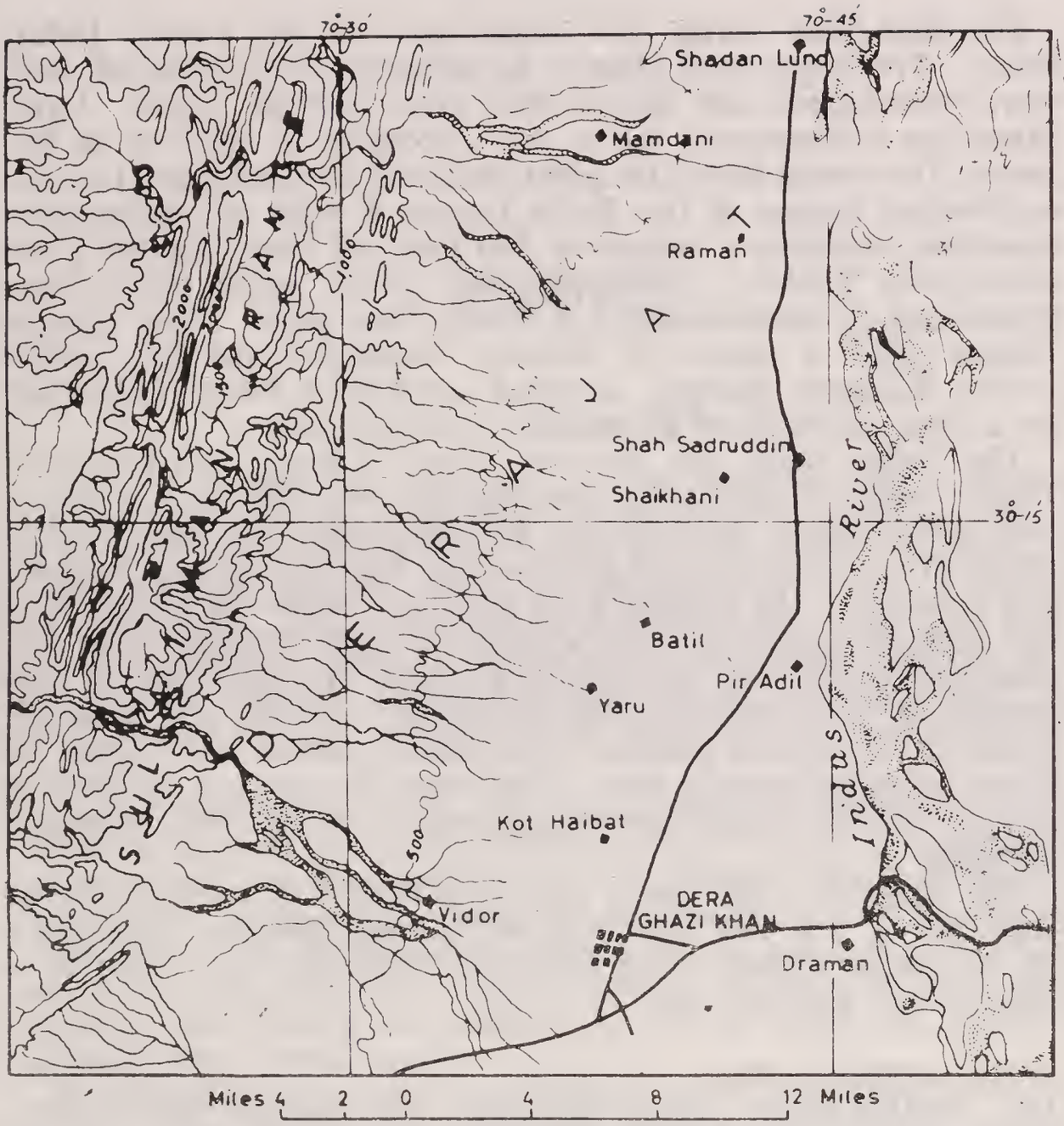


Fig. 11 Derajat (Sulaiman Piedmont)

THE LOWER INDUS PLAIN

The Lower Indus Plain is very flat, sloping to the south with an average gradient of only six inches per mile. Excluding the deltaic area, the predominant landforms are meander and cover flood plains. Meander flood plain is more extensive in the north-east sector of the upper Sind plain, cover and meander plains are equally extensive in the upper and central Sind plains, and more than two-thirds of the lower Sind plain is cover flood plain.

The Kachhi-Sibi Plain is bounded on the north by the Marri-Bugti Ranges and on the west by the Kalat Ranges. Surrounded on three sides by arid mountains, it is a barren, desolate area, in which heat and aridity combined with uniformly textured soils, create ideal conditions for mirages. Its southern edge is its contact line with the Indus alluvium.

The Sind Plain forms the major part of the Lower Indus Plain. The upper Sind plain is agriculturally less developed, and more waterlogged and saline, than areas further south. Lake Manchhar is alternately full or dry according to the level of the Indus. The central part of the plain has a uniform landscape, but one outstanding feature is the Rohri cuesta, a ridge of nummulitic limestone, attaining a height of 250 feet and extending 30 miles south from Sukkur. The lower Sind plain, which starts from Hyderabad, is predominantly a cover flood plain. The Ganjo Takkar ridge, a cuesta of Kirthar limestone and an outlier of the Kohistan Ranges, stretches southward from Hyderabad for a distance of about 15 miles.

The Indus Delta has its apex some distance north-east of Thatta, where distributaries fan out to form the deltaic plain. Two of the larger distributaries are the Ochito and the Gungro. Many of the channels perform the dual function of distributaries and estuaries. The channel beds and their levees are higher than the adjacent lands, and the shallow troughs between them are often filled with water, resulting in swamps. The tidal delta is submerged at high tide, and has mangrove swamps and tamarisk groves in its western section. The eastern section is the Rann of Kutch, a saline marshy land. The coast is low and flat except between Karachi and Cape Monze, where the Pab Hills approach the shore.

The Karachi Plain has a thin mantle of soil over weathered bedrock. A few low hills rise to 50 feet. Shallow depressions are known as *dhand*. One of these, Haleji Dhand, is used as a reservoir for Karachi city.

SOUTH-EASTERN DESERT

The South-Eastern Desert spreads over eastern Bahawalpur, the eastern half of Khairpur, and the greater part of Tharparkar Districts. In Bahawalpur it is known as Cholistan or Rohi. The desert is separated from the central irrigated zone of the plain by the dry bed of the Ghaggar in Bahawalpur, and the Eastern Nara in Sind. The surface of the desert is a wild maze of sand-dunes and sand-ridges, occasionally rising 500 feet above the general surface. Generally speaking the alignment of the dunes is longitudinal in the south, where southerly winds are strong, becoming more and more transverse toward the north, where the winds are less strong and less constant in direction. With little rainfall and a low water table, the desert is a barren land of scattered, stunted, thorny bushes, mostly acacia.

3. SOILS

FACTORS IN SOIL FORMATION

Soil is defined as that part of the unconsolidated material covering the surface of the earth which supports plant growth. It has three major constitutents: solid particles (salts, minerals and organic matter), air and water. The type of soil formed is a function of topography, climate, vegetation, and the parent rocks from which the soil material is derived. Soil material transported and deposited by running water is termed alluvium, while that transported and deposited by winds forms aeolian soil. Soils formed *in situ* are termed residual.

Soil texture varies with the size of the soil particles. Coarse textured soils are sandy, fine textured soils are clayey, and a mixture of sand and clay is called loam. The organic content of the soil also varies, being largely dependent on the extent and type of the vegetative cover. Soils of high organic content are darker in colour, and have more nutrients for plant growth than those of low organic content. Since most of Pakistan is arid or semi-arid, the soils contain little organic matter.

Soil-forming processes are complex and continuous. As a result, soils vary in their chemical composition, colour, texture, and organic content from place to place, even within small areas. The ensuing discussion describes only the major soil-groupings of Pakistan (fig. 12).

SOILS OF PAKISTAN

Indus Basin Soils

The Indus Basin comprises a vast area of alluvial plains deposited by the Indus and its tributaries, and a small area of loess plains. Most of the material is sub-recent or recent in origin, calcareous, and low in organic content. The soils can be divided into three major categories: Bangar Soils (old alluvium); Khaddar Soils (new alluvium); and Indus Delta Soils.

Bangar Soils cover a vast area in the Indus Plain, including most of the Punjab, Peshawar, Mardan, Bannu and Kachhi plains, and the greater part of the Sind Plain. These soils are deep, calcareous, of medium to fine texture, low in organic matter, but very productive when irrigated and fertilized. In some ill-drained

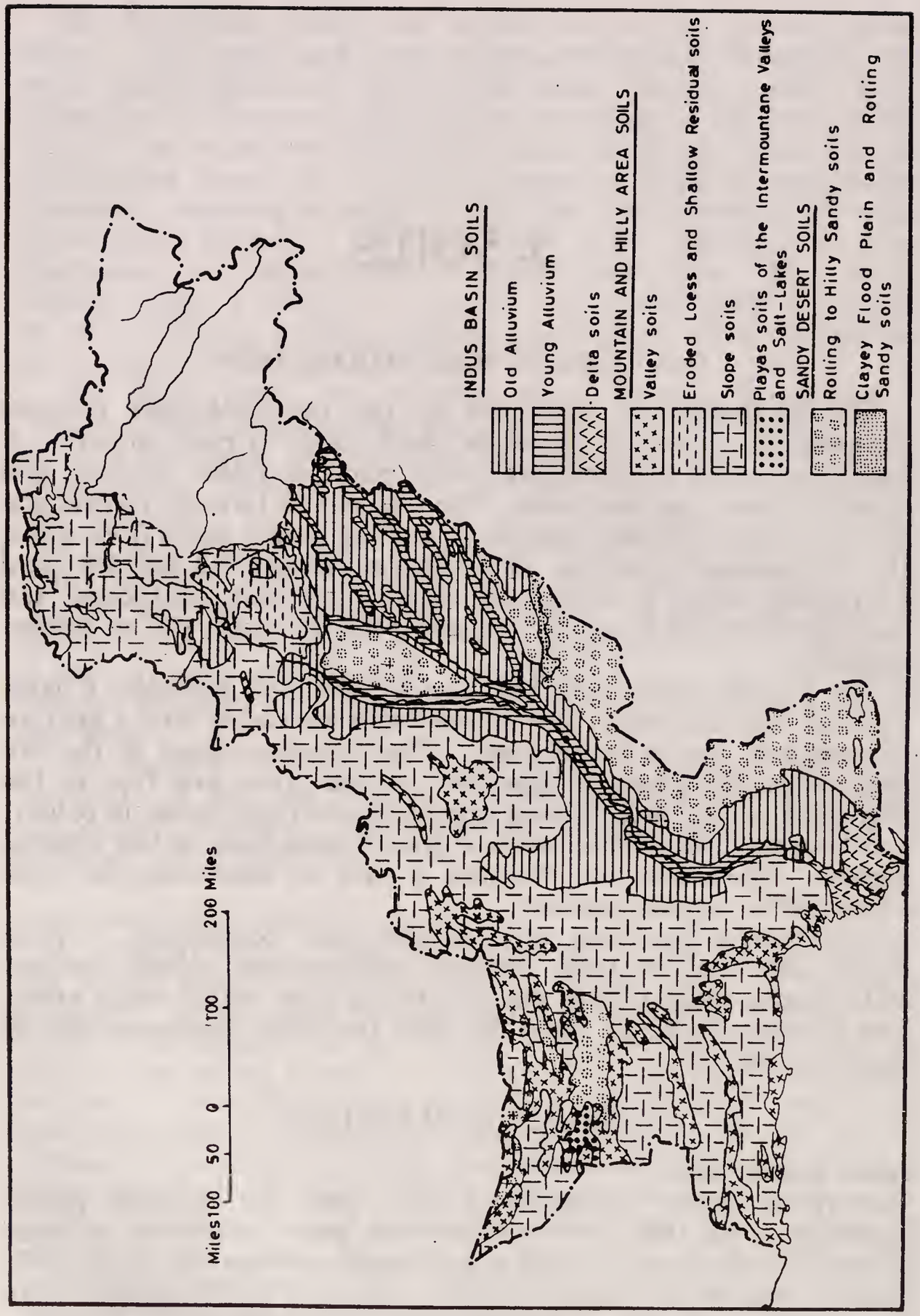


Fig. 12 Pakistan: soils

areas, these soils have become waterlogged, and capillary action has carried salts to the surface. Some areas show a puffy salt layer at the surface, but these can be reclaimed by simple leaching, if

supplied with plenty of irrigation water. Over very small areas, strongly alkaline soil patches have developed, and these, being non-porous, are difficult to reclaim.

In the upper Chaj and Rechna Doabs, the submontane area bordering the Peshawar–Mardan Plain, and in the eastern Potwar, the Bangar soils have developed under sub-humid conditions. Because of the higher rainfall, they have been leached of lime and are non-calcareous, medium to fine textured, and have a slightly higher organic content. These soils are also fertile when supplied with plenty of water and manure.

Khaddar soils are formed from recent and present-day deposits along the rivers. Parts of these soils are flooded each year, adding depositional layers of silt loam and silty clay loam. The organic content of these soils is low, but they are usually free of salts.

Indus Delta Soils are formed of sub-recent alluvium and estuarine deposits. They cover the entire area of the Indus Delta from south of Hyderabad to the coast. Clayey soils, developed under flood water conditions, cover about one-third of the area. With irrigation, these soils are used for rice cultivation. Saline loamy soils cover most of the delta. Some with salt crust at the surface, have been reclaimed by simple leaching and better drainage. Extremely saline patches can be used only for poor grazing.

Coastal estuarine deposits form the lower part of the Delta, which is a maze of tidal flats, basins, and sea-water creeks. The soils are extremely saline and barren, except for a weedy vegetation.

Mountain Soils

Mountain soils occur in the highland areas of the north and west, and are residual as well as transported. Along the steep crests and slopes, and in the broken hill country, shallow residual soils have developed. Under arid and semi-arid conditions, these soils are usually strongly calcareous, with low organic content. Further north, under sub-humid conditions, there is more leaching, and a higher organic content.

In the mountain valleys, soils are formed from the alluvial infills of the streams. These soils are calcareous silt loams and sandy loams of low organic content. They are cultivated in patches only.

In the sub-montane area of the Potwar Plateau, shallow residual soils and silty eroded loess have been formed. In places these soils are massive, susceptible to erosion, and strongly gullied, producing a dissected landscape. Lime content is high, and organic content low, but, with plenty of water, these soils are relatively productive.

In the lowest parts of the inter-montane valleys and interior basins of the arid and semi-arid regions, strongly saline soils develop. Excess of evaporation over precipitation leaves a thick crust of salts at the surface of the intermittent lakes. For the most part, these

soils are barren. The margins carry low shrubs and salt bush, used for poor grazing.

Sandy Desert Soils

The soils extend over some parts of western Baluchistan, and the Cholistan and Thar Deserts. Thal desert soils occur in large sections of the Sind Sagar Doab. Desert soils include rolling to hilly sandy soils, and clayey flood plain soils. Where the soils are formed of deep sand, as in much of Baluchistan, they are moderately calcareous, and largely aeolian. In places, the wind-blown material is mixed with old alluvium. The arid and semi-arid desert sand areas have few possibilities for improvement, beyond very poor grazing.

4. HYDROLOGY

The availability of water for agriculture has always been of vital importance to Pakistan. The natural rainfall for crops is adequate only in the Himalayan foothills. Although use of underground waters is increasing, Pakistan may be said to be dependent on its rivers, and all its useful rivers are part of the Indus system. Smaller rivers, principally in Baluchistan, peter out in areas of inland drainage.

THE INDUS SYSTEM

The Indus system includes a large number of tributaries, but the principal affluents are the Jhelum, Chenab, Ravi, Beas and Sutlej. Two of these, the Beas and the Sutlej, combine near Harike in India, before entering Pakistan. The Indus and its important tributaries traverse long distances through the Himalayas and have captured most of their flow before debouching into the plains of Pakistan.

TABLE 1

Catchment Areas and Discharge of Major Rivers

River	*Mountainous Catchment Area*[1] *(sq. miles)*	*Av. Annual Discharge* 1963/4–65/6[2] *(million acre ft.)*
Indus	103,800	92.0 (at Attock)
Jhelum	13,000	22.0 (at Mangla)
Chenab	10,500	26.7 (at Marala)
Ravi	3,100	6.4 (at Balloki)
Sutlej	18,500	16.6 (at Suleimanke)

1 S. G. Burrard and H. H. Hayden, *A Sketch of the Geography of the Himalayas* Part III, Delhi, 1933, p. 175.

2 IBP Publication No. 258, Water Management Cell, Indus Basin Project Division, WAPDA, 1968.

The volume of water in the rivers is subject to vast seasonal and monthly fluctuations (fig. 13). It is small in winter, and increases gradually with the approach of summer, as the snows in the mountainous catchment areas begin to melt. The volume of water in the rivers in the early summer months varies with their size, altitude, situation with respect to the monsoons, the height of the snow line, and heritage of glaciers from past eras[1] in the respective catchment areas.

In the Indus, Jhelum, and Chenab, the volume of water increases appreciably after March, but this increase comes later in the eastern rivers. The Indus, in which an early rise is most marked, draws its supply from two large groups of glaciers, the Hindu Kush and the Karakoram, the glaciers of the Karakoram being larger than those of any other mountains outside the Polar region.

The approach of the rainy season at the end of June or early July is marked by a great increase in flow. The period of high flow terminates in the Indus and Jhelum in September, but continues for another month in the eastern rivers. The decrease in flow after the peak month is as sharp, or even sharper, than the rise before it. Even months with high mean discharges are characterized by wide fluctuations in the daily discharge. Floods generally occur in the early part of the rainy season in the western rivers, and later in the eastern.

Because about 60 per cent of the flow in the Indus system is concentrated in the three rainy months, there is a great need for reservoirs and dams to regulate the flow, reduce floods and loss to the sea, and provide more water for irrigation. Further, the flow of the Ravi, Beas, and Sutlej has been lost to India, and must be replaced from other sources. Storage dams and replacement works are discussed later, in the chapter on irrigation.

DRAINAGE PATTERN OF BALUCHISTAN

In Baluchistan, the main rivers sprawl out in all directions from the axis of high land formed by the Quetta node, the Central Brahui Mountains, and the Central Makran Range. Rivers draining to the north-east and east of the main divide generally join the Indus system. These include the Zhob, with its main tributary the Kundar, the Loralai, and the Kulachi. The Bolan and Mula Rivers, flowing south or south-east from the main divide, dissipate themselves in the Karachi–Sibi Plain. Southward flowing rivers drain to the Arabian Sea. The Hab, Porali, Hingol, with its main tributary the Mashkai, are the chief of these. Rivers flowing west or south-west generally dissipate their water in shallow depressions of varying size called *hamuns*. The more important of the rivers

[1] The large size of the feeder glaciers of the Indus cannot be explained on the basis of present meteorological conditions. (S. G. Burrard and H. H. Hayden, op. cit., p. 244.)

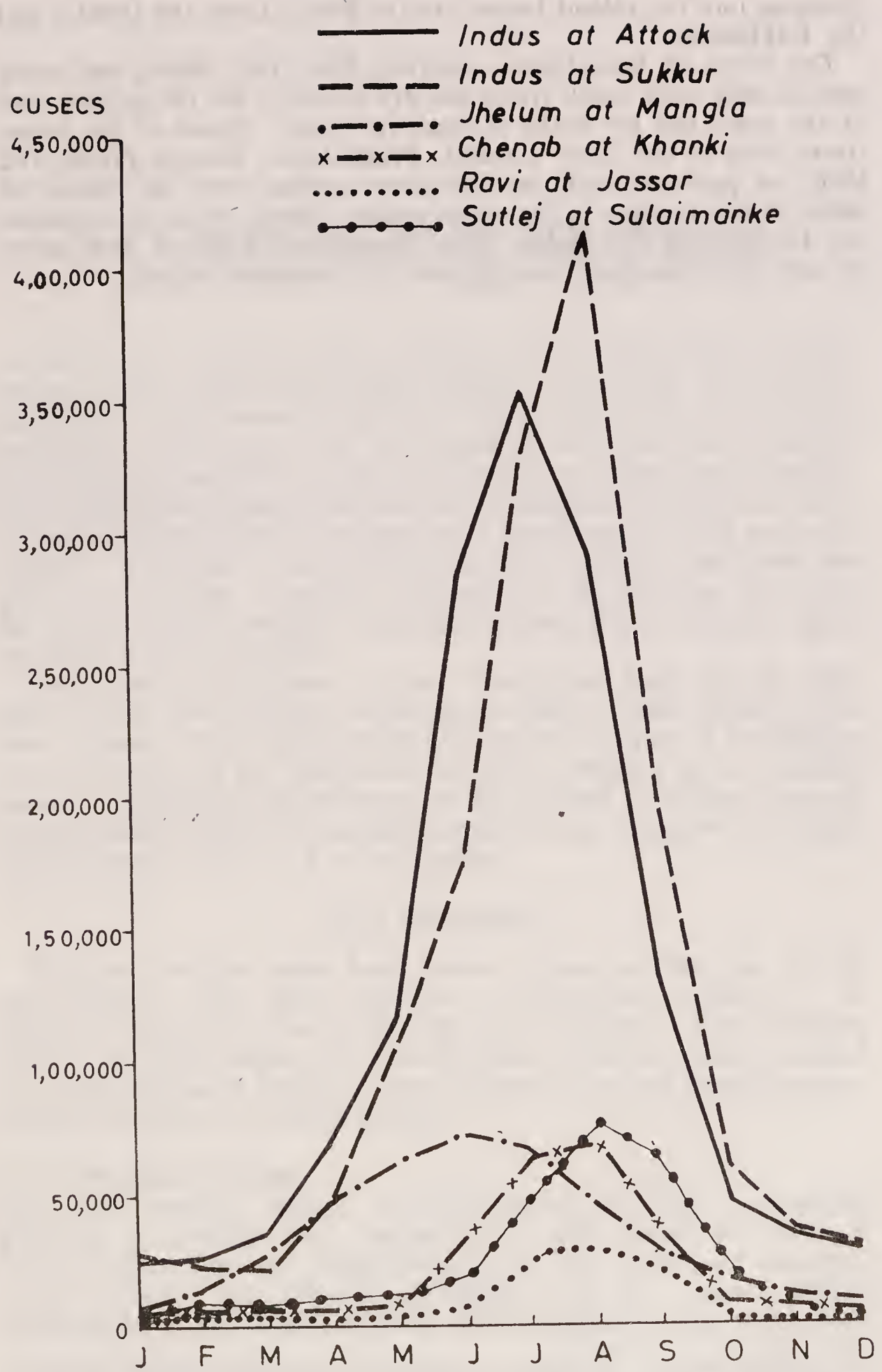


Fig. 13 Mean monthly river water discharge

draining into the inland basins are the Pishin Lora, the Baddo, and the Rakhshan.

The rivers of Baluchistan generally flow only during the rainy season, and some small rivers are dry not only for the greater part of the year, but for many consecutive years. Some of the larger rivers, such as the Zhob, Loralai, Pishin Lora, Hingol, Porali, and Hab, are perennial only in their lower reaches, and the volume of water is small except in the rainy season. Some rivers, for example, the Hingol and the Bolan, flow intermittently above and below ground, and disappear underground in limestone regions.

5. CLIMATE AND WEATHER

Pakistan lies on the western margin of one of the major climatic regions of the earth, the monsoon region. The winds in winter are north-east to south-west, and the reverse, south-west to north-east, in summer. The causes of the reversal of the wind system, and of the pulsating character of the monsoons, are varied and complex. The summer monsoon brings maritime influences and rain, but there are annual fluctuations or pulsations in the strength of the monsoon current. Cyclones in the monsoons cause rainfall, but their frequency is variable. Similarly, the paths of the cyclones vary with the position and strength of the Inter-tropical Front, and this again results in variable rainfall.

The climate of Pakistan is more 'continental' than that of other parts of the sub-continent, which come under a more typical monsoon regime. The rainfall in most parts of Pakistan is insufficient and its usefulness for agriculture is further reduced by its variable nature. Moreover, the efficiency of the rainfall is reduced because it takes place in the late summer months when, because of the high temperatures, much of it is evaporated.

THE SEASONS

Pakistan has the same four seasons found in the rest of the sub-continent, but their duration is somewhat different.[1] In Pakistan, the seasons may be distinguished as follows: Cold Weather Season (mid-December to March); Hot Weather Season (April to June); Monsoon Season (July to September); and Post-Monsoon Season (October to mid-December).

Cold Weather Season

The cold weather season is characterized by high barometric pressure, somewhat low temperatures, and small precipitation from shallow western disturbances. In the month of January, which typifies the climatic conditions of this season, mean pressure generally decreases from 1035 millibars in the north-west

[1] The account of the seasons in this chapter comprises the relevant portions of the article, 'Weather and Climate of Pakistan', by S. N. Naqvi and M. Rahmat Ullah, *Pakistan Geographical Review* Vol XVII, No. 1, pp. 12-16.

at Drosh to 1015.2 millibars in the south. The mean monthly temperature is below 40°F. in the mountainous areas, and varies from about 50°F. in the north of the plain area to about 65°F. in the south.

The generally fine weather of this season is occasionally affected by disturbances from the west, which form along the Mediterranean Front, and reach Pakistan after travelling across Iraq, Iran and Afghanistan. With the advent of the cool season, the incidence and intensity of these disturbances increase, and they move southward. The winds along the cold fronts of these depressions lower the temperature. The minimum temperature occasionally falls below freezing even in parts of the plain, to 28°F. in Lahore, for example. It is still lower in the Potwar Plateau, the cis-Indus plains, and the hilly areas.

Rainfall during the months December–March increases northwards and westwards. Over the middle and lower Indus Plain it is 1 inch or less, in the upper Indus Plain it ranges from 3–5 inches, and in the north and north-west, it rises to 10 inches or more.

Hot Weather Season

High temperature and aridity are the main characteristics of the hot weather season. With the approach of the season, the day temperature begins to rise. In May–June, it reaches its peak when, over large areas, the mean maximum daily temperature varies between 105°F. and 114°F. Southern and south-western parts of Pakistan register higher temperatures than elsewhere. Jacobabad is the hottest place in the sub-continent, with the highest recorded temperatures of 126°F. in May and 127°F. in June. The hill resorts and the Sind-Makran coast are areas of comparatively low temperature, but Karachi experiences short spells of high temperatures (108°F.) when winds from the Rajasthan Desert are drawn to low pressure troughs in the north Arabian Sea.

As the season approaches, pressure falls. A trough of low pressure begins to appear in April, when most of the Indus Plain has a mean pressure of 996 millibars. Relative humidity drops from about 50 per cent in the early morning to 25 per cent or less in the afternoon. Rainfall is small, varying from 1 to 3 inches over the plains to 4 to 5 inches in the Himalayan sub-montane areas and parts of the Potwar Plateau. The rainfall is associated with the westerly disturbances, which have by now swung to more northerly latitudes, causing thunderstorms over the hills and widespread dust-storms over the plains.

The Monsoon Season

The establishment of low pressure over the Indo-Pakistan sub-continent in May and June attracts winds from the Indian Ocean, which 'burst blowing' over the land about the middle of June as

the south-west monsoons. The monsoons gain in strength until July, remain constant to the end of August, and then begin to slacken. The monsoon-current reaches Pakistan about the beginning of July and is well established by the middle of that month. In some years, the monsoon remains active even in September.

The tropical cyclones or 'lows' formed along the Inter-tropical Front at the head of the Bay of Bengal move in a north-westerly direction over northern India and enter Pakistan. Their tracks vary with the position of the Inter-tropical Front. Some, after reaching the central parts of India or Rajasthan, re-curve north and north-westward. Others continue westward and bring rains to the lower Indus Plain.

The effect of the Arabian Sea branch of the monsoons over Pakistan is felt from the end of June. However, these monsoons penetrate only the coastal areas, and result in the formation of stratus clouds, with very little rain.

During the month of July, the mean monthly temperature exceeds 90°F. over most of the Indus Plain and western Baluchistan. Pressure in the low, centered on Multan–Jacobabad, is 996 millibars. Average rainfall during the monsoon season in the Indus Plain decreases from 25 inches in the north, to 5 inches or less in the south.

The Post Monsoon Season

This season is a transitional period between the monsoonal regime and cool-season conditions, and is also known as 'the season of retreating monsoons'. In October, maximum temperatures range from 94° to 99°F., with 60°F. as the normal minimum. There is a further fall of about 10°F. in maxima and minima in November. The high pressure begins to establish itself over Pakistan in mid-November. The absence of any active wind system results in general dryness, and October and November are the driest months.

THE CLIMATIC ELEMENTS

Temperature

Pakistan extends north–south over a considerable expanse of latitude (24°N. to 37°N.). This, together with the diversity of terrain (see Chapter 2), results in a diversity of temperatures at any given time. Seasonal differences in temperature are also substantial, due more to the high temperatures of summer than extreme cold in winter (figs. 14, 15 & 16).

Temperatures in the hottest month are very high, except in mountainous localities. In the plains the hottest month is June, in the hill stations, July. In HILLY AREAS summer temperatures, like winter temperatures, are influenced by altitude and the 'face' of the terrain, and thus vary considerably from place to place. For example, the mean temperature of the hottest month is 97.8°F. at Drosh

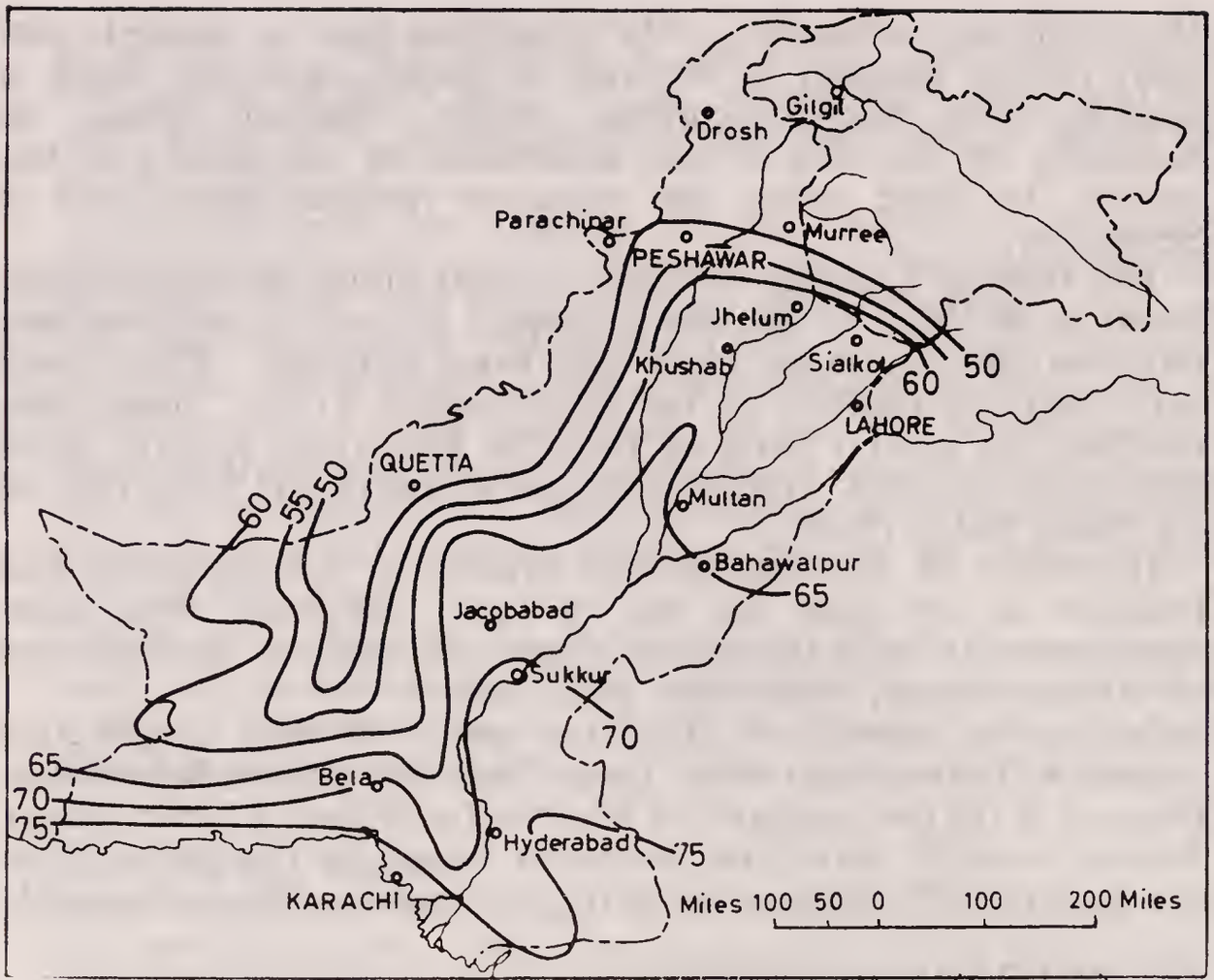


Fig. 14 Pakistan: Mean monthly temperature (January)

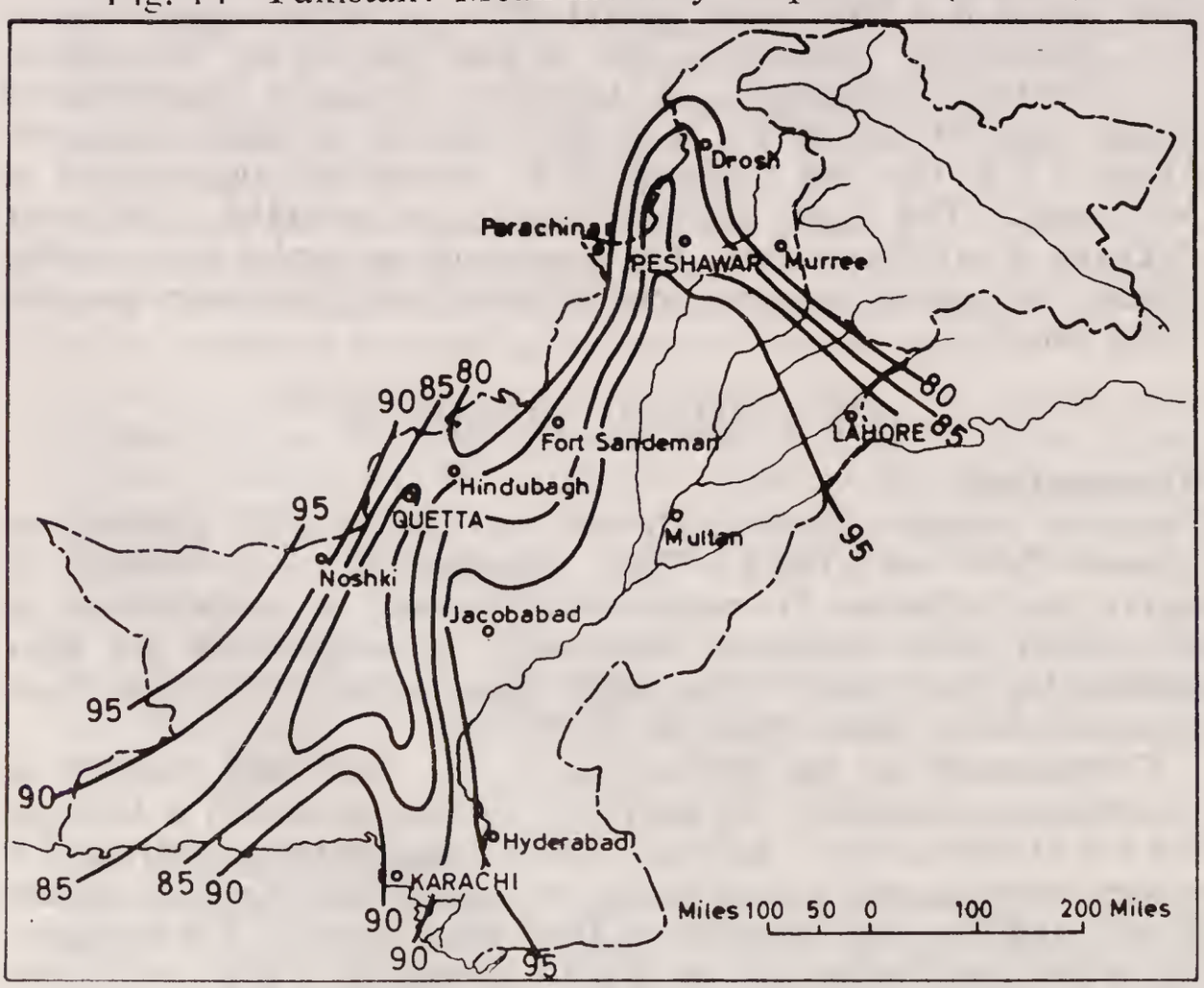


Fig. 15 Pakistan: Mean monthly temperature (July)

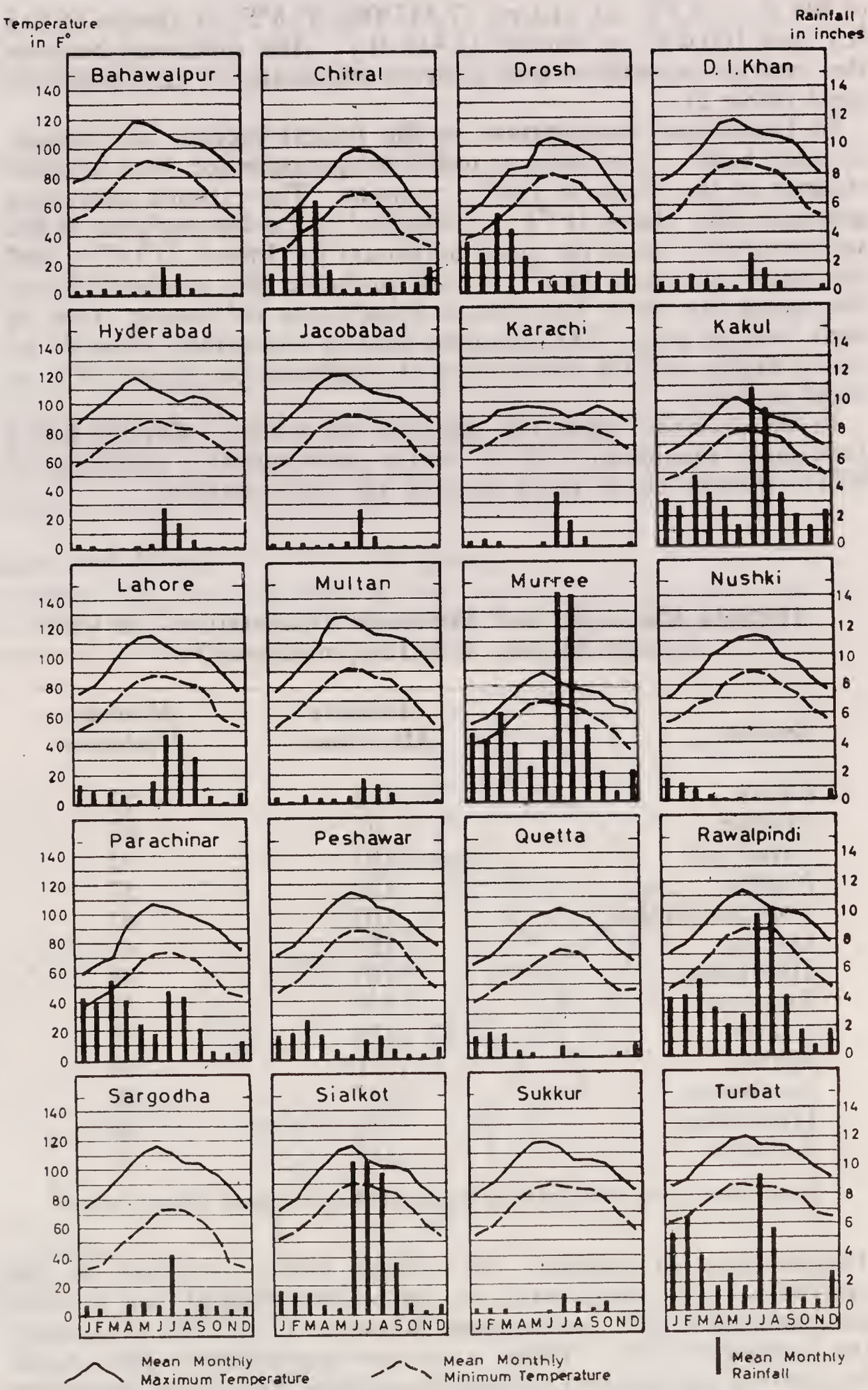


Fig. 16 Pakistan: Rainfall and Temperature

(4,806 ft.), 78.5°F. at Murree (7,445 ft.), 87.8°F. at Quetta (5,213 ft.), and 100.4°F. at Nushki (3,416 ft.). The difference between the extreme maximum and extreme minimum of the month is great (table 2).

In the PLAINS temperatures in the hottest months are uncomfortably high. The mean monthly temperature for June at most stations in the plains is 100°F. or more. The extreme maximum generally rises above 117°F. Jacobabad is the *thermal-pole* of the sub-continent, where the mean maximum for June is 119.4°F., and the mean minimum, 90.7°F. It is probable that nowhere else in the world are there agricultural populations cultivating crops in such intense heat. The day-time heat is sometimes relieved by cooler nights, and the temperature at Jacobabad can fall to 70°F. at night in June.

In the COASTAL AREAS the summers are milder. Karachi has a June mean maximum of 95°F. and a mean monthly minimum of 85°F. Stratus cloud cover reduces the daily maxima.

TABLE 2

Absolute Maximum and Minimum Temperatures for the Hottest Month, June/July, in degrees F.

Station	*Absolute Maximum*	*Absolute Minimum*
Drosh	113	53
Murree	95	42
Parachinar	103	45
Nushki	120	57
Fort Sandeman	107	62
Quetta	105	41
Hindubagh	109	48
Peshawar	122	56
Lahore	119	65
Multan	121	69
Jacobabad	127	70
Hyderabad	122	68
Karachi	116	72

Unpublished data obtained from Regional Meteorological Office, Lahore.

Temperatures in January, the coldest month, are low in the NORTHERN AND NORTH-WESTERN MOUNTAINS. Chitral has a mean maximum of 47.7°F. and a mean minimum of 29.7°F. in January the coldest month. These areas are snowbound until April. Stations in the western mountainous areas experience somewhat similar temperatures in January.

TABLE 3

January Temperatures at Mountain Stations (degrees F.)

Station	*Absolute Max.*	*Mean Max.*	*Absolute Min.*	*Mean Min.*
Drosh	62	44.8	10	32.3
Murree	65	43.4	12	31.1
Parachinar	68	50.1	3	28.8
Quetta	68	51.4	9	27.0

Unpublished data obtained from Regional Meteorological Office, Lahore.

January temperatures in the upper Indus Plain are moderate and pleasant. At Lahore, for example, the mean maximum is 75.2°F. and the mean minimum is 50.7°F. These figures increase in the lower Indus Plain, reaching 87.3°F. and 64.8°F. in Karachi. More details are given in Statistical Table I of the Appendix.

Pressure and Winds

In SUMMER, the land becomes heated and a low pressure area is created in south-western Pakistan (fig 17). In the month of July, atmospheric pressure (reduced to 32°F. and mean sea-level) is

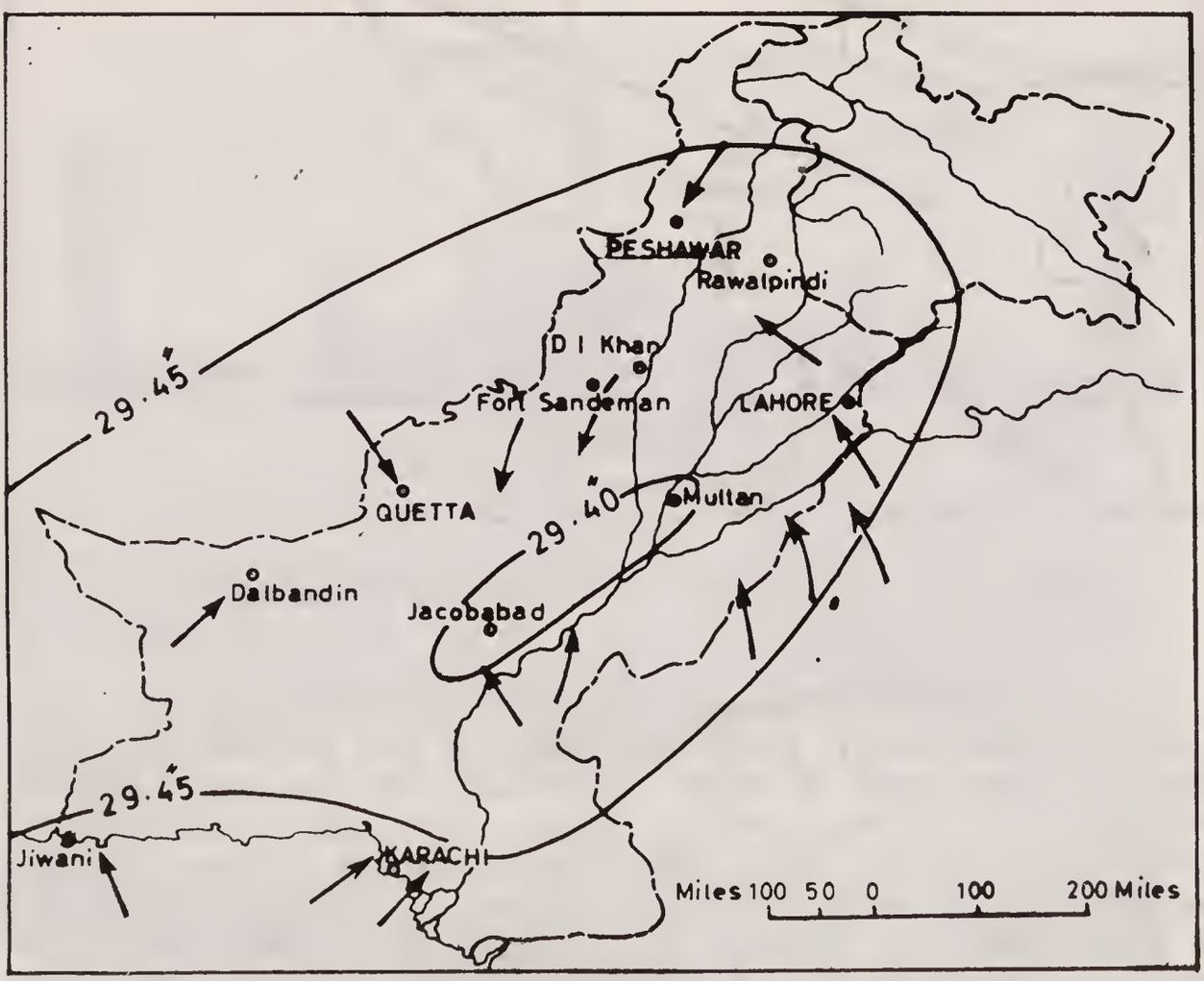


Fig. 17 Pakistan: Pressure and Winds (July)

lowest (994.7 millibars.) in the vicinity of Multan, and rises northwards (Lahore, 996.0 millibars.) and southwards (Karachi, 997.7 millibars). This low pressure area attracts winds from the Indian Ocean. As previously explained, some cyclonic storms migrate to this low all the way across northern India from the Bay of Bengal. Although their moisture content decreases as they move westward, it is these storms which bring most of Pakistan's rainfall. Winds sucked in from the Arabian Sea bring less moisture because these air streams have originated over Arabia, and have a lower moisture content. Nevertheless, they do produce some rain in the western mountains.

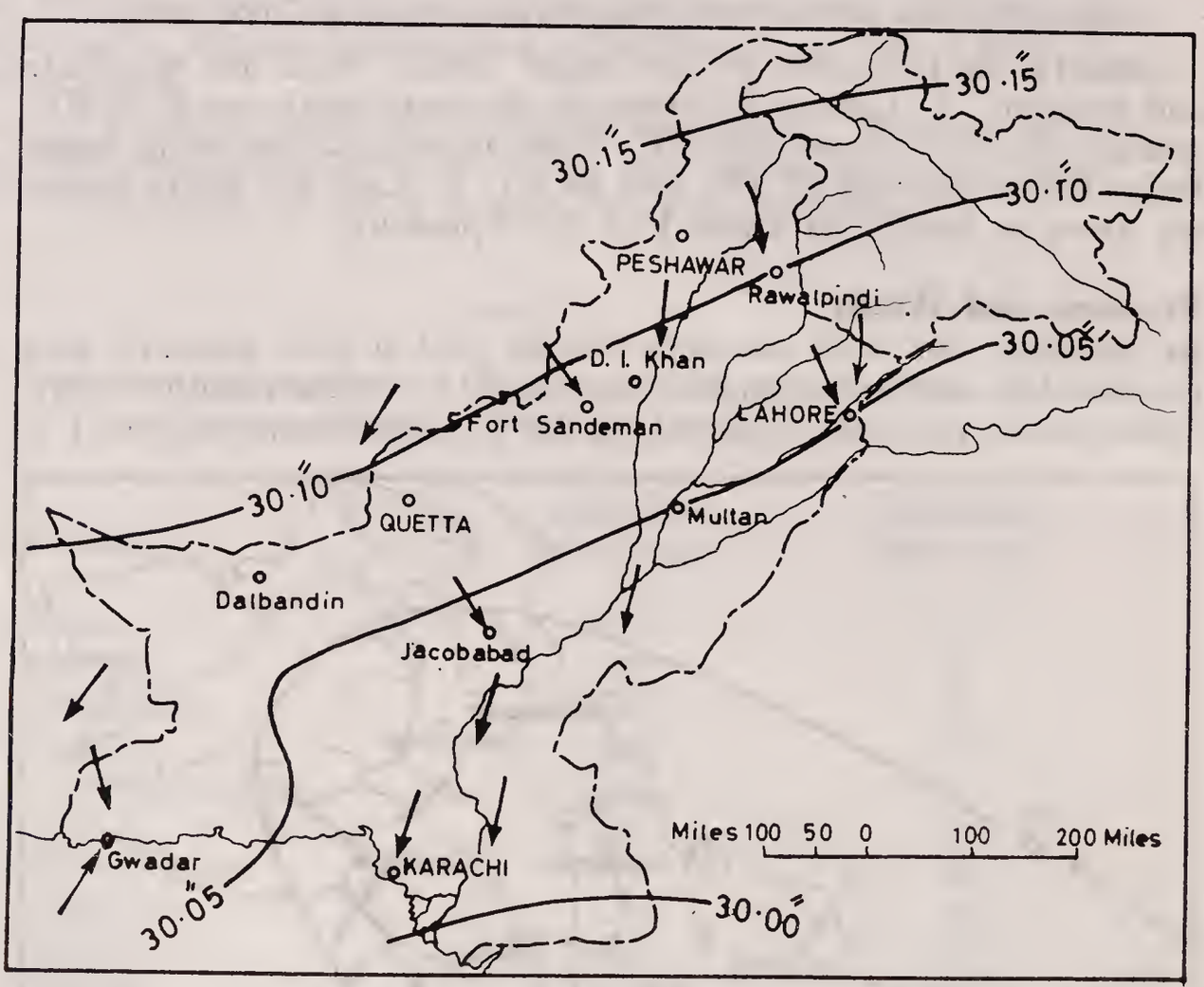
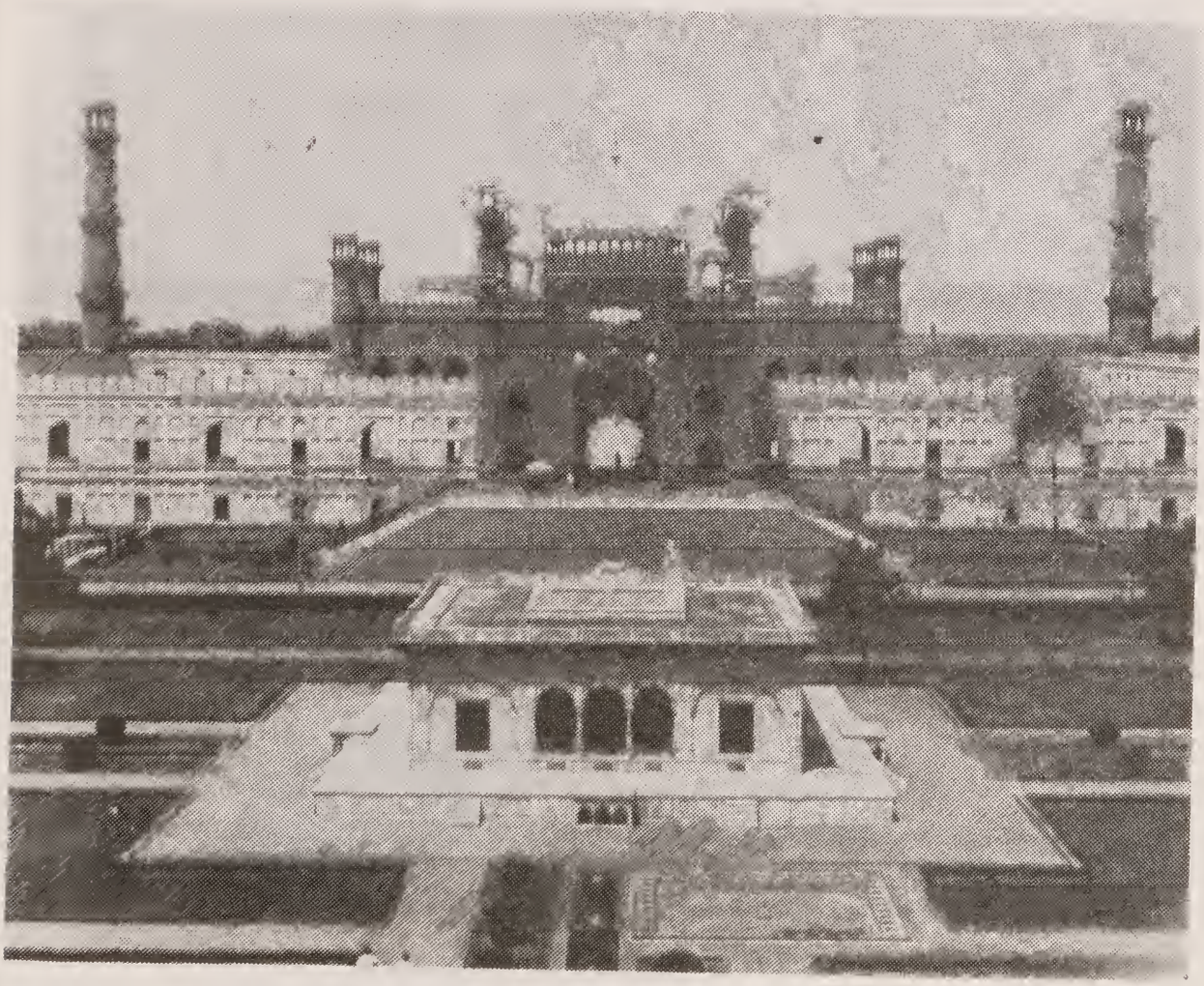


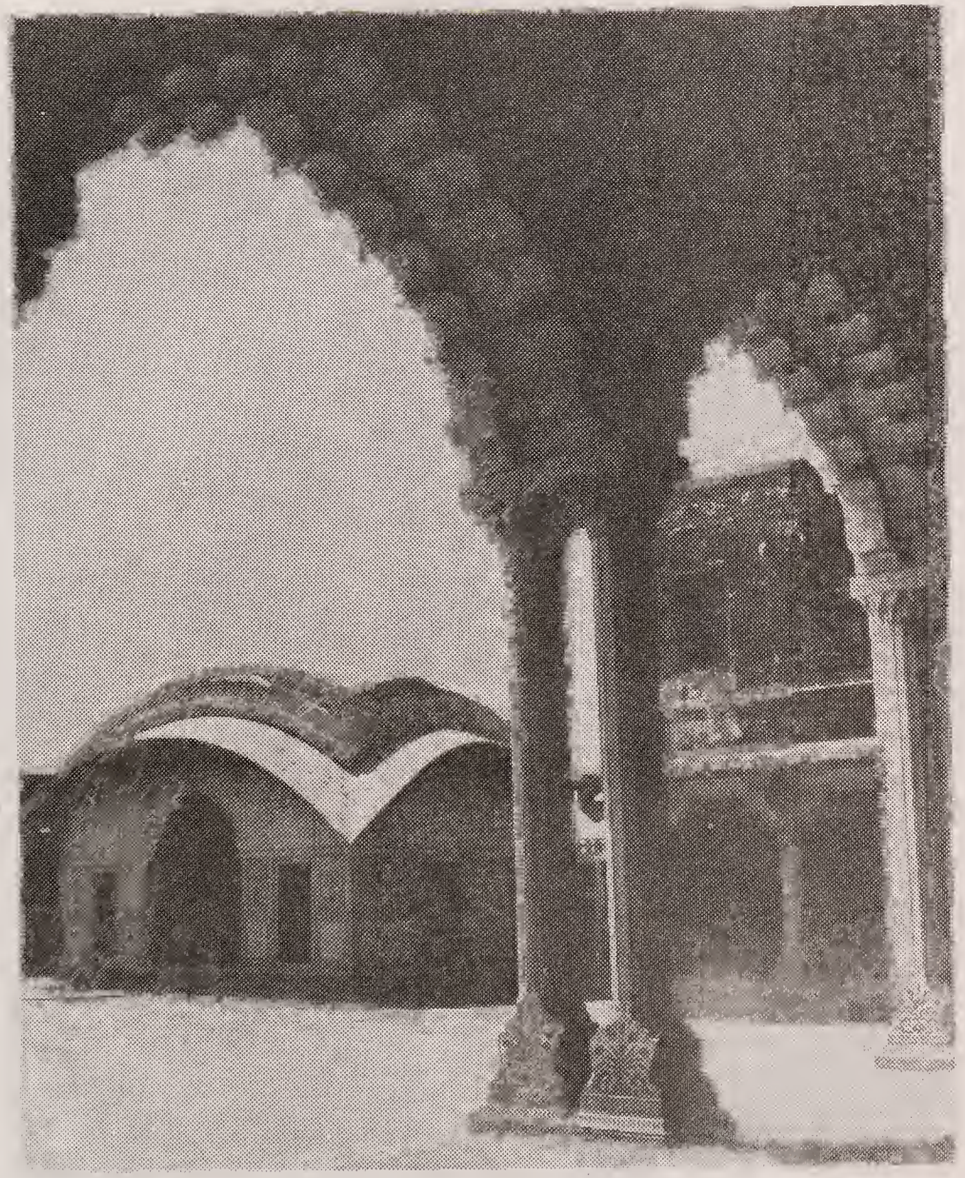
Fig. 18 Pakistan: Pressure and Winds (January)

In WINTER, the temperatures over the land are relatively low, and a high pressure area is established (fig 18). The pressure generally decreases from north to south. In January, the pressure is 1022.6 millibars at Peshawar, 1017.4 millibars at Lahore, and 1017.3 millibars at Karachi. Thus, while the prevailing direction of the winter monsoons over the sub-continent as a whole is north-east to south-west, over Pakistan it is almost from north to south. Because these winds blow from the land toward the sea, they are generally dry.

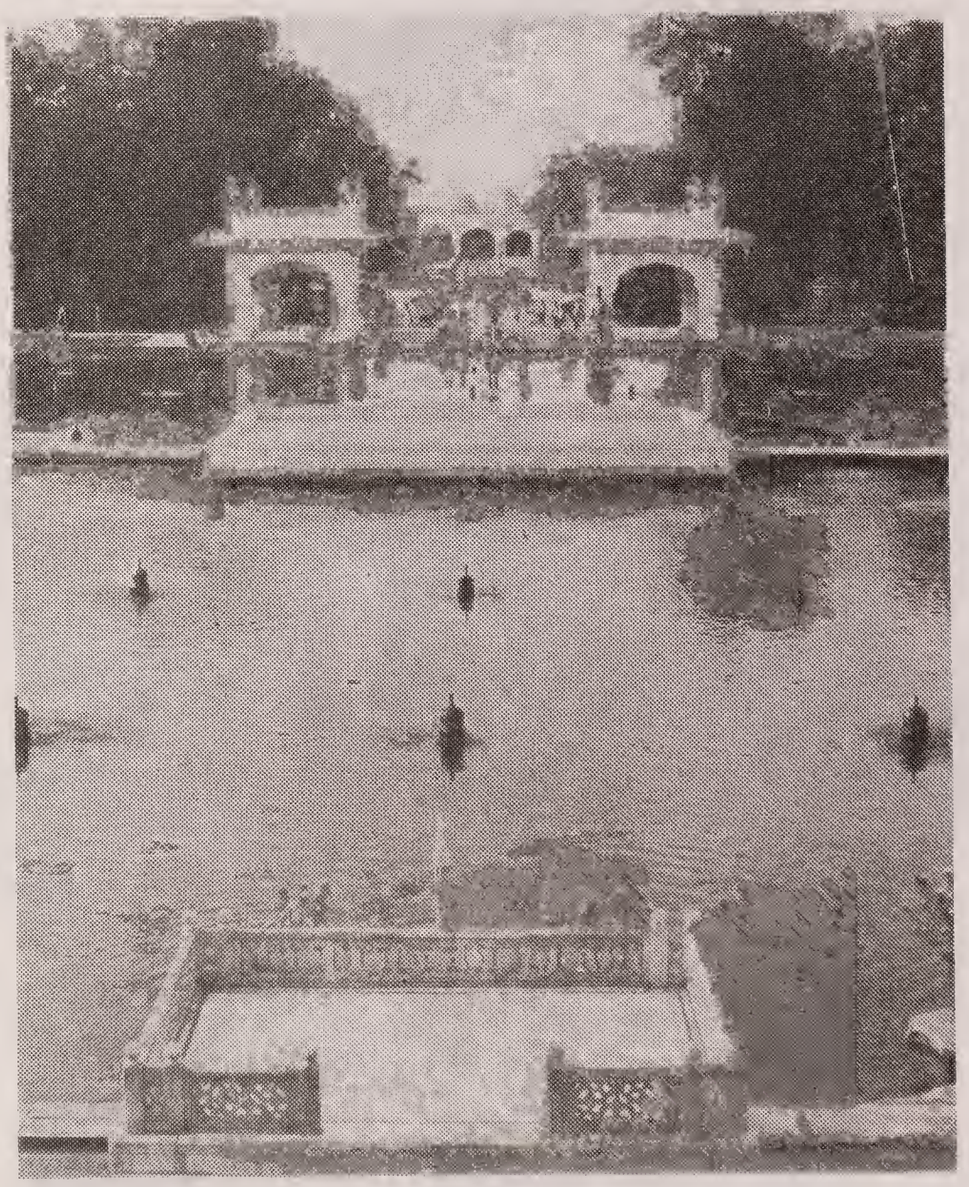
Moenjodaro: Citadel mound with Kushana Stupa



Badshahi Mosque, Lahore



Naulakha Pavilion, Old Fort, Lahore



Shalimar Gardens, Lahore

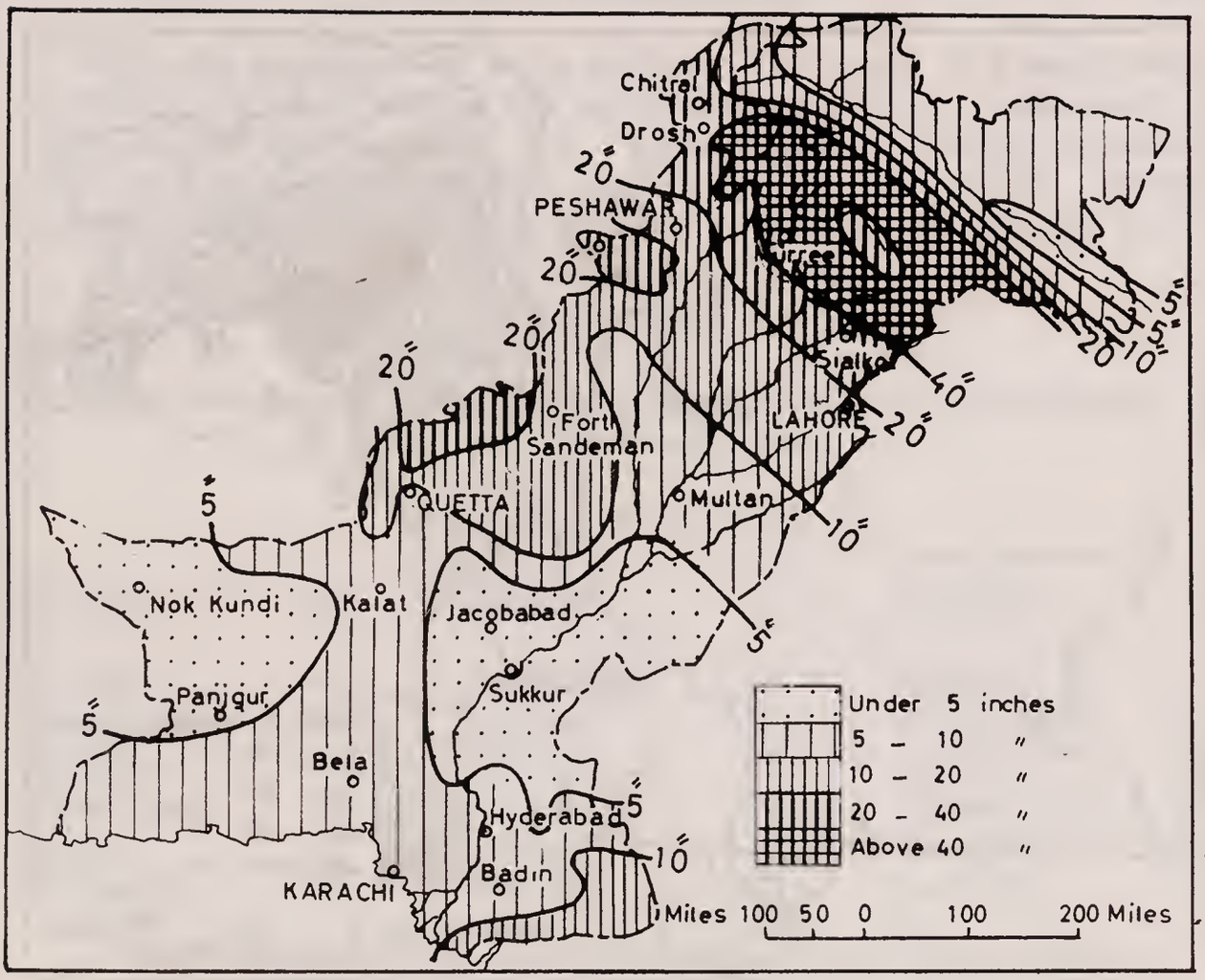


Fig. 19 Pakistan: Mean annual rainfall

Rainfall

The mean annual rainfall of Pakistan is shown in (fig. 19). It is 40 inches or more in the northern mountainous region (Murree, 64.6 inches). Local variations, characteristic of highly differentiated terrain, are recorded in this area. Areas in the extreme north-west, largely sheltered from the monsoonal effect, receive only 20–25 inches (Chitral, 23.1 inches; Drosh, 25.9 inches). The Himalayan Piedmont receives 30–40 inches and the 20-inches isohyet (line joining places receiving the same amount of rainfall) lies somewhat north of Lahore (19.3 inches), veering north-west. The amount of rainfall decreases sharply toward the southern part of the upper Indus Plain. It is less than 5 inches in the Indus corridor, and the northern parts of the lower Indus Plain (Sukkur, 3.6 inches). The Kachhi-Sibi re-entrant is one of the driest areas (Jacobabad, 3.5 inches; Sibi, 5.6 inches). The rainfall again increases southward toward the coast (Hyderabad, 6.1 inches; Karachi, 8.2 inches). On the Makran Coast, it is over 5 inches (Pasni, 5.2 inches; L. bela, 7.7 inches), increasing over the central ranges of Baluchistan (Quetta, 7.7 inches; Fort Sandeman, 15.0 inches). Elsewhere in Baluchistan, it varies from less than 5 inches (Nokkundi, 1.95 inches) to about 10 inches (Panjgur, 4.8 inches, Kalat, 9.2 inches).

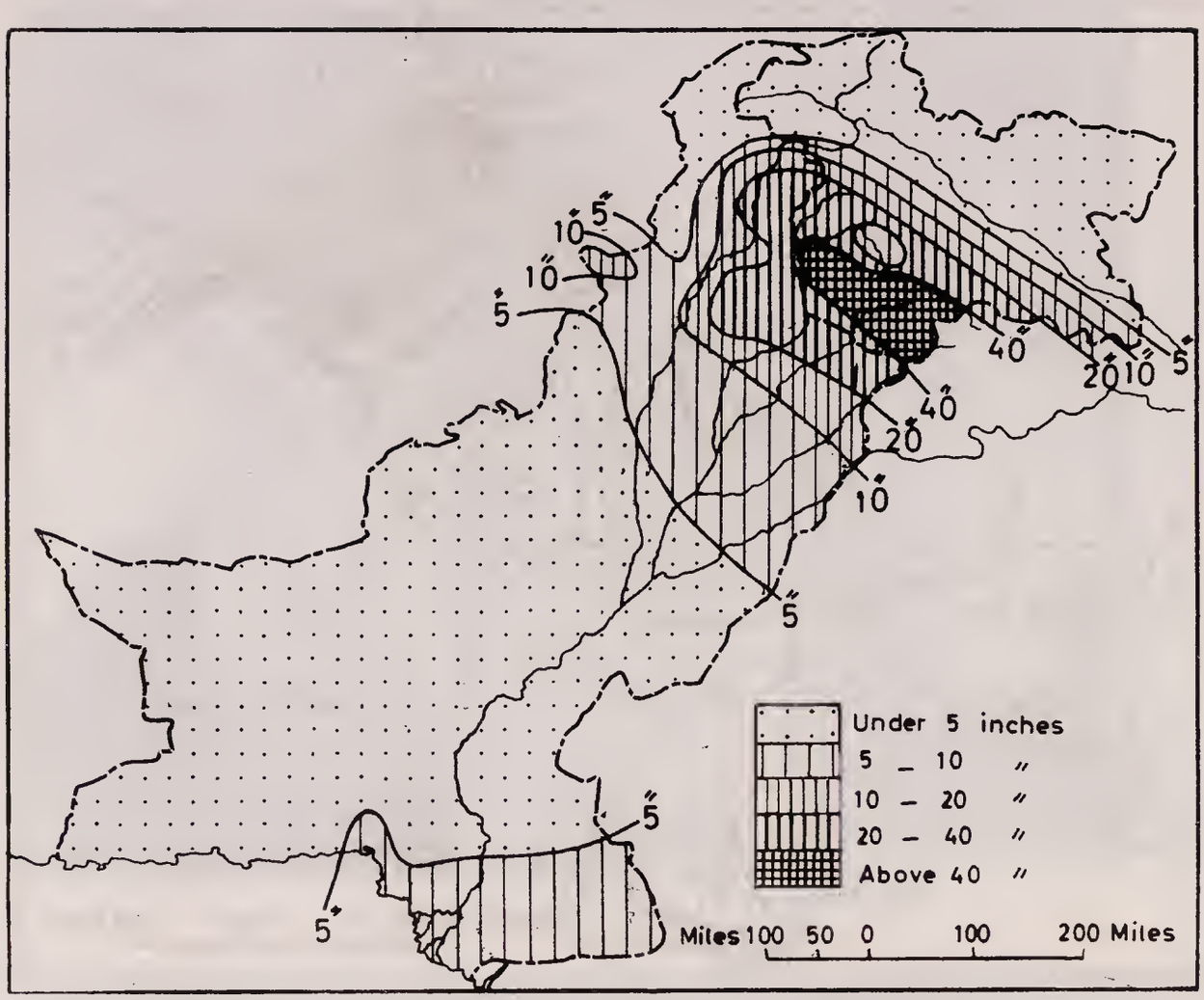


Fig. 20 Pakistan: Rainfall (July to September)

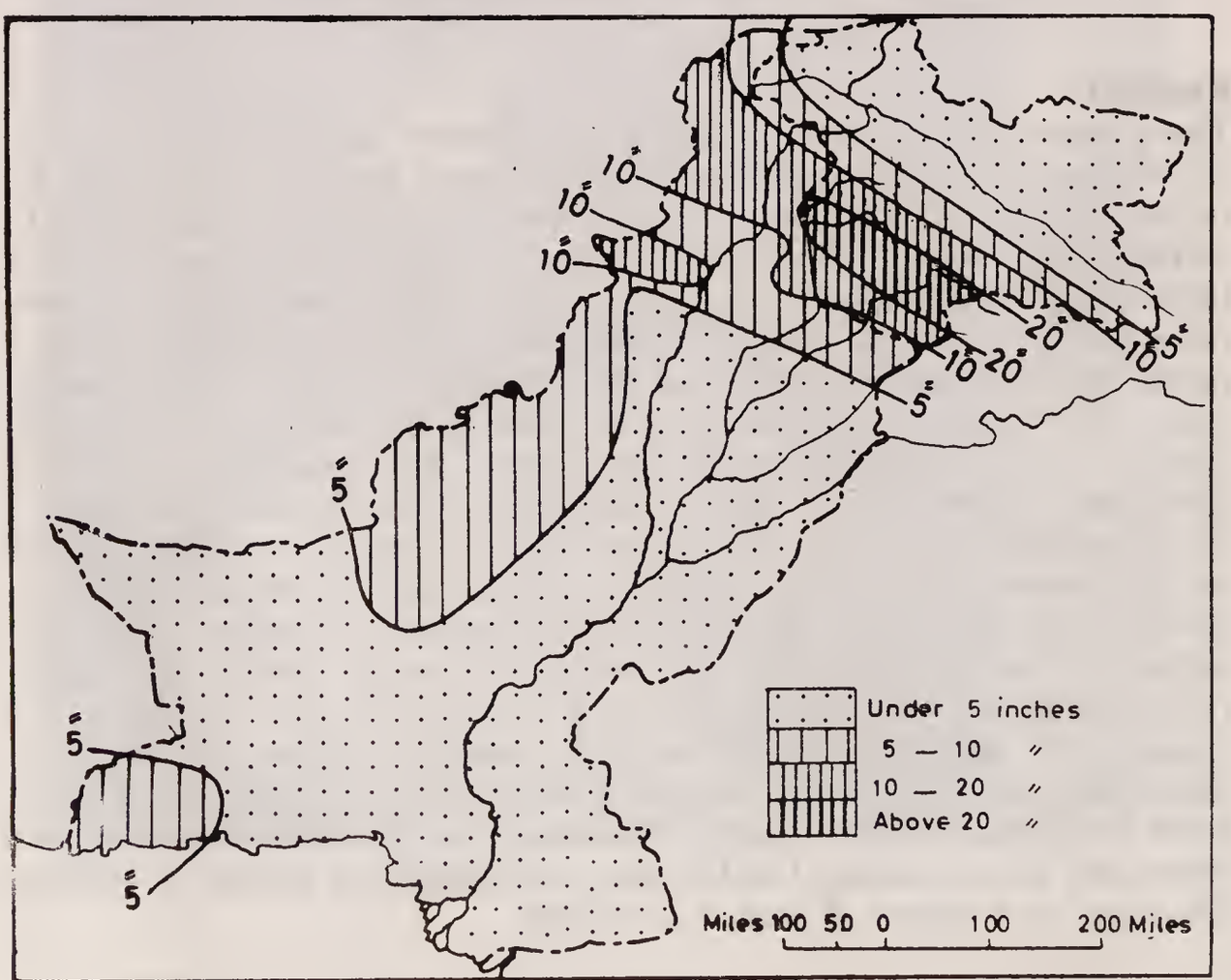


Fig. 21 Pakistan: Rainfall (December to March)

With the exception of some areas in the north and north-west, rainfall is concentrated in the three months (July to September) of the summer monsoon (fig 20). Table 4 shows summer monsoon rain as a percentage of total rainfall for selected stations. Winter rainfall (December to March) is much smaller in amount (fig 21).

TABLE 4

Summer Monsoon Rainfall (July–September) as a Percentage of Total Rainfall

(Averages, 1931–60)

Station	%	*Station*	%	*Station*	%
Drosh	11	Rawalpindi	60	Multan	59
Parachinar	34	Murree	52	Bahawalpur	68
Quetta	12	Jhelum	67	Sukkur	67
Hindubagh	19	Khushab	58	Hyderabad	82
Kalat	21	Sialkot	70	Karachi	78
Peshawar	27	Lahore	66	Lasbela	55

Unpublished data obtained from Regional Meteorological Office, Lahore.

Variability of Rainfall

The rainfall of Pakistan, like that of some other marginal areas of monsoon climate, is markedly variable in the amount and timing of its incidence, and in its areal distribution (fig 22). Over a large area of Pakistan most of the rainfall is associated with monsoon depressions. A secondary source is the passage of western disturbances. In the coastal areas, tropical storms from the Arabian Sea, and thunderstorms associated with thermal instability, produce some rainfall. Each of these sources of rainfall is in itself of a variable character.

The monsoon activity is of a 'pulsating' nature. The monsoon blows in 'intermittent bursts'. Areas of Pakistan receiving 50–75 per cent of their rainfall from the monsoon have above normal variability.[1] The above-normal variability increases from north-east to south-west over the Indus Plain. Below-normal variability is indicative of the comparatively steady influence of the western disturbances, and occurs where winter precipitation is 50–100 per cent of the annual total. The tropical storms from the Arabian Sea area are markedly variable in their incidence, and have erratic paths. They contribute to the high variability of the coastal strip. Jacobabad, the area of greatest extremes in temperature, also

[1] Kazi S. Ahmad and Mubashir L. Khan, 'Variability of Rainfall and its Bearing on Agriculture in the Arid and Semi-arid Zones of West Pakistan', *Pakistan Geographical Review*, Vol. XVI, No. 1, p. 40.

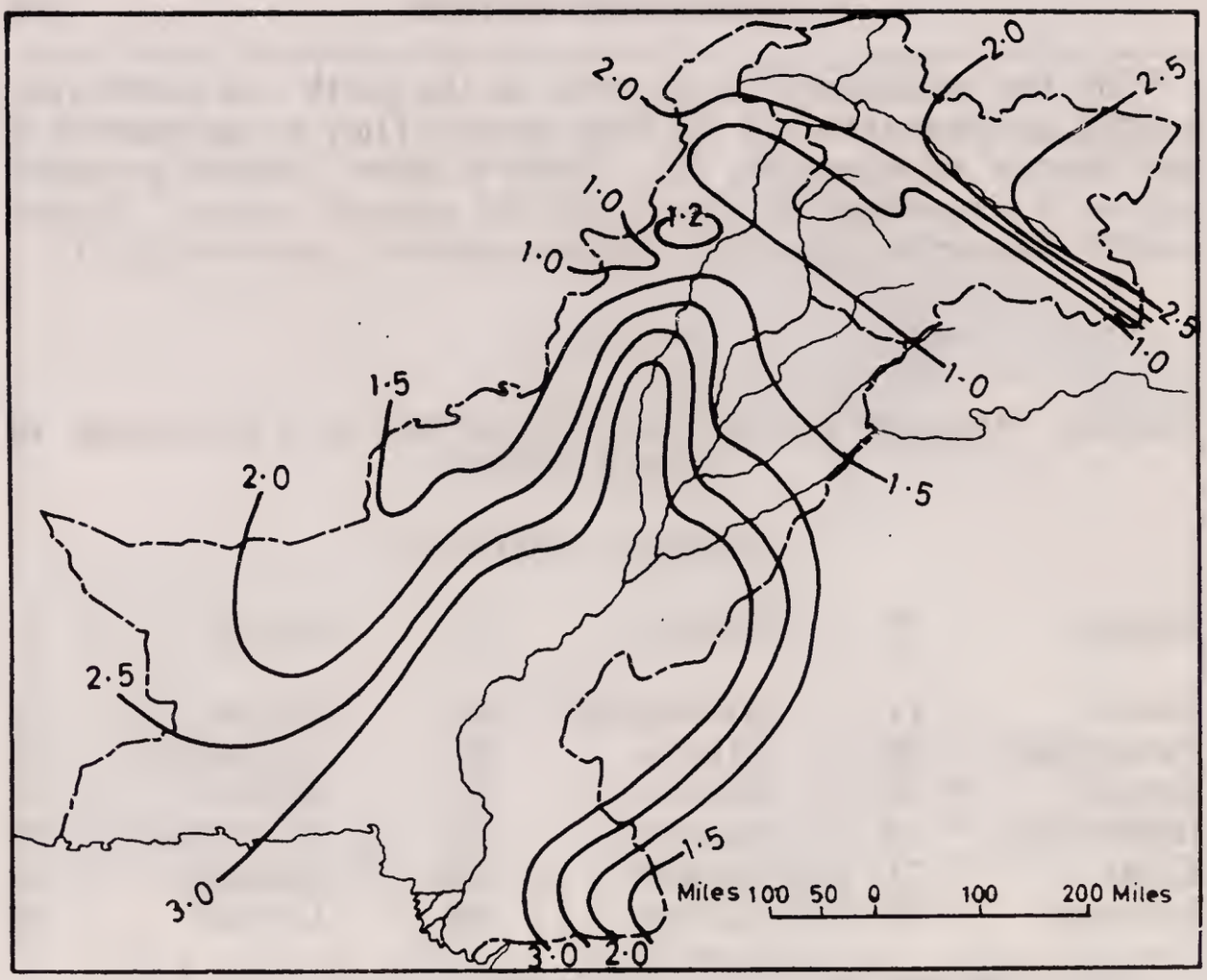


Fig. 22 Pakistan: Variability of rainfall

registers the greatest fluctuation between average and absolute maximum rainfall.

The mean annual number of rainy days varies from 89 at Murree to less than 10 (Sukkur, 6.5). It is obviously larger at wetter places, and in localities receiving rainfall in both the winter and summer months.

Efficiency of Precipitation

It has been shown that rainfall over most of Pakistan is low, markedly variable in character, and occurs mainly in the summer months when temperatures are high. High temperatures cause greater evaporation and transpiration (giving out of moisture by the leaves of trees and plants). Thus, the usefulness or efficiency of the rainfall for plant growth is reduced (fig. 23).

A measure of the efficiency of precipitation, known as the 'moisture index', has been devised by Thornthwaite.[1] When applied to Pakistan, Thornthwaite's formula reveals that, with the exception of a narrow strip of land along the N.W.F.P.–Kashmir border and a small area around Parachinar, Pakistan has a negative moisture index. This indicates that aridity or insufficiency of

[1] C. W. Thornthwaite, An Approach towards a Rational Classification of Climate, *Geographical Review*, January 1948, pp. 55-94.

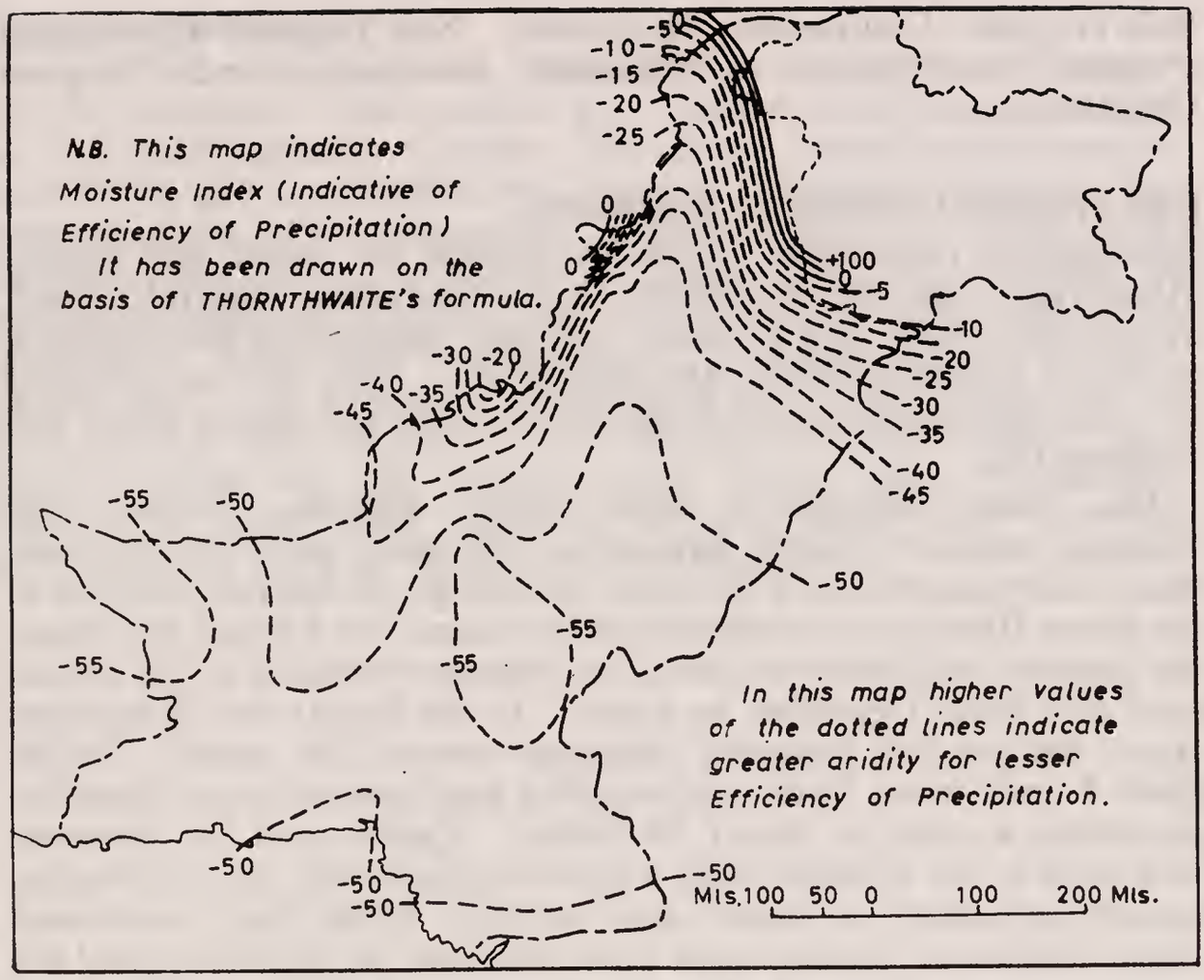


Fig. 23 Pakistan: Efficiency of precipitation

moisture for plant growth is a basic characteristic of Pakistan's physical environment.

A critical isopleth (line joining, places having the same moisture index, temperature and rainfall) dividing semi-arid from arid areas, runs from south of Lahore to north of Peshawar, and thence to a point north-west of Quetta. To the north of this line, moisture conditions are semi-arid to dry sub-humid. The vast area to the south of this line is arid. Aridity is highest in two distinct areas, the desert lowland of north-western Baluchistan, and the area around Jacobabad.

A more detailed examination of the moisture balance, by months, indicates that only in a few rainy hill areas, such as Murree, is there no month of water deficiency. In the dry areas, water deficiency is commonly experienced for 9 to 10 months and, in some cases, 12 months.

CLIMATIC DIVISIONS

A detailed scheme of climatic divisions for Pakistan has been prepared by Kazi S. Ahmad.[1] The four major divisions are:

1 Kazi S. Ahmad, Climatic Regions of West Pakistan, *Pakistan Geographical Review*, Vol. VI, No. 1, pp. 1-35.

Sub-Tropical Continental Highlands, Sub-Tropical Continental Plateau, Sub-Tropical Continental Lowlands, and Tropical Coastlands.

Sub-Tropical Continental Highlands

Sub-tropical continental highlands include the outer and middle Himalayas, the north-western hills (including Chitral, Swat, Waziristan, Zhob and Loralai), and the Baluchistan hills (Quetta, Sarawan, Central Makran and Jhalawan). They are characterized by cold, snowy winters, cool summers, winter and spring rains, and frequent fog.

The outer Himalayan area, which includes Murree and Hazara, receives rainfall throughout the year, with two maxima, one in late summer, and the other in spring. In the rain-shadow of the outer Himalayas, precipitation decreases. In Chitral and Swat, the summer rains become scanty, and about two-thirds of the annual total falls from December to April. In the Kohat and Waziristan areas, the rainfall generally decreases toward the south. In the Zhob–Loralai area, both winter–spring and summer rains diminish, producing a total of about 10 inches. Quetta and the Sarawan area have a dry climate, with a mean annual total of 5–10 inches, occurring mostly in winter and spring. North and north-west winds, known as *gorich*, blow from October to February, and are piercingly cold. In the Makran–Jhalawan area rainfall is still lower, under 5 inches a year. From Kohat south, the annual temperature range is pronounced: the winters are cold and the summers hot.

Sub-Tropical Continental Plateau

This embraces north-western Baluchistan and is markedly dry and hot. Hot and dusty winds prevail almost continuously from mid-May to mid-September. Most of the scanty rainfall takes place in January and February (Nokkundi, 1.95 inches). Extreme heat, dryness, and dust are the chief characteristics of this climatic division.

Sub-Tropical Continental Lowlands

These include the entire Indus Plain, with the exception of the coastal areas. The climate is characterized by high summer temperatures, aridity, and late summer monsoon rains. The annual range of temperature is high. The northern submontane area and the Potwar Plateau are wetter than the rest of the Indus Plain and receive more winter rain. The Thal Desert, the Kachhi-Sibi Plain and the south-eastern desert are the driest areas. Thunderstorms are a prominent feature, especially in the Peshawar Plain, and dust storms are frequent during summer.

Tropical Coastlands

The tropical coastlands are dominated by sea breezes throughout the summer. The annual and diurnal temperature ranges are low and humidity is high. The mean annual temperature is over 90°F., and the rainfall over 7 inches. May and June are the hottest months, with a secondary maximum after the cloud cover dissipates in October. At Karachi, relative humidity exceeds 50 per cent throughout the year, and 80 per cent at night from April to October. From May to September, it is at least 60 per cent during the day. The Lasbela coastal plain with rainfall maxima in both summer and winter, is the transitional area between the Makran coast and the Karachi–Sind coastal belt. Westward, most of the rain takes place in winter, while from Karachi north-eastward most of the rain occurs in summer.

6. NATURAL VEGETATION

Natural vegetation comprises forests, shrubs and grasses, (fig 24), and is determined by climatic conditions and soil types. The climate of Pakistan is too dry for forests, except in the northern hilly and sub-montane belts. Soil formation on the hill slopes is a prerequisite for forest growth, but human practices in these areas have contributed to erosion, rather than to soil formation. Ruthless wood-cutting,

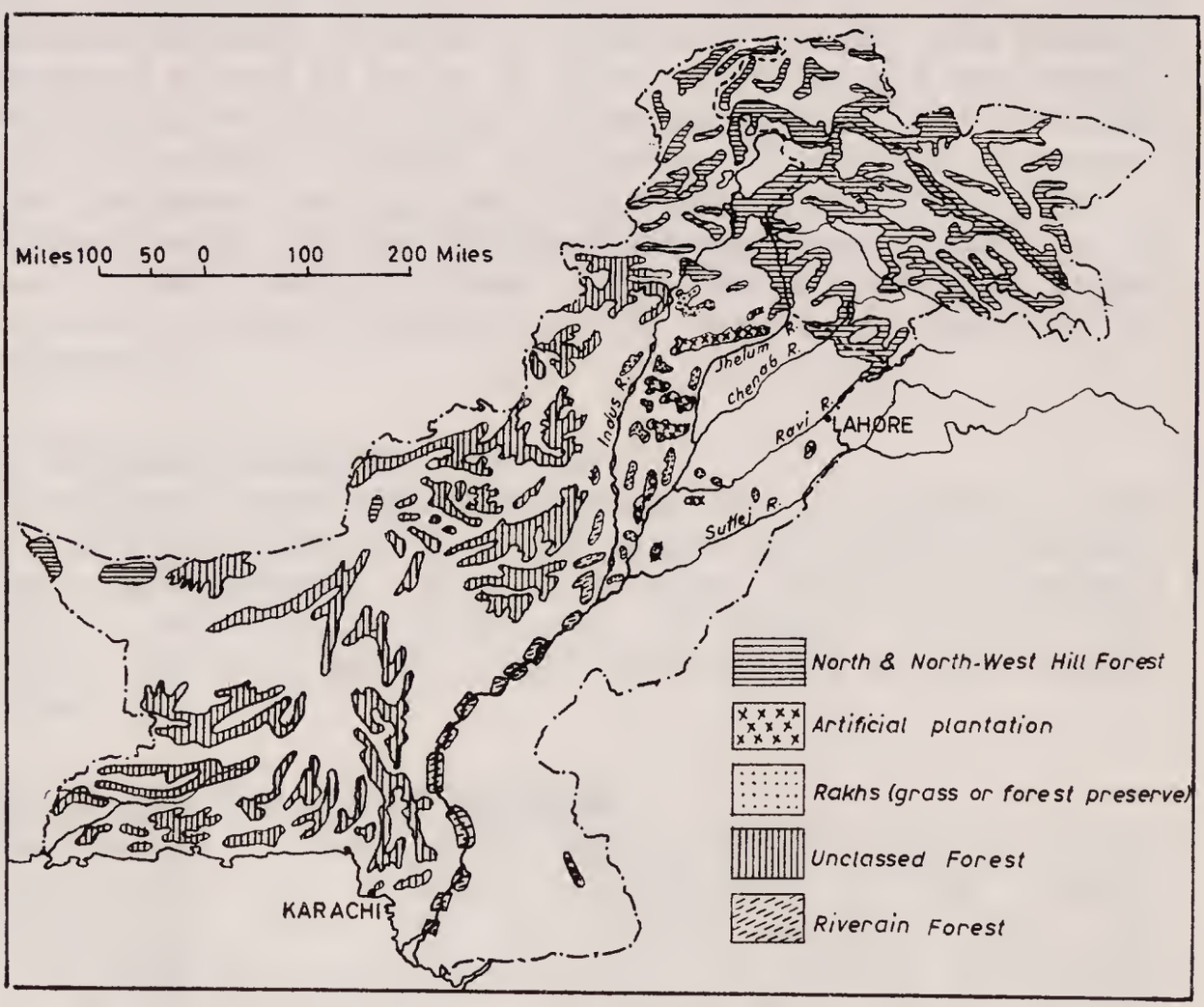


Fig. 24 Pakistan: Natural vegetation

over-grazing, and the annual removal of grass cover from the slopes are all processes which handicap soil formation and the development of forests. As a result, there is a marked deficiency of tree-cover in Pakistan.

It is generally accepted that, for a balanced economy, with an agrarian base, 20–25 per cent of the land should be under forest. In Pakistan, only about 3 per cent of the total area is forested. Afforestation programmes increased the acreage under forest from 3.4 million in 1947/8 to 6.41 million by 1971/2.[1] Additional large areas have been reserved for afforestation in Thal, Ghulam Mohammad Barrage, and Gudu Barrage, and this is likely to improve future acreage to some extent. Of the 6.41 million acres classified as forest in 1971/2, Sind had 1.22 million, Baluchistan, 2.65, the Punjab, 1.05 and N.W.F.P., 1.49. Much of the acreage in Sind and Baluchistan is not true forest and, indeed, two-thirds of the 'forested' area is scrub-land.

Slightly over two-thirds of the forest land is under public ownership, the remainder being privately owned. Forests are classified as 'Reserved', 'Protected', or 'Unclassified'. Reserved and Protected forests are publicly owned. Tree-felling in Reserved forests is done only under the strict supervision of the Forest Department. In Protected forests the local population has some traditionally acquired rights of use for example, grazing and collection of dried branches for firewood. This makes the scientific management of such forests difficult. Unclassified forests are under private or communal ownership, and depleted so badly that large areas of such so-called 'forests' are devoid of tree cover.

TYPES OF FOREST

Northern and North-Western Mountain Forests

These are mostly evergreen coniferous softwood forests, with some broadleaf species growing on the lower altitudes. The principal coniferous trees include fir, deodar, blue pine and spruce, and they grow generally at altitudes of 3,000–12,500 ft. Above the tree-line (12,500 ft.), there are stunted alpine forests. Below 3,000 ft. there are some pines but more broadleaf trees, such as oak, maple, birch, walnut, and chestnut.

Coniferous forests constitute the main source of commercial lumber, obtained by felling trees from the more accessible parts of the groves on the lower slopes of the hills. In the future, with the construction of access roads, their economic exploitation will improve. The deodar tree is particularly useful as a source of timber for houses and for railway sleepers. Broadleaf species, like oak, walnut and chestnut, are used in the manufacture of furniture.

Shrub Forests of the Foothills and Plains

Shrub forests are found over large areas in the northern and north-western foothills and plains. The principal species are acacia, wild olive, and mesquite. These are mostly found in the

1 Year Book of Agricultural Statistics, Government of Pakistan, Ministry of Food and Agriculture, January 1974, p. 2.

Districts of Peshawar, Mardan, Kohat, Campbellpur, Rawalpindi, Jhelum and Gujrat. Their yield in firewood is very small.

The Baluchistan Hill Forests

In the Quetta and Kalat divisions of Baluchistan there are some dry hill forests at altitudes between 3,000 and 10,000 ft. The trees include Chilghosa pines and pencil junipers. In 1972/3, a small beginning was made, at a cost of Rupees 4.6 million, to improve the forests of Baluchistan by stabilizing sand-dunes in Pasni and Gawader and planting trees along 150 miles of highway[1].

Riverine Bela Forests and Irrigated Plantations

These are high-yielding commercial units of hardwood species. They contain planted shisham, mulberry and acacia trees. Shisham is a high-quality cabinet wood extensively used for high-quality furniture. Changa Manga Forest near Lahore is the largest of the irrigated forest plantations. First established about 100 years ago, it now covers 12,500 acres and has an annual yield of 10 cubic feet of timber and 250 cubic feet of firewood per acre. This yield is some ten times that of natural forests in Pakistan. Other sizeable irrigated plantations are Wan Bachran in the Thal area, Chichawatni in Sahiwal District, and some parts of Ghulam Mohammad and Gudu Barrages. Linear plantations are found along river banks and irrigation canals, roads and railways.

The planted acreage is still relatively small. In Punjab Province, of a total forested area of 1.05 million acres in 1971/2, only 256,000 acres were in irrigated, and 30,000 in linear plantations.

The Rakhs

The Rakhs are dry scrub forests grown in small patches on the arid plain. They provide insignificantly small quantities of fuel wood. Species include farash, bakain, jand, and karil.

Tidal Forest

These occur in the coastal wastelands from Karachi to Kutch, covering an area of approximately 750,000 acres. These forests are of the mangrove type, with trees of stunted growth, and produce some fuel wood for use in Karachi.

The average annual demand for timber in Pakistan has been estimated at 6.5 million cubic feet.[2] The gap between supply and demand results in high prices for timber. Similarly, the estimated annual requirement for firewood is 450 million cubic feet, on the basis of a per capita need of about 10 cubic feet. Supply amounts only to about 17 million cubic feet. The deficiency is met by burning cowdung and anything else that grows above soil level. Such a practice is clearly harmful to the regeneration of trees and shrubs.

[1] *Annual Development Programme of Baluchistan*, 1972-3, Vol. V, p. 14.

[2] *An Appraisal of Resources and Potential Development*, a report prepared by Hazra Engineering Co. for WAPDA, 1963, p. 1-18.

Part II

Resource Pattern

7. MINERAL RESOURCES

The geological history and structure of Pakistan suggest the existence of significant mineral resources, especially oil and gas. At the time of Independence, little was known about the mineral wealth of the country. Explorations by the Geological Survey of Pakistan, foreign oil companies, and other agencies are continuing but as late as 1970/71 mineral production contributed less than 0.5 per cent of the G.N.P. The index of mineral production rose from 100 (1964/5) to 122 (1971/2), a slow rate of growth when compared with the industrial sector.

Five regions are comparatively rich in minerals (figs. 25 and 26). The Salt Range and Makarwal region (rock salt, gypsum, and coal) the Potwar Plateau (oil); north-east Baluchistan and adjacent parts of Waziristan (coal, chromite and marble); Lower Indus Plain (natural gas and coal); and Chitral (iron).

COAL

Coal is one of the principal minerals produced in Pakistan, but total reserves, estimated at 400 million tons, are not large by world standards. Sizeable deposits exist in Baluchistan, the Salt Range (Cis-Indus and Trans-Indus), and Sind, with Baluchistan the

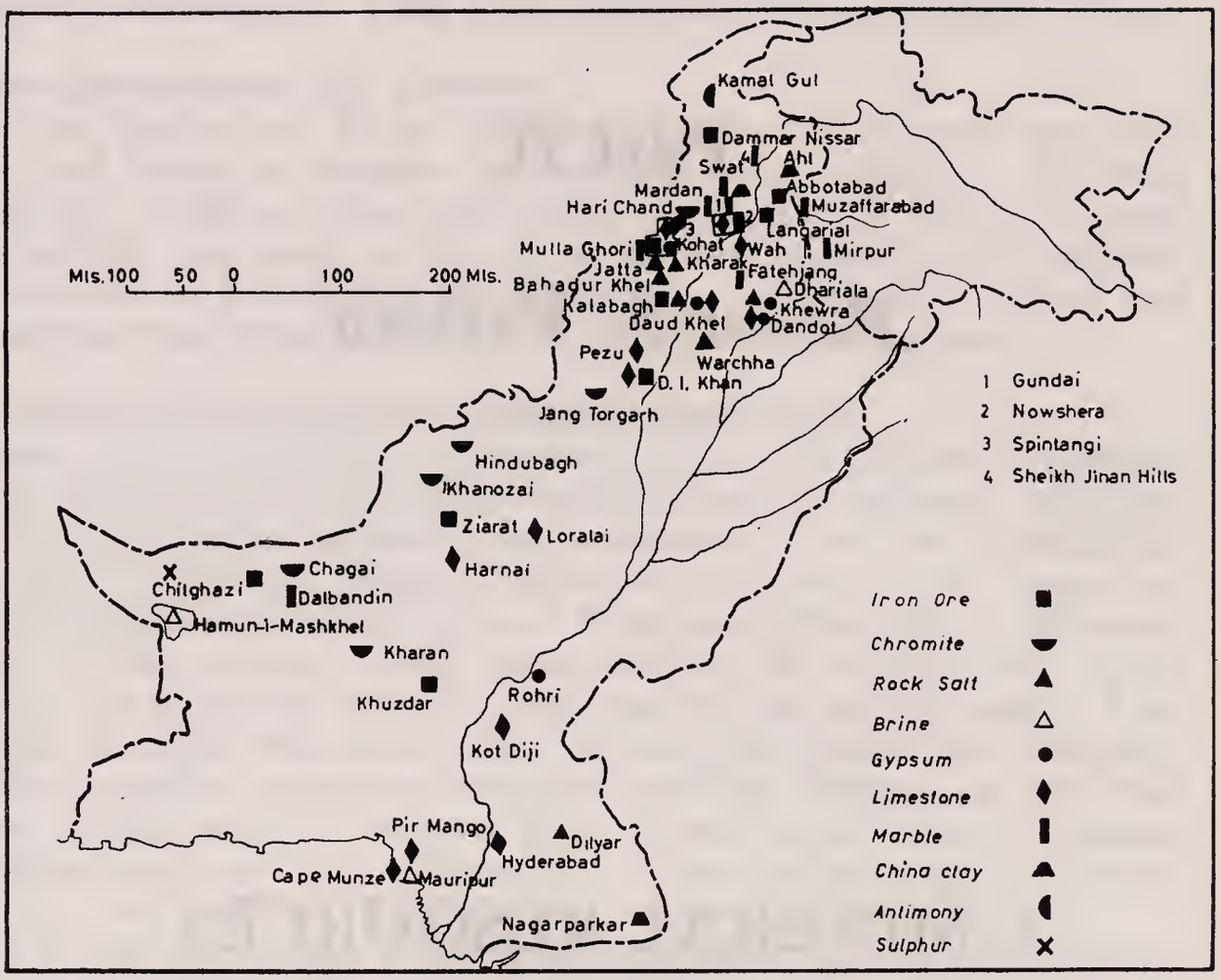


Fig. 25 Pakistan: Minerals

major producer (fig. 27). The Pakistan Industrial Development Corporation (P.I.D.C.) has assisted the development of mines in Baluchistan and elsewhere.

The coal is of low quality, lignite to sub-bituminous, and occurs in the Lower Tertiary sequence, ranging in age from 50 to 60 million years. The coal seams are generally lenticular, vary in thickness from a few inches to a few feet, have a high ash and sulphur content, and are of low heat value. Coal is used mainly in brick and lime burning, briquetting plants, the ceramics industry, ginning mills, and for firing the boilers of power stations and steam locomotives. There may be some future use in chemical industries. Production in 1970/71 was 12,87,000 tons.

Salt Range and Makarwal Coal Fields

The coal belt in the Salt Range extends from 20 miles north of Khushab to 15 miles north-east of Khewra, an area of about 100 sq. miles. There is only one workable seam and this has a maximum thickness of 5 ft. Outcrops occur along the upper slopes of the south-facing Salt Range scarp. The coal is high volatile bituminous with a high ash and sulphur content and deteriorates badly during storage. The main producing mines are at Dandot

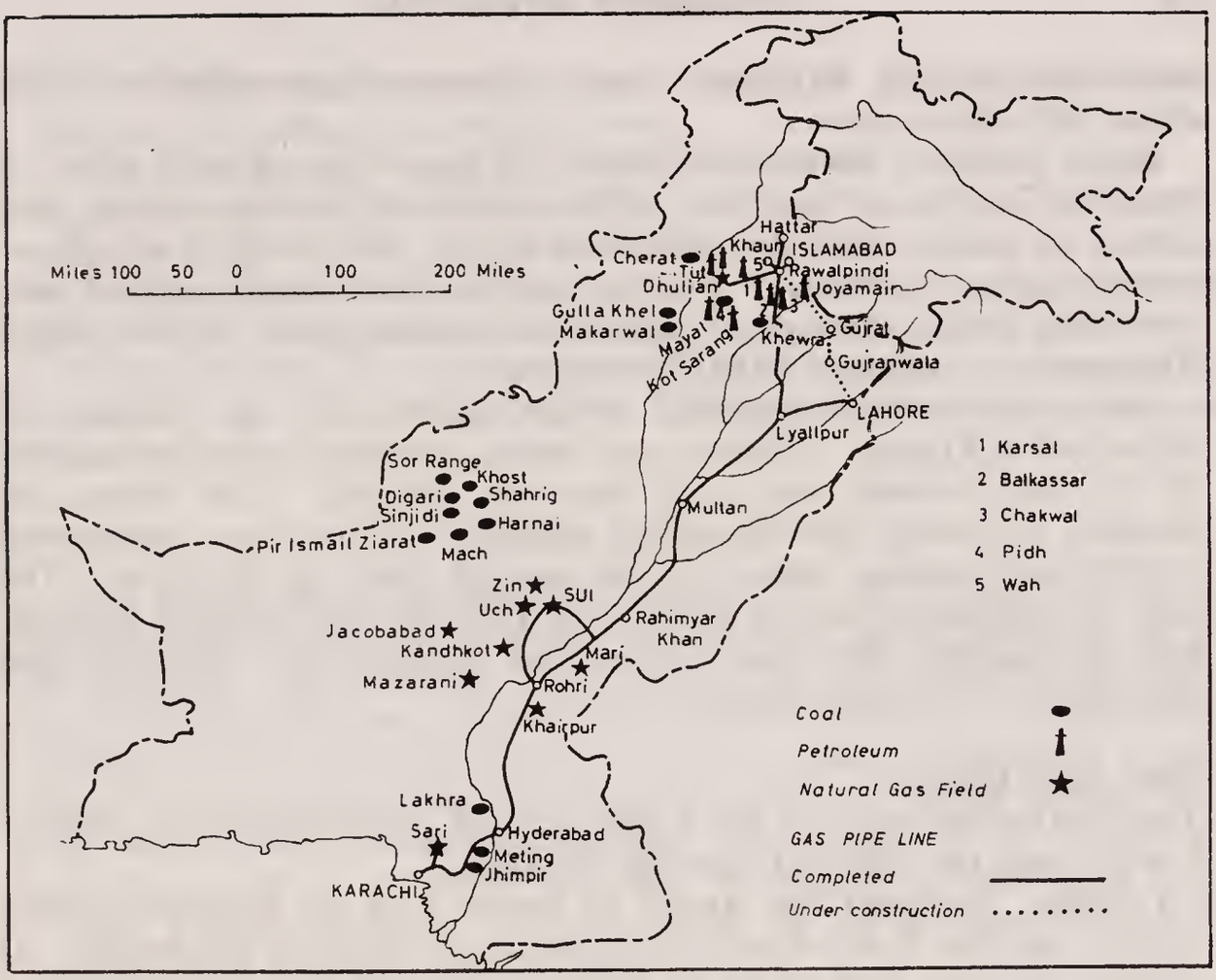


Fig. 26 Pakistan: Mineral fuels

and Pidh. Reserves are estimated at 75 million tons.

The Makarwal coal-mining area lies in the Trans-Indus Salt Range and extends from eight miles west of Kalabagh to west of Makarwal. The coalfield occurs in an anticline which has been subjected to tectonic disturbances in its eastern sector. Seams in the western sector are less disturbed and more regular and range in thickness from 2 to 10 ft. The coal is of slightly better quality than that of the Salt Range. Reserves to a depth of 200 feet are estimated at 21 million tons and, with the exhaustion of the surface outcrops, these deeper seams are being exploited.

Baluchistan Coal Fields

The coalfields of Baluchistan are mostly located in the north-eastern part of the province and can be considered in three groups: (1) Khost-Shahrig, Harnai; (2) Mach; and (3) Sor Range-Degari.

KHOST-SHAHRIG, HARNAI. This is the largest coal field in Baluchistan. It extends over an area of 80 sq. miles from Harnai to 20 miles east of Quetta. It is connected with the Sibi–Zardalu branch-line of Pakistan Railways. The coal-bearing strata extend in a northwest–southeast direction for a distance of about 35 miles. At present three seams up to 5 ft. thick, are being mined. The coal is high volatile . inous, an has the highest

heat value among Pakistani coals. Reserves are estimated to be about 40 million tons.

MACH coalfield covers an area of 16 sq. miles on both sides of the Sibi–Quetta railway line. The coal is of inferior quality and occurs in shallow and discontinuous seams, only four of which are economically workable. Further, since most seams extend into low-lying areas, there is a problem of excess water in the mines. Reserves to a depth of 1,000 ft. are small.

SOR RANGE–DEGARI coalfield covers about 18 sq. miles, 10 miles east of Quetta. Several coal seams, ranging in thickness up to 10 ft., are present but only two are worked. The mines are shallow, following the dip of the seams. P.I.D.C. has constructed a mile-long haulage tunnel in the central block of the field. The coal is sub-bituminous in quality, of low ash and sulphur content, and is suitable for brick kilns and briquetting. Reserves are estimated at 53 million tons.

Sind Coal Fields

Two coalfields occur in the lower part of the Indus Plain; one at Lakhra and the other at Meting–Jhimpir.

LAKHRA coalfield lies about 10 miles west of Khanot railway station, on the Kotri–Dadu branch-line of Pakistan Railways. It extends over an area of 80 sq. miles. The coal beds are associated with a gently folded anticline, have a thickness of 2–8 ft. and occur at depths of less than 150 ft. The coal is inferior quality lignite,

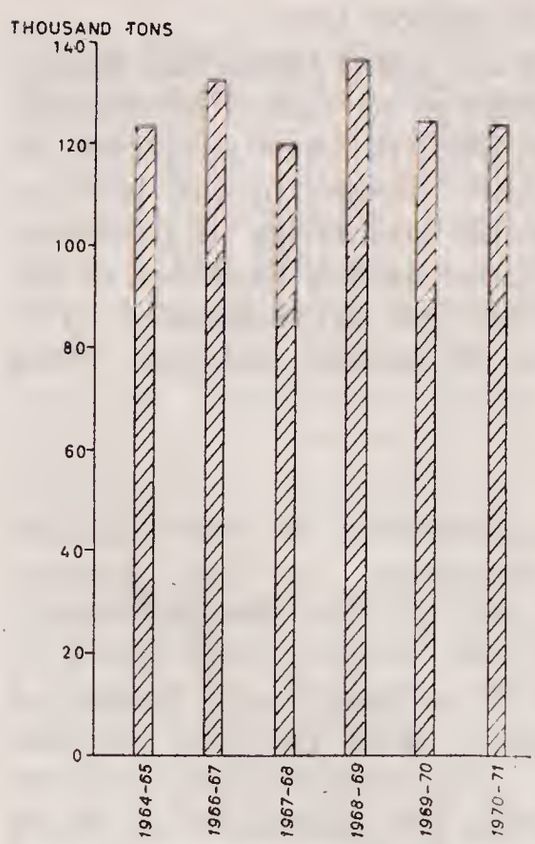


Fig. 27
Production of coal
(Pakistan)

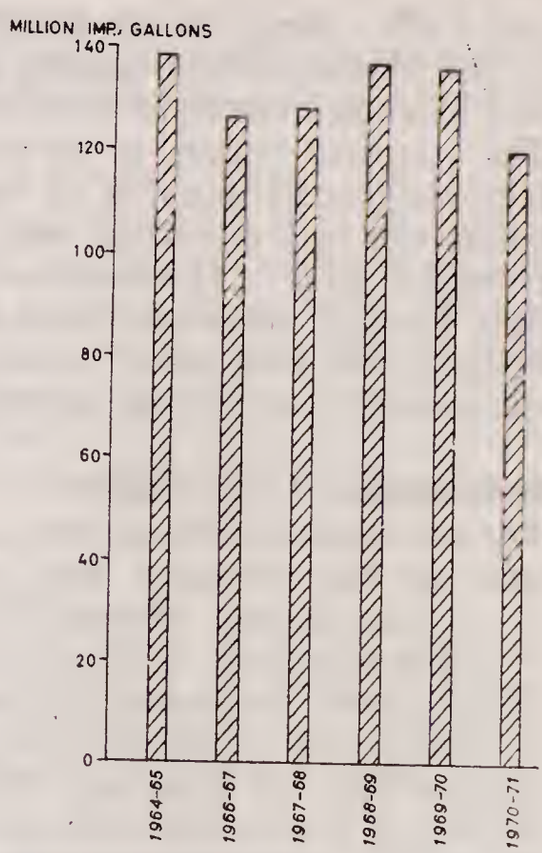


Fig. 28
Production of crude oil
(Pakistan)

has a high moisture content, and tends to crumble on drying. Reserves are about 22 million tons.

METING–JHIMPIR coalfield lies about 80 miles north of Karachi near Jhimpir and Meting railway stations. It extends over an area of 350 sq. miles. The coal beds occur at the base of low limestone hills, but there is only one workable seam and this is thin and lenticular. Reserves are about 28 million tons.

Coal is found in other localities in Pakistan but, because of the smallness and inferior quality of the deposits, mining is uneconomical.[1]

NATURAL GAS AND OIL

The search for oil in Pakistan started in 1868 when the first test hole was drilled at Kundal near Mianwali, and continues to the present day. In Pakistan, large areas are covered by sedimentary rocks which have petroliferous members. The search is for stratigraphic and structural traps where oil could accumulate. Such favourable structures are usually not found in areas of intense folding, such as the northern mountains. The possibility of major discoveries, either in on-shore or off-shore areas, is considered quite bright. Parts of Pakistan adjacent to the oil and gas producing fields of Iran have a similar geologic history.

At the time of independence, Pakistan inherited four producing fields, Khaur, Dhullian, Joya Mair, and Balkassar. Since that time four more fields have been discovered: Karsal, Tut, Sarang and Mayal. All of these lie in the Potwar Plateau (fig. 28). Traces of oil occur at several other localities, and exploration continues in Punjab, Sind, and Baluchistan by arrangement between various foreign companies and the Oil and Gas Development Corporation.

KHAUR oil-field lies 54 miles south-west of Rawalpindi in Campbellpur District. This is the oldest field in Pakistan, discovered by the Attock Oil Company in 1915. Production commenced in 1922. Khaur dome is formed of upper Murree beds of grey sandstone and red shales. This field is now almost exhausted.

DHULLIAN oil-field is located about 10 miles north-west of Khaur. Discovered in 1937, this is the biggest field in the country, and also produces substantial quantities of gas. The structure is a gentle dome, about 36 sq. miles in area, and the oil is obtained from the Lani and Ranikot horizons of the basal Murree beds.

JOYA MAIR oil-field was discovered in 1944 by the Attock Oil Company. The structure is a narrow anticline, and the oil-producing horizon, Sakesar limestone. The oil is heavy asphaltic oil, and is transported to the Morgah refinery by railway.

BALKASSAR oil-field is located west of Joya Mair in Jhelum District. The first well was drilled by Attock Oil Company in 1945/6.

[1] In Baluchistan: Pir Ismail Ziarat, Sinjidi, and Kach; in N.W.F.P.: Cherat Hills, Nowshera, and Surgarh Range; in Azad-Kashmir: Kotli, Kuiratta, Dandili, and Khilla-Muzaffarabad.

The structure of the field is a gentle anticline, with two producing horizons, both of Eocene limestone. The oil is asphaltic, suitable for furnace fuel.

KARSAL oil-field was the first field discovered after independence. It lies a few miles north-west of Balkassar, to which it is joined by a pipeline. The Karsal anticline is exposed on the surface and the oil occurs in limestone. Quality is similar to that of Balkassar oil.

TUT oil-field was discovered in 1968, and the *Kot Sarang* and *Mayal* fields even more recently. All are located in Campbellpur District and have recently begun commercial production.

Production of crude oil in 1971/2 stood at 2.9 million barrels, but this was only 20 per cent of the country's requirements. Large quantities of crude oil are imported each year, principally for transport, and are a heavy drain on the country's foreign exchange. Imported crude oil is refined at Korangi, near Karachi, and local crude oil at the Morgah refinery, Rawalpindi. Korangi also produces a range of pertro-chemical products and the two refineries fulfil more than two-thirds of the requirements for oil products.

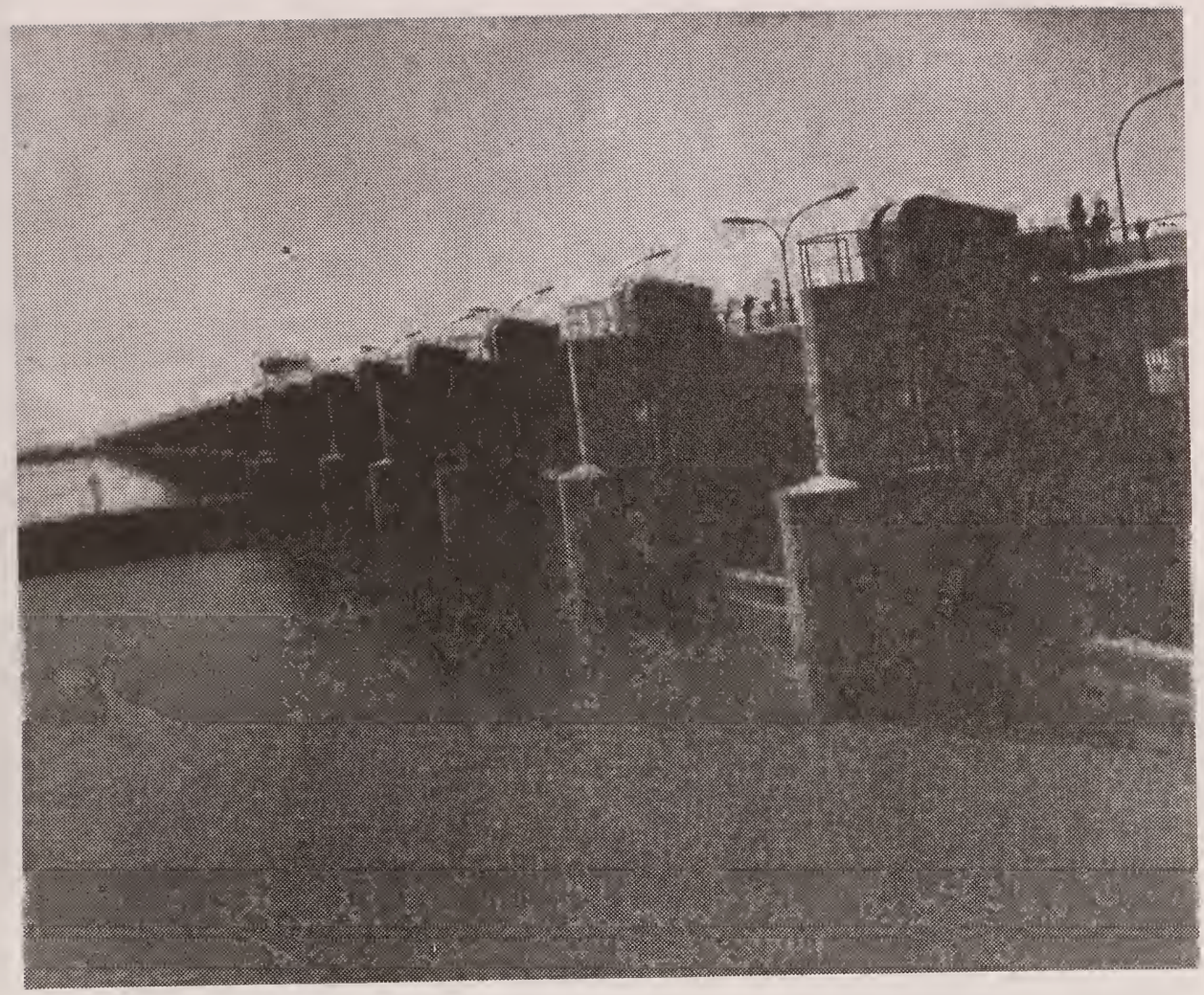
NATURAL GAS

Natural gas is the cheapest and most efficient source of energy in Pakistan. The country is well endowed with natural gas, total estimated reserves being 15.85 million cubic feet. Ten gas fields, of which only four are in production, have been discovered to date (fig. 29). The first field was discovered at Sui in 1952, while drilling for oil. As a result of an extensive programme of test drilling, additional fields were found at Zin, Uch, Khairpur, Kandkot, Mari, Mazarani, Sari, Jacobabad and Dhullian. The natural gas of Pakistan has a high methane content, usually 70–90 per cent. Production has increased rapidly, from 25,750 million cubic ft. in 1959/60 to 127,075 million cubic ft. in 1971/2.

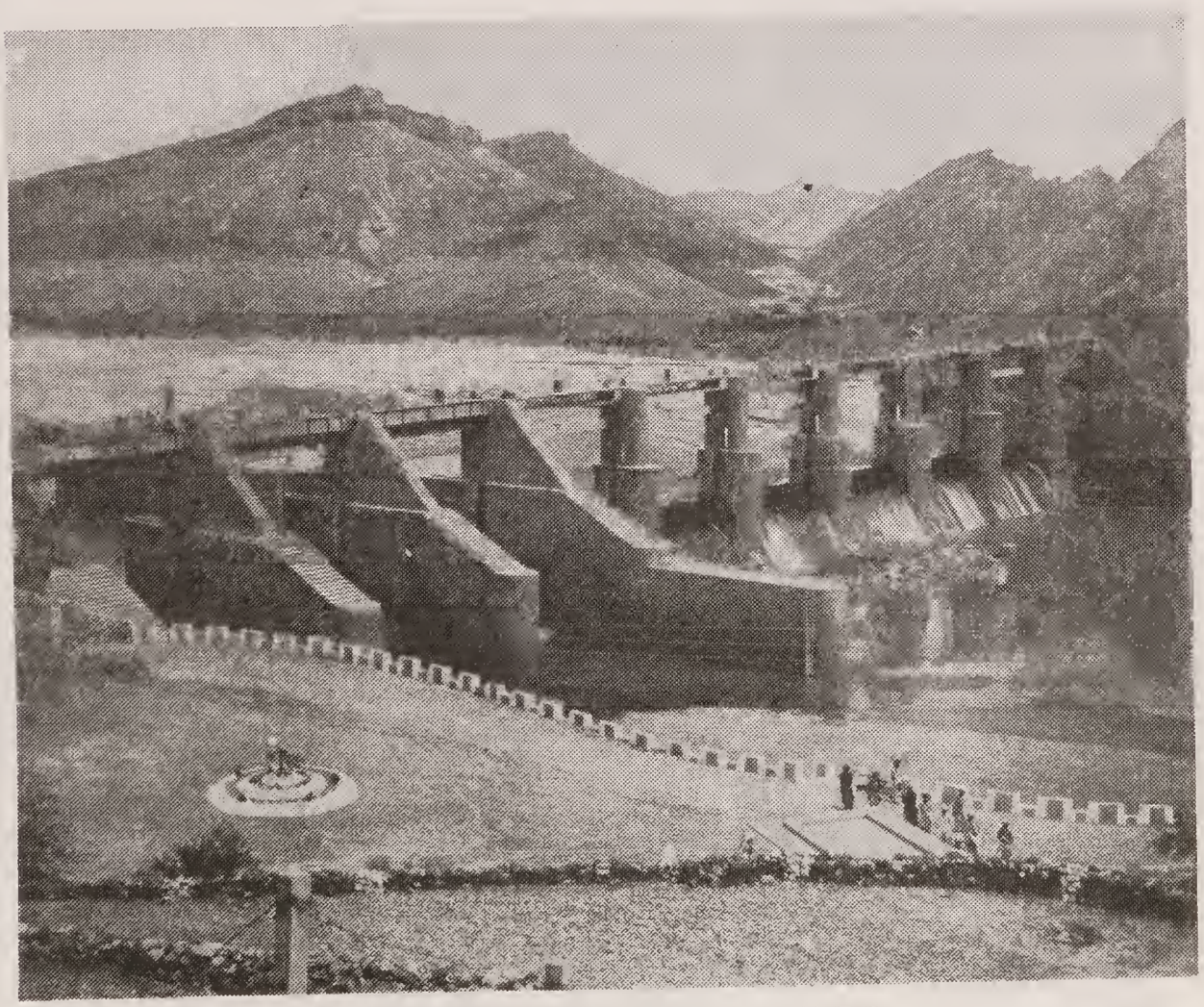
SUI is the major producing field. It lies in the Sibi District of Baluchistan, at the foothills of the Marri-Bugti range, and is one of the biggest fields in the world. The reservoir rock is known as Sui Main limestone. One reservoir covers an area of 75 sq. miles.

Production from DHULLIAN is associated with the oil-field and is conveyed to Rawalpindi by a 65-mile pipeline for power generation and domestic and industrial use. This gas also reaches Wah, where it is used in the cement and ordnance factories.

Natural gas is used for power generation and by industry. Power stations using natural gas have been built at Karachi, Hyderabad, Jamshoro, Multan and Lyallpur, and 37.5 per cent of total production is consumed in power generation. Fertilizer factories use 19.3 per cent; cement factories, 14.1 per cent; and other industries, including textiles, 26.0 per cent. Natural gas is playing a vital role in the economic development of Pakistan by providing a cheap



Gudu Barrage



Kurram Garhi Small Dam, N.W.F.P.

Tarbella Dam

Tarbella Dam (detail)

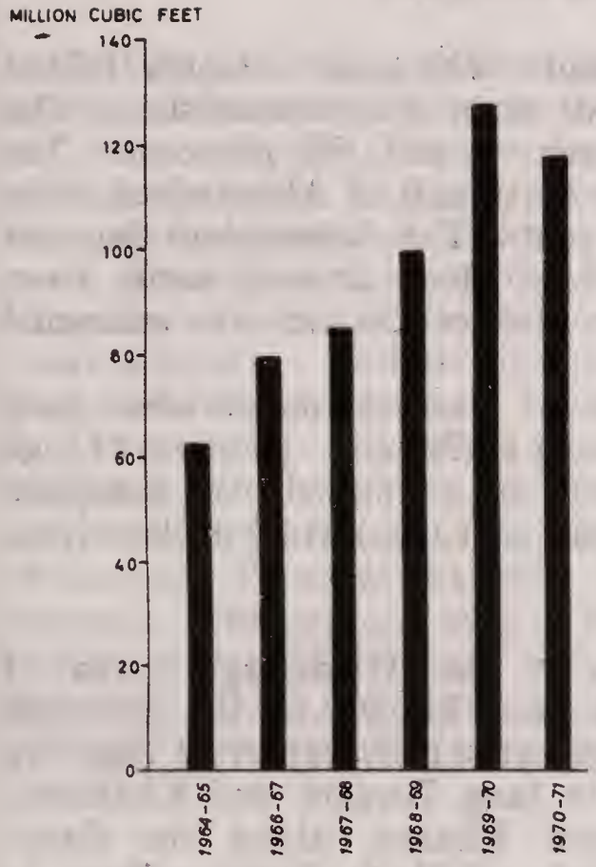


Fig. 29
Production of natural gas
(Pakistan)

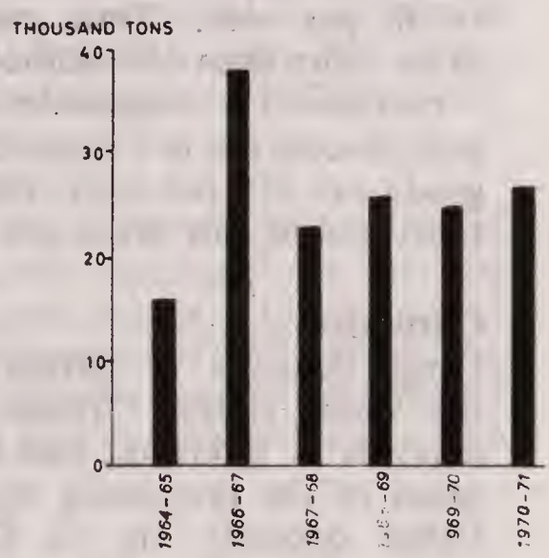


Fig. 30
Production of chromite
(Pakistan)

fuel for industry. Commercial and domestic consumption (3 per cent) is still very limited.

OTHER MINERALS

Pakistan has considerable deposits of non-metallic minerals, including rock salt, gypsum, china clay, limestone and marble. Metallic minerals found in some quantity are chromite, antimony, and iron ore.

Iron Ore

Iron ore deposits occur at many localities. The more important are discussed below.

KALABAGH: iron ore occurs near Kalabagh in the Surghar Range and near Sakesar in the Salt Range. They are the largest deposits in Pakistan, but the ore is of low grade (30–35 per cent iron) and of irregular composition, broadly classified into two main types, Chichali and Kutch. Reserves are estimated about 300 million tons.

DOMMEL NISAR: magnetite deposits in southern Chitral, about 20 miles south of Drosh, have an iron content of 55–65 per cent. The ore occurs in lenticular bodies and reserves are estimated at 3 million tons.

LANGRIAL, GALDANIAN AND ABBOTTABAD ore. Langrial iron deposits are in the vicinity of Langrial village in Haripur *tehsil,*

about 20 miles south of Abbottabad. The area is highly folded and faulted, and the ferruginous beds occur discontinuously. The iron content varies widely between 9 and 50 per cent. The Galdanian deposits, about 10 miles north-east of Abbottabad, have an average iron content of 20 per cent. The Abbottabad deposits occur on the eastern side of the city. Iron content varies from 14–46 per cent. Total reserves in Hazara District are estimated to be more than 100 million tons.

CHILGHAZI: magnetite deposits of various magnitudes have been discovered in Chagai District, near Dalbandin. Reserves of high grade ore (55 per cent iron or more) are estimated over 3 million tons, and of low grade ore (25–30 per cent iron) at 20 million tons.

Chromite

Large deposits of chromite occur in the Hindubagh area of the Zhob valley. These are the best known of the chromite deposits in Pakistan, and have been extensively exploited (fig. 30). Most of the producing mines are in Jang Torgarh and Khanozai. Other deposits are in Chagai and Kharan, along the flanks of the Ras Koh Range, and north of Hari Chand village in Charsadda District.

Chromium is used in making stainless steel, high speed tools and precision instruments, dyes, and in photography. Total production, almost all of which is exported, amounted to 27,300 tons in 1970/71.

Rock Salt and Brine

All the rock salt deposits in Pakistan occur in the Salt Range, and particularly at the base of the Salt Range escarpment, from Junate to Mari Indus. The most important mines are in Khewra, Warcha, Kalabagh and Jatta.

KHEWRA is the most extensively worked area with seams attaining a thickness of as much as 60 ft. Khewra is the terminus of the Makarwal branch of the Pakistan Railway. The deposits have been worked since 1872. Present production is 220,000 tons a year.

WARCHA is 10 miles north-west of Gunjital railway station. The mine has five seams, with a maximum thickness of 50 ft., and produces 40,000–45,000 tons a year.

KALABAGH salt deposits are located on the right bank of Luni Wahan *nullah*. The seams are irregular and contorted and production is small.

JATTA, BAHADURKHEL and KARAK salt deposits are located in the trans-Indus extension of the Salt Range. The thickness of the rock salt in the Bahadurkhel area is 350 ft., while in Jatta and Karak, it is over 100 ft. Production from this area almost equals that of the Warcha mines. The reserves, however, are thought to be very large.

Salt is also obtained from brine and salt lakes, but the amount obtained from these sources is relatively small compared with that of rock salt (344,000 tons in 1970/7). Salt is harvested in the Tharparkar area of Sind, where a 6-foot layer of salt covers an extensive area, and obtained by evaporating sea-water at Mauripur, near Karachi, and along the Makran and Lasbela coasts. Large deposits of concentrated brine have been discovered at Dharyala near Khewra. Various chemicals and fertilizers may be manufactured from this brine at a potash factory proposed for Dharyala.

Gypsum

Gypsum deposits occur frequently in the western mountains of Pakistan. Those at Khewra, Dandot and Daudkhel are the best known. The deposits vary in thickness and colour. Light grey to white and reddish pink are most common. Total production amounts to 164,000 tons. Gypsum is used in the manufacture of cement, plaster of Paris, fertilizers, and prefabricated construction board.

Limestone

Limestone deposits constitute a large part of the sedimentary rocks of Pakistan. Although limestone is widespread, some areas have more concentrated deposits. These include Pezu, Moghalkot, Kohat, and Nowshera in N.W.F.P.; Loralai and Harnai in Baluchistan; the Salt Range, Potwar Plateau, Margalla Hills, and Zinda Pir (D. I. Khan) in the Punjab; Ganjo Takkar, Murli Hills, Mango Pir, Cape Monze, Kot Diji and Ranipir in Sind. Big quarries are located in the trans-Indus Salt Range at Daudkhel and in the lower Indus Plain near Hyderabad. Total annual production is about 3 million tons. Lime is the main ingredient of cement and is also used by glass factories and chemical industries.

Marble

Good quality marble in a wide range of colours is found in many parts of Pakistan. The best known deposits are in the Mullagori area of Khyber Agency, at Ghundari and Maneri in Mardan District, at Nowshera, in Swat, and in the Dalbandin area of Chagai District. Valuable deposits also exist in Campbellpur District in the Kala-Chitta range and in Sheikh Jenan Hill, and in Muzaffarabad and Mirpur, Azad Kashmir.

The Khyber Agency deposits occur at two places on the Peshawar–Mullagori road. The workable marble is in the lower section of the quarry and is over 100 ft. thick. There are bands of white, grey, yellow, and brown marble. The white marble compares well with the world-famous marbles of Carrara, Italy. The Ghundai Tarko marble deposits occur at the boundary of Swabi, Mardan District and Swat. The marble is white, crystalline, and of uniform texture. The Maneri Hills of Swabi *tehsil* contain white marble with

grey patches. Numerous joints and fractures make it difficult to obtain blocks larger than one cubic ft., and this marble is used for chips. In central and western Chagai District, there are vast flat terraces of marble. The marble is known localy as malmal, but its correct name is aragonite. Production is handicapped by acute problems of transportation and water shortage.

Marble is one of the principal foreign-exchange earning minerals. Production was 26,000 tons in 1970/71.

China Clay (Kaolin), Antimony and Lesser Minerals

Kaolin Deposits occur in Nagar Parkar, in Tharparkar District, Ahl in Hazara District and Shah Deri near Mingora in Swat. Antimony is mined in small quantities (33 tons a year) at the Kamalgol mines in Chitral. Traces of radio-active minerals have been found in N.W.F.P., and D. G. Khan District. Asbestos is found north of Hindubagh, sulphur in Kohi Sultan, Chagai District, bauxite in Hazara, and manganese in Lasbela and Kohat.

8. IRRIGATION

Rainfall in Pakistan is deficient because the country lies on the arid margin of the sub-continent's monsoon regime. However, the Indus River together with its tributaries, the Kabul, Jhelum, Chenab, Ravi, and Beas-Sutlej, provides excellent opportunities for irrigation (fig. 31). Irrigation is an ancient practice, dating back 3,000 years but the modern system of large perennial canals started

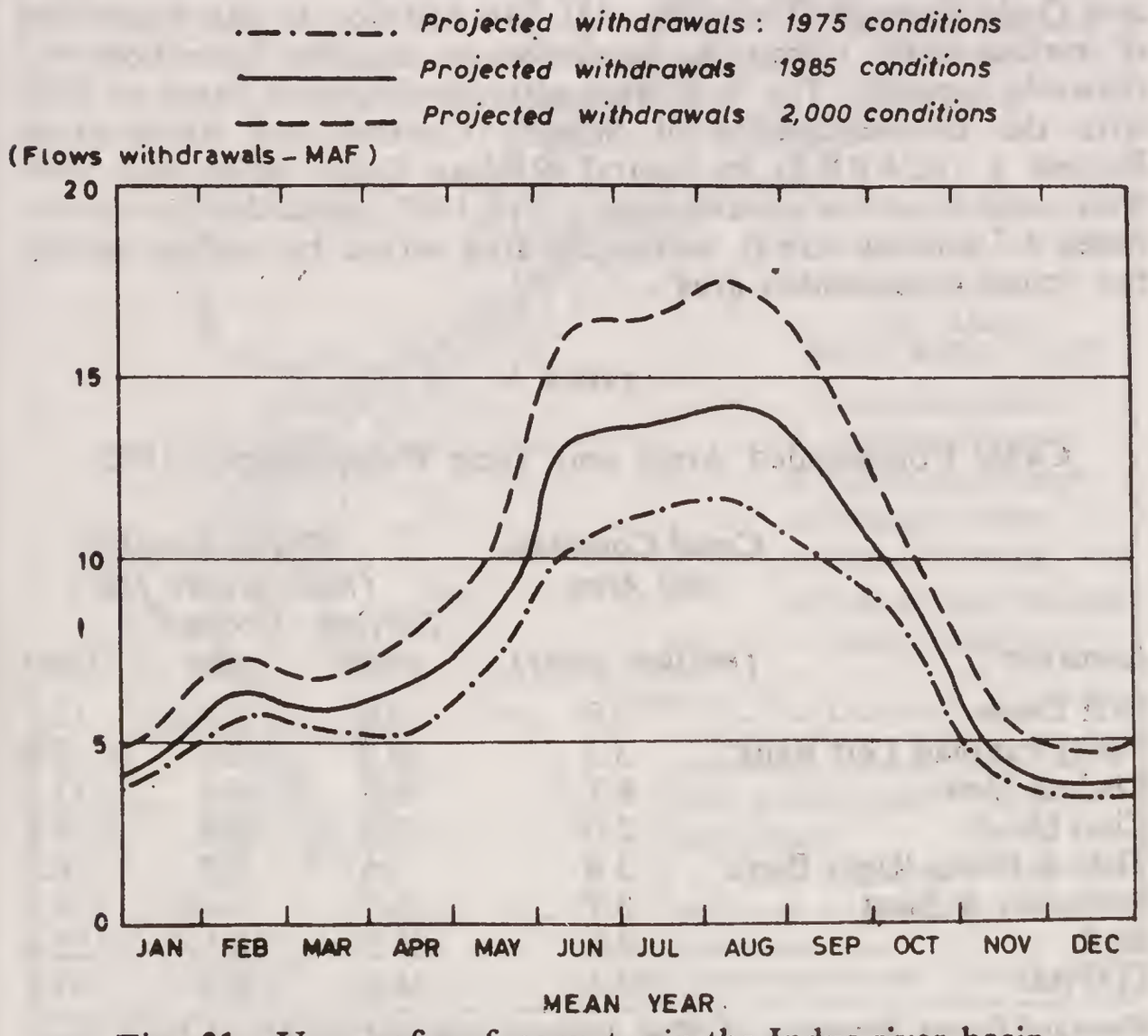


Fig. 31 Usage of surface water in the Indus river basin

to develop about the beginning of the present century. Today, Pakistan has a splendid system of surface and sub-surface irrigation facilities in the form of barrages, weirs, dams, canals, wells and tube-wells, serving a vast area.

The upper Bari Doab canal, the first modern canal, was opened in 1859 and considerably improved by 1900. The Triple Canal Project was approved by the government in 1905. On the main river, the Indus itself, the first major development occurred in the early 1930s in the form of the Sukkur Barrage Project. Almost simultaneously, work was begun on the Sutlej Valley Project. In the Vale of Peshawar, canal development, primarily from the Swat River, a tributary of the Kabul, dates from the 1890s.

The irrigation system of Pakistan has been greatly expanded since Independence. Average annual irrigation withdrawals at canal heads increased from 65 million acre ft. between 1947/8 and 1950/1, to 85 million acre ft. between 1961/2 and 1965/6. Apart from the irrigation works necessitated by the Indus Waters Treaty of 1960 between Pakistan and India, the principal works constructed during this period were Jinnah Barrage (1947), Warsak Dam (1960), Ghulam Mohammad Barrage (1955), Taunsa Barrage (1958), and Gudu Barrage (1962) (fig. 32). In addition to this expansion of surface-water irrigation, ground-water aquifers have been extensively tapped. The first large-scale development came in 1959 with the commencement of Salinity Control and Reclamation Project I (SCARP I) in central Rechna Doab, when tube-wells were sunk to utilise ground-water. In 1965, ground-water contributed 9.7 million acre ft. within the area served by surface canals, the 'canal commanded area'.

TABLE 5

Canal Commanded Areas and Their Water Supply, 1965

Location	*Canal Commanded Area (million acres)*	*Water Supply (million acre feet)*		
		Surface water	*Ground water*	*Total*
Bari Doab	5.9	9.0	3.1	12.1
Sutlej/Panjnad Left Bank	3.5	6.4	0.6	7.0
Rechna Doab	4.7	6.6	4.6	11.2
Chaj Doab	2.0	3.2	0.6	3.8
Thal & Indus Right Bank	3.6	5.6	0.7	6.3
Peshawar & Swat	0.7	1.7	—	1.7
Sind	9.0	25.5	0.1	25.6
TOTAL	29.4	58.0	9.7	67.7

Water and Power Resources of West Pakistan, prepared by World Bank Study Group, headed by Pieter Lieftinck, Vol. 1, p. 16.

Fig. 32 Pakistan: Irrigation

The canal commanded areas together account for 80 per cent of the food crops and virtually all the cash crops grown in Pakistan. The irrigated area constitutes more than three-quarters of the area sown. Of this, a mere 100,000 acres uses the old inundation irrigation system and are outside the canal commanded areas of perennial irrigation.

NEED FOR ADDITIONAL IRRIGATION WATER

The existing system of irrigation, although very impressive, is still inadequate for present and future needs. The canal systems were generally designed to maximize the canal commanded area. As a result, the land is only able to support crops at about half the density that would be possible with large water supplies. Between 1950 and 1965 agricultural output grew at an average rate of 2.3 per cent a year, slightly less than the growth rate of population. Agricultural output can be increased by greater use of fertilizers, increase of surface irrigation supplies where warranted, extension of the canal commanded area, and use of ground-water.

Water supplies can be rapidly increased by the use of ground-water, because this does not require major construction projects. Drilling of tube-wells can also assist the control of drainage and salinity. Suitable aquifers are believed to extend to a depth of 1,000 ft. or more beneath the Indus Plain. Within the canal-irrigated area, the uppermost 100 ft. of the sub-surface aquifers is estimated to be capable of yielding 300 million acre ft. per annum. A programme for ground-water development put forward by the Irrigation and Agriculture Consultants Association (IACA) envisages use of 45 million acre ft. by 1985.[1]

CANAL SYSTEMS

The irrigated area is served by more than 40 major canal commands. Main canals start from a barrage or dam or weir on a river. A barrage feeds one or more main or link canals. A number of minor distributaries feed out of the main canal and these, in turn, serve a number of outlets to the farmers' water-courses, each of which irrigates between 150 and 600 acres.

There are three major groups of canal systems: (1) Canals on Upper-Indus Tributaries, (2) Systems on the Indus, and (3) Systems west of the Indus.

Systems on Upper-Indus Tributaries

The principal canals systems are: from the *Jhelum,* (a) Upper Jhelum Canal, which starts from Mangla, joins the Chenab at Khanki, to give its surplus water to the Lower Chenab Canal, and (b) the Lower Jhelum Canal, which starts from Rasul; from the *Chenab,* (a) the Upper Chenab Canal, starting from Marala and joining the Ravi

[1] Pieter Lieftinck, *Water and Power Resources of West Pakistan,* Vol. II, Baltimore, 1969 p. 75.

near Balloki to supplement the water supply of the Lower Bari Doab Canal, (b) the Lower Chenab Canal from Khanki, and (c) the Haveli System of Canals from the Trimmu Weir, below the junction of the Chenab and the Jhelum; from the *Ravi,* (a) the Upper Bari Doab Canal, which begins at Madhopur (India), irrigating mainly the Indian Punjab, with only its Lahore branch reaching Pakistan, (b) the Lower Bari Doab Canal from Balloki, and (c) the Sidhnai Canals from the left bank of the Ravi at Sidhnai; from the *Sutlej,* the Sutlej Valley Project, in which canals depart from the river at Gandasinghwala, Sulaimanke, Islam, and below the junction of the Sutlej with the Chenab at Panjnad.

The upper Jhelum, the Upper Chenab, and the Lower Bari Doab canals together form the *Triple Project*, which was designed to carry surplus water from the Jhelum to the Chenab, and from the Chenab to the Ravi.

Systems on the Indus

The largest dam on the Indus is now being built at Tarbela. Other barrages, in descending order along the river, are *Jinnah Barrage* near Kalabagh, part of the Thal Project; *Taunsa Barrage* 180 miles further downstream, which has a 100,000 kW power station in addition to diversion works; *Gudu Barrage,* 90 miles upstream from Sukkur; *Sukkur* or *Lloyd* Barrage, the oldest barrage on the river; and *Ghulam Mohammed Barrage,* near Kotri.

Systems west of the Indus

These include (a) the *Swat Canals* departing from the river at Malakand (Upper Swat Canal) and Abazai (Lower Swat Canal); (b) the *Warsak Multi-Purpose Project* on the Kabul River 20 miles northwest of Peshawar, which includes a 160,000 kW power plant; and (c) the *Kurram Garhi Project* on the Kurram and Baran Rivers in Bannu *tehsil.*

In addition to these major projects, some smaller dams have also been built by the Water and Power Development Authority (WAPDA). These include Rawal Dam, Gomal Dam Multi-purpose Project, Khanpur Dam, and Hab Dam. The Agricultural Development Corporation has set up the Small Dam Organization to construct dams of localised utility, storing the flood water of hill streams. A number of such dams have been constructed in the dry submontane areas of the north-west.

THE INDUS WATERS TREATY

The sources and upper reaches of all the principal left bank tributaries of the Indus lie in India. After Partition, there was the threat that India would divert these waters to its own use. In any case, the existing irrigation in the Punjab was disrupted by the division of the Punjab between India and Pakistan. The Bari Doab

system and the Sutlej Valley Project were dislocated, giving rise to the canal-water dispute between the two countries. Even before the Indus Waters Treaty of 1960, Pakistan had undertaken the construction of link canals to divert water from the western rivers to the eastern. These link canals are: (a) the *Bambanwali–Ravi–Bedian link*, an 87-mile canal from Bambanwali to Bedian on the Ravi, to feed the branches of the Upper Bari Doab Canal entering Pakistan from India; (b) the *Balloki–Sulaimanke link,* a 54-mile canal connecting the Ravi with the Sutlej, and supplying the Sutlej Valley Project, and (c) the *Marala–Ravi link*, 60 miles long, connecting the Chenab with the Ravi, and supplying additional water to the Balloki–Sulaimanke Link.

The dispute between India and Pakistan over the waters of the eastern rivers was eventually resolved through the mediation of the World Bank, and the Indus Waters Treaty between India and Pakistan was signed on 19 September 1960. The treaty recognises a division of the rivers of the Indus system between the two countries, the three eastern rivers (Ravi, Beas and Sutlej) being awarded to India, and the three western rivers (Indus, Jhelum, and Chenab) being awarded to Pakistan. The area of Pakistan dependent on the irrigation water of the three eastern rivers ceded to India is about 8 million acres. By the terms of the Treaty, India must limit its withdrawals from these rivers according to an agreed schedule, extending under certain conditions to March 1973. Pakistan, by way of compensation, was to receive financial assistance in the construction of new sources of supply. The Indus Basin Plan envisaged by the Treaty included 2 storage dams, 5 barrages and 1 gated syphon, 8 link canals, remodelling of 3 existing link canals, and some other irrigation works. The Project was scheduled to be completed in three phases. The first phase comprised the construction of Mangla Dam, the Trimmu–Sidhnai–Mailsi–Bahawal Link Canal System, the Sidhnai Barrage, and the Mailsi Syphon. The second phase included Tarbela Dam, the Rasul–Qadirabad–Balloki–Sulaimanke Link Canal, and three barrages at Rasul, Qadirabad, and Marala. Works of the third phase include the Taunsa–Panjnad Link, the Chashma–Jhelum Link, and the Chashma Barrage. Most of these works are now complete, if not fully operational.

MANGLA AND TARBELA STORAGE DAMS

Mangla Dam on the Jhelum, is one of the longest earth-filled dams in the world, 11,000 ft. at the crest, with a gross storage capacity at its present height of 5.55 million acre ft. Because the Jhelum carries a huge load of silt (61,000 acre ft. per annum) strenuous efforts are being made to increase the life of the dam. Remedial measures include silt trap storages, treatment of landslips by engineering methods, and river bank re-inforcement, but in the long run, the life of the dam will depend on improved management of land in the catchment area. Half of the catchment area is range land, now heavily

over-grazed. The design of the dam provides for a future increase of 49 ft. in height, raising the storage capacity to a possible 9.6 million acre ft. and the kilowattage from the present 400,000 to 1 million kW.

Tarbela Dam, is designed to store the waters of the Indus at a point where the river debouches from the Himalayan foothills onto the Potwar Plateau. The dam has a gross storage capacity of 11.1 million acre ft., with 9.3 million acre ft. of live storage for flood control and irrigation, and the generation of 2.1 million kW. of electricity. An unusual feature proposed for the Tarbela Project is construction of two large off-channel reservoirs to increase storage and lengthen the life of the generating facilities, since silting is expected to reduce the life of the main dam (fig. 33). Water from Tarbela will be used in the Haro and Soan Basins and, for replacement supplies, will be diverted to the Chashma–Jhelum Link Canal and thence to the Triummu–Sidhnai–Mailsi–Bahawal Link Systems. It will also feed the Taunsa–Panjnad Link Canal. By augmenting the flow of the Indus itself at periods of lower water, Tarbela will increase the usefulness of all the barrages further downstream.

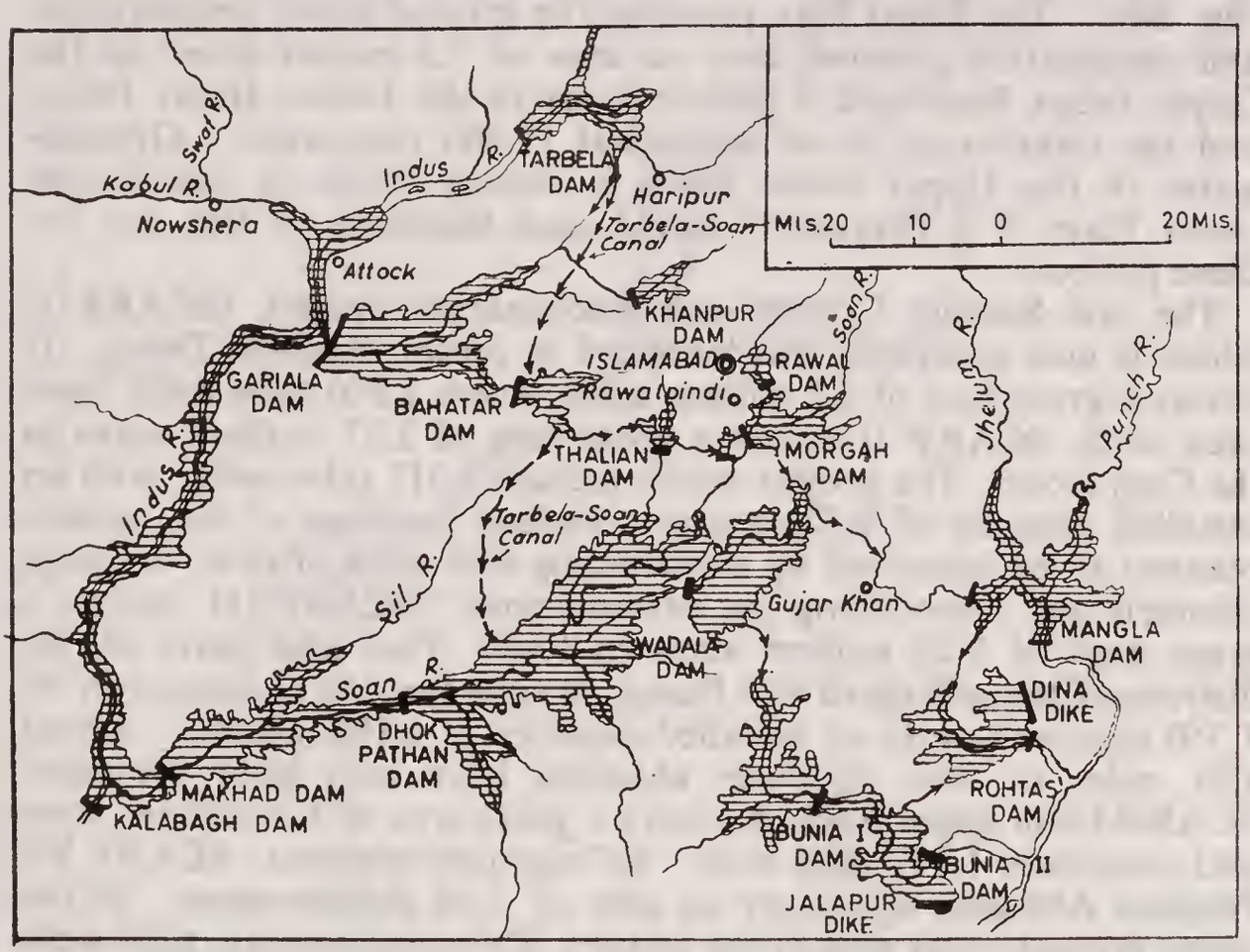


Fig. 33 Tarbela and potential side valley storages

BARRAGES OF THE INDUS BASIN PROJECT

All five of the barrages called for by the Indus Waters Treaty have now been built. Their combined length is 3.5 miles, and together they provide a diversion of 100,000 cusecs into the Link Canals.

WATERLOGGING AND SALINITY

The extensive system of canal irrigation in the Indus Basin using unlined canals has raised the water-table, rendering the worst affected areas waterlogged. When the water-table is 5 ft. or less below the surface of the ground, stagnant water in the root zone may adversely affect the growth of plants. In some areas of high water-table, soil water evaporates in the hot sun, leaving a deposit of salts on the ground. The lands thus salinized are rendered unproductive.

The incidence of waterlogging and salinity in the canal-irrigated lands of Pakistan is very high. A Colombo Plan Survey estimated poorly drained or waterlogged land in the Indus Plain at 23 per cent of the total area. Before remedial measures were undertaken, about 100,000 additional acres were becoming unproductive every year. Remedial measures include improved drainage facilities and pumping of ground-water. Pumping of water by tube wells not only lowers the water-table, but provides water for irrigation and for flushing out salts from saline soils.

Various Salinity Control and Reclamation Projects (SCARPs) have been launched and are in various stages of implementation (fig. 34). The Third Plan provides for ground-water development and reclamation schemes over an area of 7.3 millon acres in the Upper Indus Plain and 4 million acres in the Lower Indus Plain, and the installation of an additional 12,000 tube-wells. Ground-water in the Upper Indus Plain is usually fresh; in the Lower Indus Plain it is commonly saline, and therefore of less use for these projects.

The first Salinity Control and Reclamation Project (SCARP I) which is now complete, was launched in central Rechna Doab. It covers a gross area of 1.2 million acres, where 1,800 tube-wells have been sunk. SCARP II covers a gross area of 2.27 million acres in the Chaj Doab. The project works include 3,311 tube-wells, with an installed capacity of 9,220 cusecs. Surface drainage of the area is planned to be improved by constructing 450 miles of new drainage channels and remodelling the existing ones. SCARP III covers a gross area of 1.28 million acres in lower Thal and parts of the districts of Muzaffargarh and Jhang. It envisages the construction of 1,550 tube-wells with an installed capacity of 6,100 cusecs. About 150 miles of new drainage channels have also been provided. SCARP IV in upper Rechna covers a gross area of 1.3 million acres and comprises 1,942 tube-wells. As originally planned, SCARP VI, Panjnad Abbasia, will cover an area of 1.68 million acres. In the saline ground-water area of the project, 304 large capacity tube-wells are to be installed. All the remaining SCARPs individually cover an area of less than one million acres.

The drainage of the lower and upper Indus plains is to be improved by constructing open surface run-off drains. In the lower Indus plain, the Left Bank Outfall Scheme will have a drainage channel 257 miles long, from near Khairpur to the Rann of Kutch.

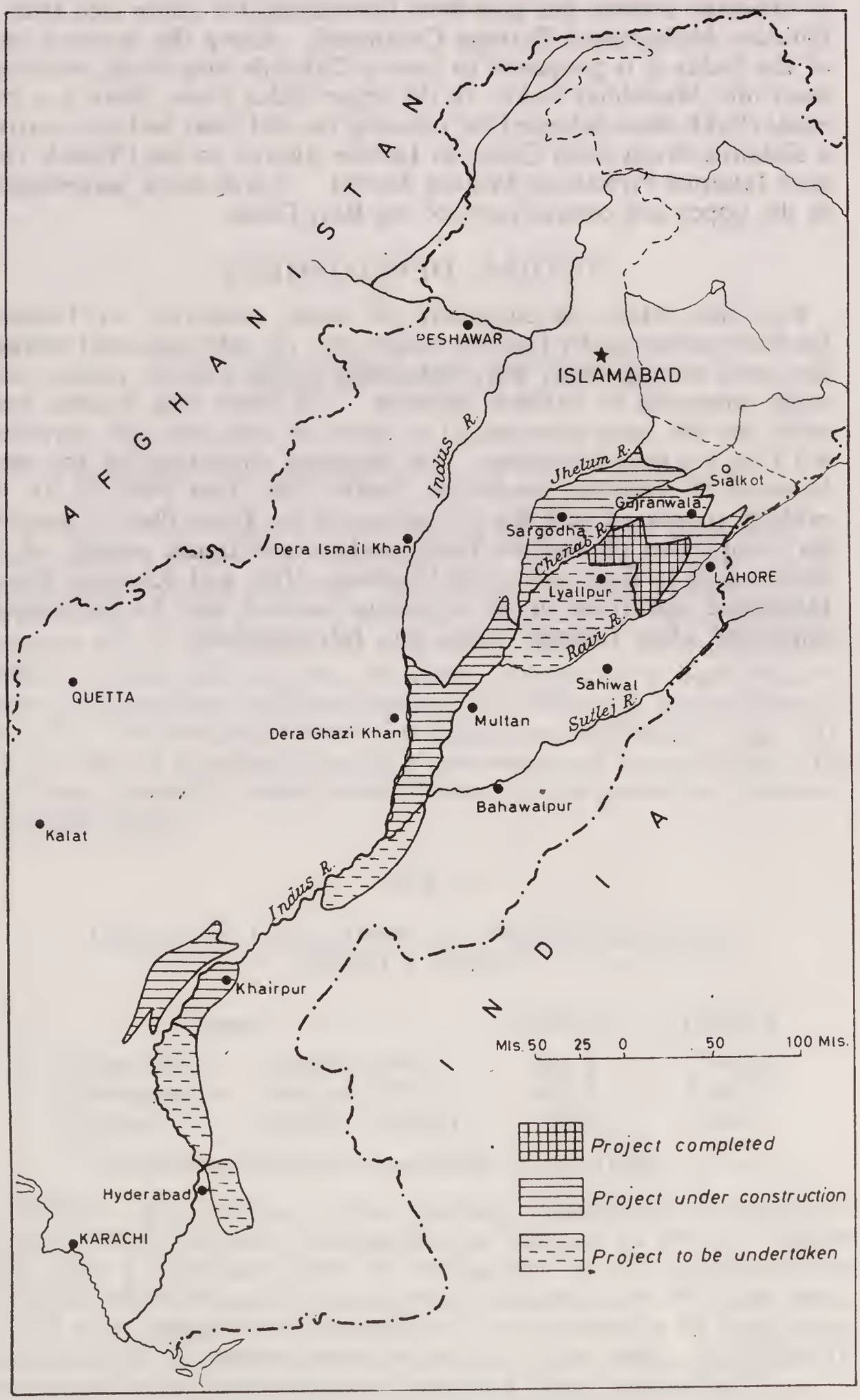


Fig. 34 Pakistan: Waterlogging and salinity control and reclamation projects

A drainage scheme has also been formulated for some rice areas in Ghulam Mohammed Barrage Command. Along the western bank of the Indus it is proposed to have a 200-mile long drain, emptying itself into Manchhar Lake. In the upper Indus plain, there is a proposal (Sukh Beas Scheme) for utilising the old Beas bed to construct a 320-mile drain from Qasur in Lahore district to the Chenab river near Jalalpur Pirwala in Multan district. It will check waterlogging in the upper and central parts of the Bari Doab.

FUTURE DEVELOPMENT

For the future development of water resources in Pakistan the four economically feasible modes are: (a) inter-seasonal storage; (b) canal enlargement; (c) private tube-wells; and (d) public tube-wells, pumping to balance recharge. Of these four modes, tube-wells are the most economical in terms of unit cost per acre-foot. All four are interdependent. The financial allocation for the development of irrigation under the fourth Five Year Plan is Rs. 4.3 million, compared with Rs. 2.2 million in the Third Plan. It provides for completion of Tarbela Dam, and an additional supply of 2.5 million acre ft. from storage at Chashma, Hab, and Khanpur Dams. Integrated operation of all irrigation facilities will be increasingly important after Tarbela comes into full operation.

9. ELECTRIC POWER

POWER GENERATION AND CONSUMPTION

At the time of Independence, Pakistan was largely dependent on hydro-electric power from the Uhl River scheme in Punjab, India. These supplies were gradually withdrawn. Pakistani resources comprised only 10,700 kW of hydro-electric power at Malakand, and thermal plants of 68,800 kW installed capacity. Development of electric power facilities has therefore received very high priority since Independence, and particularly since 1959 with the creation of WAPDA (Water and Power Development Authority) (fig. 35). In one decade generated electric power increased by more than 700 per cent, making a major contribution to the growth of industry and agriculture.

TABLE 6

Generation, Consumption and Value of Electricity, 1959/60 & 1970/71

Item		*1959/60*	*1970/71*
Generation	(million kWh.)	781.4	5,740.4
Consumption	(million kWh.)	603.3	4,046.7
Revenue	(million rupees)	69.5	560.2

West Pakistan WAPDA, *Annual Report*, 1970-1, Table 5, p. 157

Table 7, given below, shows the high percentage of consumption of electric power by manufacturing industry in 1970/1. There has been a significant shift in the pattern of consumption since 1959/60, when industrial consumption accounted for 64.6 per cent, of the total, general and commercial consumption for 16.4 per cent and agricultural consumption for only 11.1 per cent. Agricultural consumption is rising because of pumping from tube-wells.

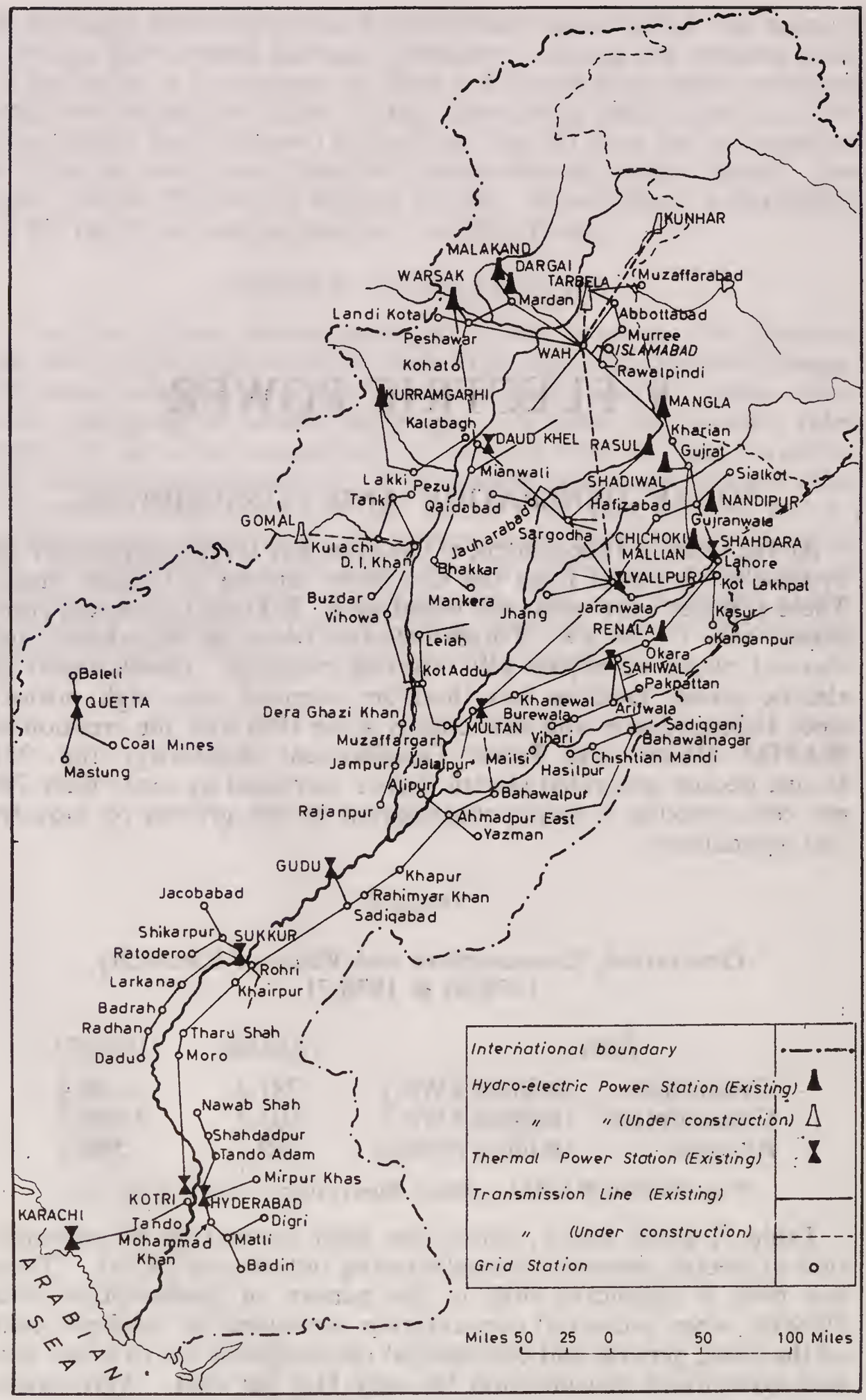


Fig. 35 Pakistan: Electric power stations and transmission lines

TABLE 7

Consumption of Electricity by Various Uses, 1970/71

Use	*Consumption* (million kWh)	*% of Total*
General & Commercial	534.1	13.5
Industrial	1,755.0	44.2
Agricultural	1,072.3	27.0
Public Lighting	21.9	0.6
Bulk Supply	582.5	14.7
TOTAL	3,965.8	100.0

Ibid Table 2, p. 155

HYDRO-ELECTRIC POWER

The hydro-electric potential of Pakistan, a substantial part of which has now been harnessed, is mostly located in the hilly north-western area, where the differentiated terrain provides natural sites for dams. Some sites in the plains have also been developed by utilizing fall in rivers and canals. While the use of the three eastern rivers has, as a result of the Indus Waters Treaty, passed to India, the hydro-electric potential of the three western rivers, the Indus, the Jhelum, and the Chenab, has been estimated at 30 million kW.

Ten main hydro-electric stations are now in operation. The capacity of all ten will be dwarfed by Tarbela when it comes into full operation. Their respective installed capacities and firm capacities (average minimum capability in winter, at times of minimum flow) are given in Table 8.

TABLE 8

Generating Capacities of Hydro-Electric Stations, 1969/70

Hydro-Electric Station	*Installed Capacity* (million watts)	*Firm Capacity* (million watts)
1. Mangla	400	224
2. Warsak	160	110
3. Malakand	20	15
4. Dargai	20	15
5. Rasul	22	11
6. Chichoki Mallian	13	10
7. Shadiwal	13	6
8. Nandipur	13	10
9. Renala	1	1
10. Kurram Garhi	4	3

Ibid, Table J, p. 159.

The *Mangla* power station will ultimately have an installed capacity of 1,000 million watts in ten sets of 100,000 kW each. On the left bank of the dam, there are five tunnels each 1,600 ft. long and 30 ft. in diameter, to supply water to the power station. The first three generating sets, each of 100,000 kW, were installed as part of the Indus Basin Plan, and the fourth was added later by WAPDA.

The *Warsak* power station has four turbines, each of 40,000 kW. The turbines are fed by a concrete-lined tunnel from the 235 ft. high dam. This station was one of the major sources of hydro-electric power before the completion of Mangla.

The *Malakand* and *Dargai* power stations produce electricity from falls in the Upper Swat Canal. Water is taken back into the Canal from the Malakand station to feed the power house at Dargai. Malakand station was completed in 1938, with an installed capacity of 16,700 kW, and this was raised to 20,000 kW in 1952. Dargai also has an installed capacity of 20,000 kW.

The *Rasul* project was started in 1946, with the limited purpose of feeding 1,860 tube-wells in Gujrat and Sargodha. The scheme was later modified to meet the requirements of the Punjab, before the completion of Warsak power station. The water in the 2-mile power channel is taken from the Upper Jhelum Canal, and after passing through the turbines, joins the Lower Jhelum Canal.

The *Chichoki Mallian* power station is located on the Upper Chenab Canal about 30 miles from Lahore, and in the event of a power failure on the main gird, can be isolated to supply the city.

The *Shadiwal* power station is located on the Upper Jhelum Canal near Gujrat, and the *Nandipur* station on the Upper Chenab Canal about 7 miles north-east of Gujranwala, while the *Kurram* and *Garhi* stations are on the irrigation canal taken out from the Kurram River.

THERMAL POWER STATIONS

The total installed capacity of hydro-electric power stations is 666.0 million watts, while that of thermal stations is 652.6 million watts outside Karachi, plus an additional 256 million watts for Karachi. The largest thermal plant (265.7 million watts) in the northern zone is at Multan. Upper Sind has plants at seven places, the largest being in Sukkur (52 million watts.) In Lower Sind there are four stations, the two biggest being at Hyderabad (43.7 million watts) and Kotri (42.3 million watts). In Baluchistan, six small stations have a capacity of 15.0 million watts. Karachi, in addition to diesel and gas-burning plants, has a 137,000 kW nuclear plant, built with Canadian aid, which came into full operation in 1974.

THE GRID SYSTEM

To make maximum use of the generating facilities, the various thermal and hydro-electric stations, excluding a few isolated ones,

have been grouped into four zones. In each of these zones the stations are inter-connected by a grid system. These grid systems are: (a) Northern Grid System; (b) Upper Sind Grid System; (c) Lower Sind Grid System, excluding Karachi; and (d) Quetta Grid System. The national grid comprises 196 grid stations, and 5,370 miles of transmission lines. The separate systems will ultimately be linked to one another, and Karachi is being tied into the system via Hyderabad.

RURAL ELECTRIFICATION

There are about 40,000 villages in Pakistan, of which 8,750 individually have a population of 1,000 or more. Of these, 5,000 have been selected for electrification. The programme is one of social improvement, to provide light, run tube-wells, and supply power for cottage industries. At the end of the Third Plan 2,435 villages had been electrified, with a further 1,000 scheduled to receive power during the Fourth Plan.

FUTURE DEVELOPMENTS

Of the various schemes to increase generating capacity in the future, Tarbela is by far the most important. The power installation at Tarbela will ultimately consist of 12 units of 175 million watts capacity. In the initial stage, four of these generating units are being installed.

Part III

Human Resources

10. POPULATION

The latest population count of Pakistan was held in 1972. However, the data released by the Census Organization up to the time of writing is fragmentary. As a result of this paucity of data from the 1972 census, most of the analysis here is based on the figures of the 1961 and earlier censuses.

The population of the country in 1972 was 64.9 million, comprising 34.4 million males and 30.5 million females. Of the total population, the province of Punjab contained 37.4 million (57.6 per cent of the total), Sind 14.0 million (21.5 per cent), N.W.F.P. 8.4 million (12.9 per cent), Baluchistan only 2.4 million (3.7 per cent), centrally administered Tribal Areas and the Federal Capital Territory of Islamabad respectively 2.5 million (3.9 per cent) and 0.2 million (0.4 per cent).

DENSITY

The density of population in Pakistan in 1972 was 209 persons per square mile (it was 138 persons per sq. mile in 1961 and 109 persons per sq. mile in 1951). Population density, by districts, in 1961, is illustrated in fig. 36. It reveals a very uneven distribution. The most densely peopled district is that of Karachi, with 1,506 persons per square mile, for that district contains

the most populous urban centre of Pakistan. The density of population is high, over 500 persons per square mile, in a large block of districts in north-eastern Punjab. The block comprises the districts of Sialkot (772 persons per sq. mile), Gujranwala (559), Gujrat (586), Lahore (1,119), Sahiwal (505) and Lyallpur (763). In the neighbouring districts, Sheikhupura has a density of 467 persons per sq. mile and Multan, 480. High densities are also found in Rawalpindi (562), Peshawar (737) and Mardan (672). Densities ranging from 300 to 399 persons per sq. mile occur in the Mohmand and Khyber Agencies, and the districts of Sargodha and Jhang. Districts with 200–299 persons per sq. mile are Hazara, Bannu, Jhelum, Bahawalnagar, Rahimyar Khan, Larkana, Nawabshah and Hyderabad. Density of 100–199 persons per sq. mile is found in Malakand and Kurram Agencies, and Kohat, Campbellpur, Mianwali Muzaffargarh, Jacobabad, Sukkur and Sanghar districts. The remaining areas of N.W.F.P., Punjab, and Sind have densities varying between 50 and 99 persons per sq. mile. Baluchistan is sparsely populated: the only district with a population density of 50 persons per sq. mile is Quetta-Pishin, while all other districts are still more thinly peopled. In four districts of Baluchistan, namely Chagai, Kharan, Zhob and Makran, covering a vast area of 72,004 sq. miles, the density of population is under 10 persons per sq. mile.

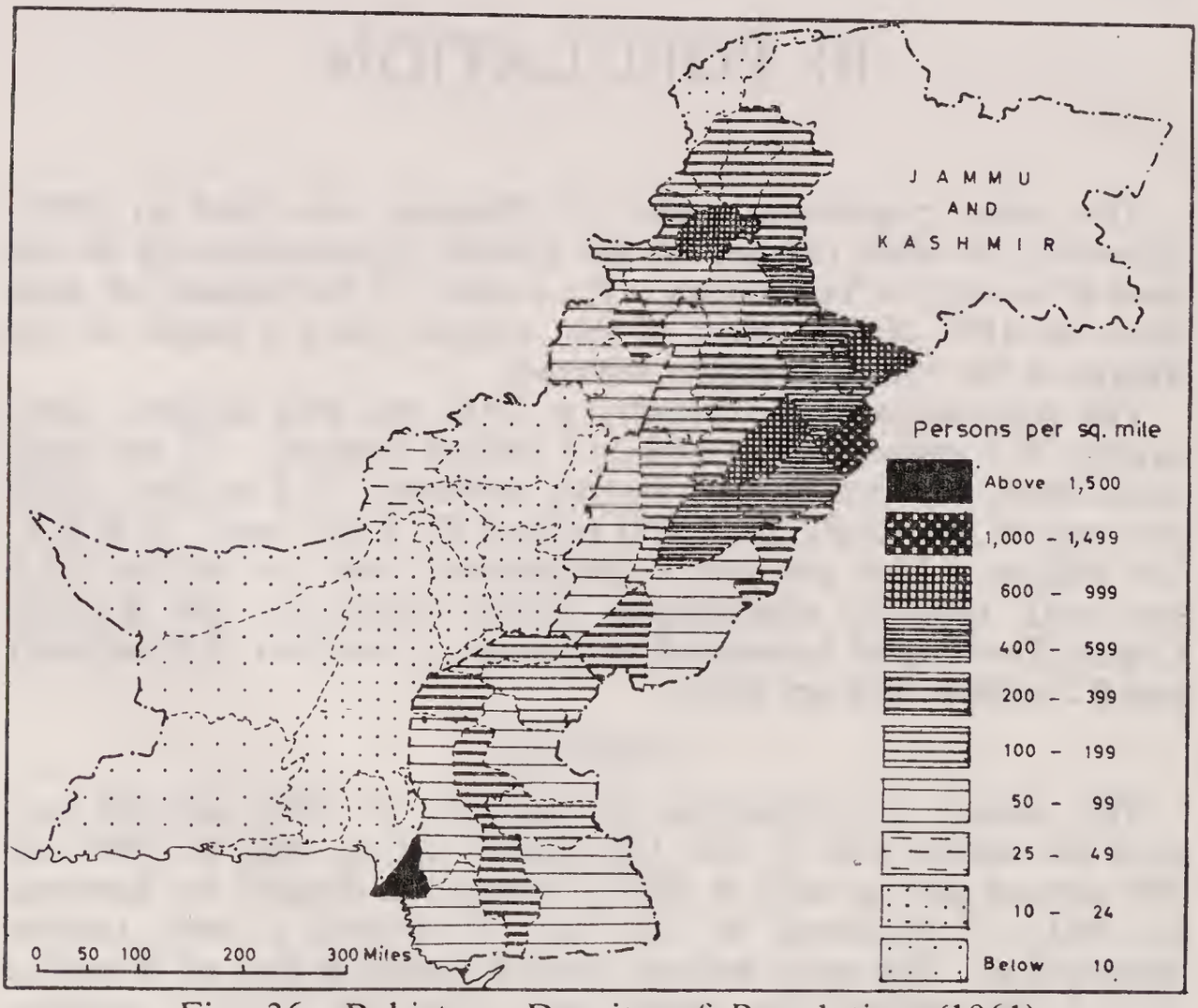


Fig. 36 Pakistan: Density of Population (1961)

The uneven areal distribution of the population of Pakistan is principally related to: (1) the diversity of landforms, the population being denser in plain areas and thinner in difficult terrains; (2) the availability of water for raising crops, areas with surface and ground-water irrigation facilities being densely peopled; and (3) the degree of urbanization, entailing both rural-urban and regional migration of population to urban centres offering better financial prospects. Provisional figures of density in 1972 are illustrated in fig. 37.

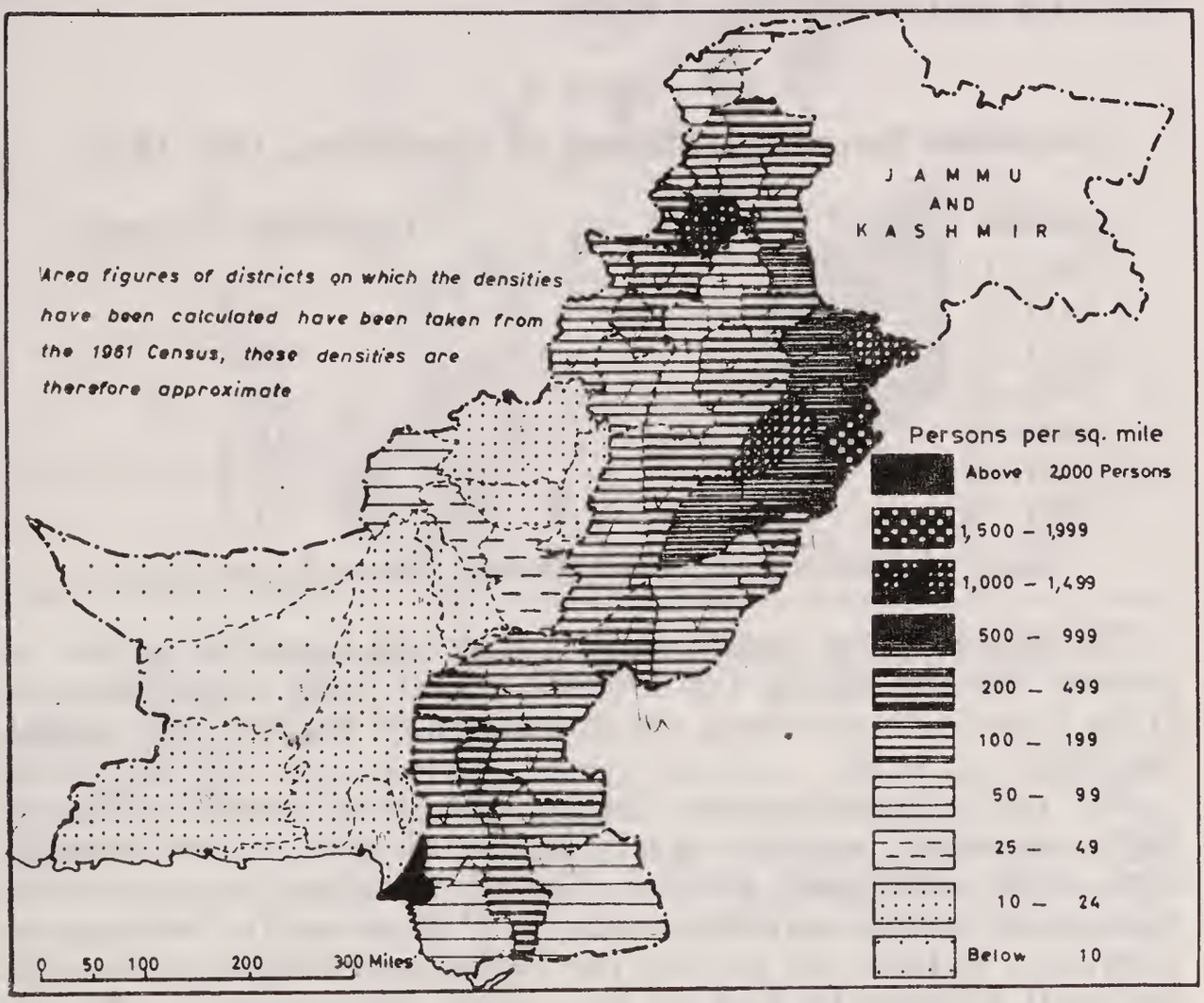


Fig. 37 Pakistan: Density of Population (1972)

GROWTH OF POPULATION

Pakistan has one of the highest rates of population growth in the world. The annual rate of increase was 2.09 per cent during the decade 1951–61, and 3.82 per cent over the period 1961–72.[1] This figure compares with 3.5 per cent for Mexico, 3.0 per cent for the Philippines, 2.5 per cent for Thailand, 2.3 per cent for India, and

[1] This rate has been calculated on the principle of compound interest for a period of 11 years. In actual fact, the 1961 census was taken on 1 January 1961, while that of 1972 took place between 16 November and 30 November. This makes the period closer to 12 years. Calculated for 12 years, the rate for the period 1961-72 becomes 3.51 per cent.

2.0 per cent for China,[1] some of the countries with highest population growth rate in the world.

The high rate of growth is due to natural increase, that is, the excess of births over deaths. The data used in compiling the vital statistics are inadequate, and known to be badly under-reported. However, the presumption that the increased rate of growth is due to some extent to a decline in the death-rate is well-founded. Improved medical facilities have reduced the death rate, particularly the infant mortality rate. Some improvements in social welfare may also have contributed to this effect.

TABLE 9

Decennial Percentage Increase of Population, 1901–1972.

Decade	*Percentage Increase*
1901–11	7.1
1911–21	8.9
1921–31	11.5
1931–41	20.1
1941–51	19.3
1951–61	27.3
1961–72	51.3

Census of Pakistan, 1961, and Preliminary Census Reports, 1972

The above figures clearly show a high and accelerating rate of growth, the rise during the 1961–72 period being unprecedented. If the recent rate continues, the population of Pakistan will double by 1990.

The rate of increase over the last inter-censal period, although high everywhere, was not equally high in all parts of the country. The newly-established Federal Capital Territory of Islamabad showed the highest percentage increase (150 per cent). Among the provinces, Baluchistan showed the highest percentage increase (78 per cent), followed by Sind (66.9 per cent). The increase in Punjab and N.W.F.P. was respectively 46.63 and 46.60 per cent. The centrally administred Tribal Areas underwent the least percentage increase (35.7 per cent). In Baluchistan and Sind, all Districts except Lasbela, Khairpur and Tharparkar, returned a high percentage increase. The Districts of N.W.F.P. and Punjab which stand out in terms of high percentage increase are Kohat, Bannu, Rawalpindi, Gujranwala, Lahore, Lyallpur and Muzaffargarh (fig. 38).

Birth and death rates can be expected to vary somewhat between various parts of the country, but the additional factor explaining higher growth of population in some administrative units is internal migration. Short-distance mobility results in growth of urban

[1] *World Bank Atlas*, Washington, 1972.

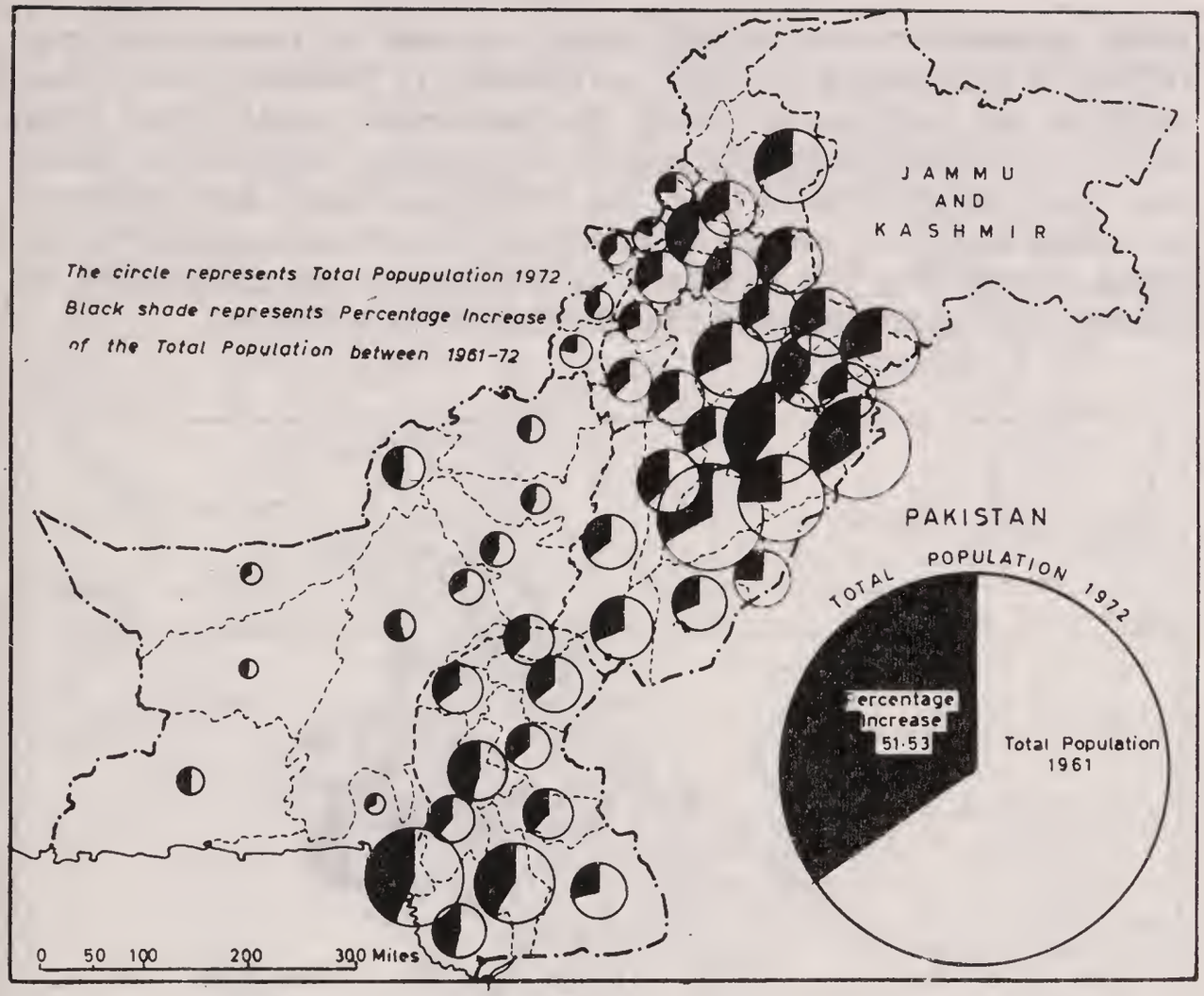


Fig. 38 Pakistan: Increase in population, by districts

centres at the expense of the country-side, while long-distance mobility results in an uneven growth rate between districts. The motive forces of mobility are numerous, the most important being related to employment opportunities. The varying rates of percentage increase by Districts are suggestive of a large-scale movement of population within the country.

RURAL AND URBAN DISTRIBUTION

The basis of urbanity of a settlement in Pakistan is its administrative organization (municipality, town committee, cantonment, civil lines) and size (5,000 persons or over, except in a few cases where a lower population size is recognized as urban on the basis of urban characteristics of the settlement). In 1961 urban population was 22.5 per cent of the total, the remaining 77.5 per cent being rural (fig. 39). In 1951 urban population expressed as percentage of total population was 17.8 per cent. Percentage figures of urban population to the total since the beginning of regular censuses in the country indicate a generally accelerating growth of urban population. The rate of natural increase of urban population has been lower than that of rural population. The higher rate of growth of

urban population is, therefore, largely a result of rural-urban migration. Traditionally the rural settlements of Pakistan were considered to be autonomous—with the proverbial solidarity of rural society. This inhibited a large-scale rural-urban migration. However, with the passage of time, the village autonomy and solidarity crumbled under the impact of economic forces conducive to rural-urban migration. The 'freedom' of the city or the availability of greater job opportunities in the town acted as a magnet.

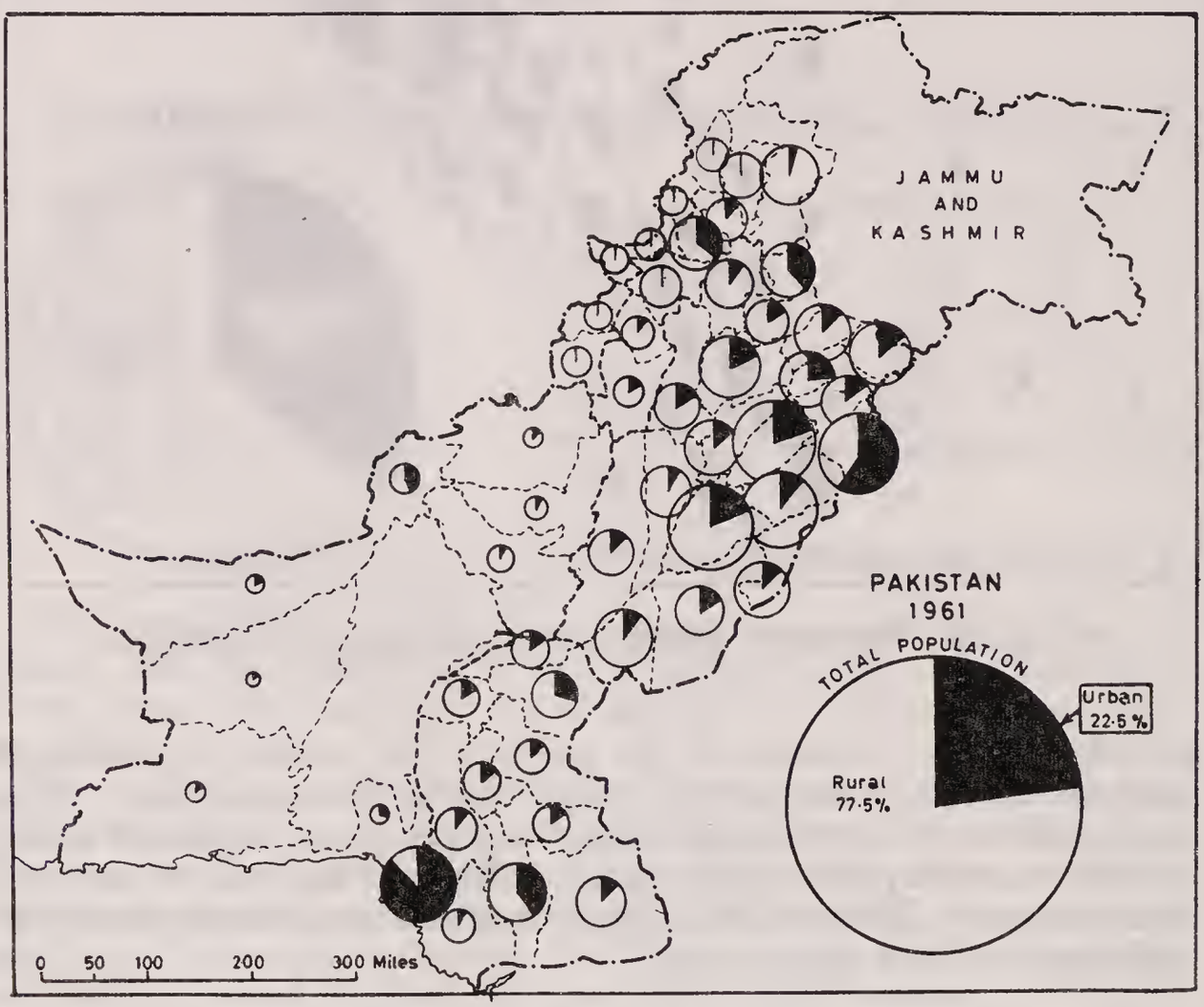


Fig. 39 Pakistan: Population, rural and urban

Urban settlements have attained various forms or patterns, resulting from peculiarities of site, historical developments, and socio-economic requirements (fig. 40).

Towns are the locales of industrialisation. The process of industrialisation has involved marked shifts in the use of material and human resources. It has altered the occupational structure of our society and these changes have given rise to a large-scale movement of population from the rural to the urban areas. The lure of the town has now been enhanced by worsening conditions in the rural areas, where the acreage of cultivated land per head of rural population has been constantly decreasing.

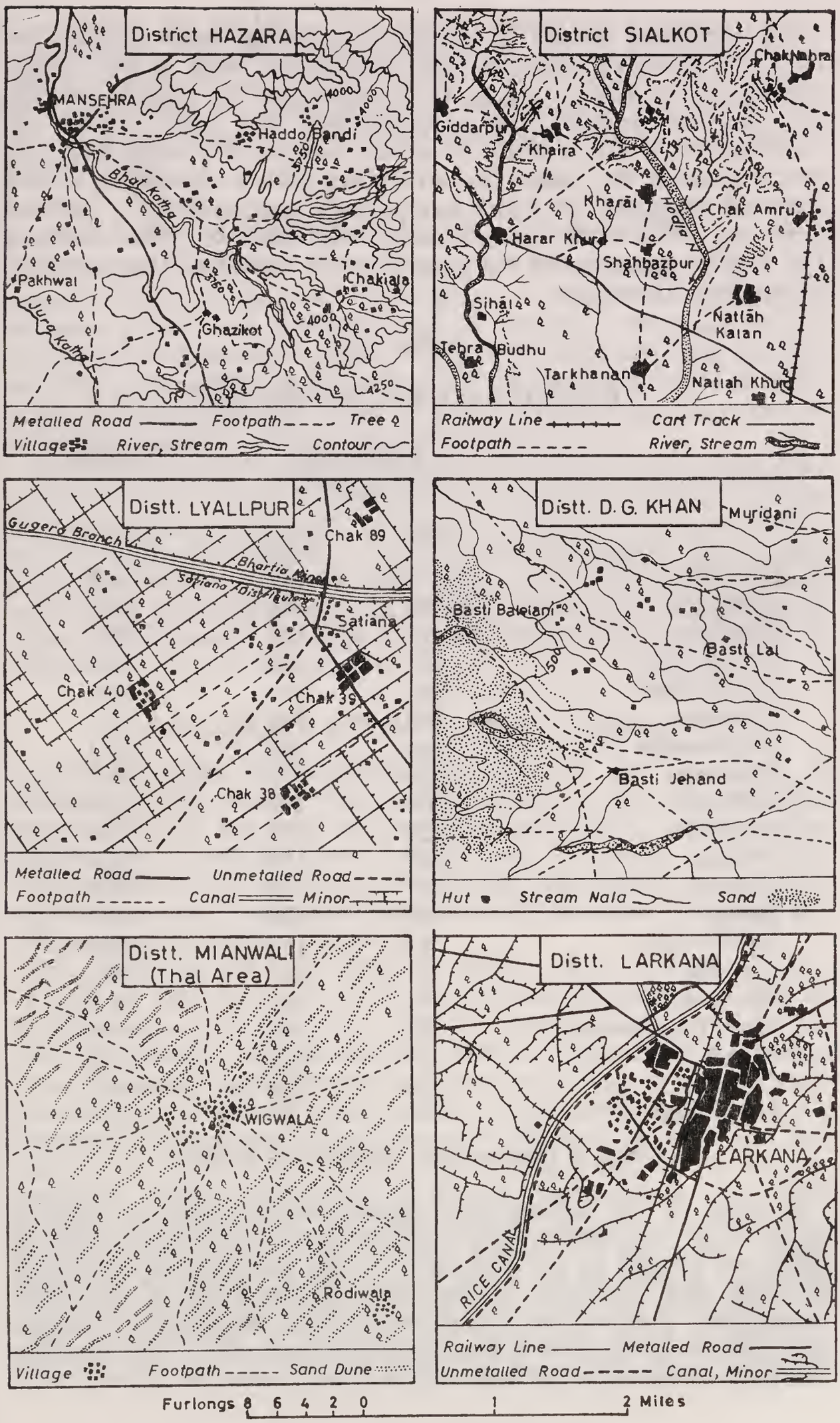


Fig. 40 Pakistan: Settlement Patterns

An interesting feature of urbanization during recent decades has been the tendency towards 'metropolitanism' with a few bigger cities growing faster, not only at the expense of the countryside, but also drawing people from medium-sized and small towns. An examination of the increase of urban population reveals that over recent decades the 'cities' (urban centres with a population of one hundred thousand or over) have grown spectacularly. Between 1961 and 1972, eight towns achieved the status of 'cities' bringing the total to twenty, and the population of twelve of these grew by more than 50 per cent.

TABLE 10

Population of Cities, 1961 and 1972

City	*Population (thousands)*		*%Change*
	1961	*1972*	*1961–72*
Karachi	1,913	3,469	81.3
Lahore	1,296	2,148	65.7
Lyallpur	425	820	92.7
Hyderabad	435	624	43.4
Rawalpindi	340	615	80.9
Multan	358	544	52.0
Gujranwala	196	366	86.7
Peshawar	219	273	24.7
Sialkot	164	212	26.9
Sargodha	129	203	57.4
Sukkur	103	159	54.4
Quetta	107	156	45.8
Jhang	95	136	43.2
Bahawalpur	84	134	59.5
Sahiwal	75	115	53.3
Mardan	78	109	39.7
Wah Cantonment	37	109	194.6
Kasur	75	103	37.3
Gujrat	60	100	66.7
Islamabad	—	77	—

Census of Pakistan 1972, (Provisional figures).

In most of the metropolitan centres, improvement of facilities has failed to keep pace with the rapid growth of population, and these cities can be said to be 'overgrown'. The distances to be covered are long, and the means of transport and the width of the roads, inadequate. Fast moving vehicles mingle with sluggish horse, camel, and donkey-drawn carts in congestion and confusion. The historical evolution of the cities has been such that they have two distinct parts.

the old and the modern. The modern sections have wide roads, impressive lay-out, and expensive buildings. The old city suffers from narrow roads and alleys, close-set and small buildings, and residential over-crowding. The location of functional areas (areas under various urban uses) has developed haphazardly and is generally inappropriate.

AGE DISTRIBUTION OF POPULATION

The age profile of the population of Pakistan shows an unusually large proportion of children. A large child population indicates a high rate of dependency in relation to the work force, and reflects not merely a rapid growth of population in the past but portends rapid growth in the future. Of the total population in 1961, 33 per cent were children under 10 years of age, 60 per cent were of working age and 7 per cent were 60 years or over.

There are marked differences in the age composition between urban and rural areas. In urban areas, the proportion of children under 10 years is less, and the proportion of working-age groups (10–24, and 25–44 years) is higher. The sex ratio (the proportion of males to females) is also higher in urban areas, 119 in the cities compared with 114 in the rural areas. The sex ratio of the working age groups in the urban areas is still higher. These figures reflect the influx of males from rural to urban areas.

RELIGIOUS GROUPS AND LITERACY

Pakistan came into existence in 1947 as the homeland of Muslims in the Indo-Pakistan sub-continent. In 1961 Muslims comprised 97.2 per cent of the total population, caste Hindus 0.5 per cent, scheduled castes 1.0 per cent, Christians 1.3 per cent, and Buddhists 0.01 per cent. During the past decade, the percentages have probably remained approximately the same. Pakistan is a preponderantly Muslim country.

In computing the percentage of literacy, children under 5 years of age are excluded. In 1961, the average percentage of literacy in Pakistan was 16.3 per cent, 23.9 per cent for males, and 7.4 per cent for females. By the more stringent standards of the United Nations, under which literacy includes the ability to write a short statement on a topic of everyday life as well as being able to read a language with understanding, literacy in Pakistan in 1961 was 14.0 per cent for both sexes (21.6 per cent for males and 5.9 per cent for females). Literacy was higher in urban areas (33.0 per cent) than in rural (10.9 per cent), and highest in the big cities (Karachi, 38.1 per cent; Rawalpindi, 32.4 per cent; Lahore, 25 per cent). Urban localities, with only 23 per cent of the total population, contained half the literates in Pakistan. The 10–14 year age group had the highest percentage of literacy (28.2 per cent), much higher than the 13.3 per cent of the age group 25 years and over. Although

the overall percentage of literacy in Pakistan is low, it is increasing with the passage of time.

CIVILIAN LABOUR FORCE

As indicated above, the composition of population by age-groups is such that the burden of dependency is high. In 1961, only 32.4 per cent of the population was in the work force, the balance being housewives (23.7 per cent) and dependents (43.9 per cent). The labour force is overwhelmingly male. Of the working population, almost three-fifths was engaged in agriculture. Population categorized in the 1961 census as 'not working but looking for work was 1.4 per cent for rural and 2.8 per cent for urban areas. This figure, which is strikingly small compared even with developed countries' was noted in the census report as being under-estimated. Our cities have by no means reached levels even approximating full employment, and all cities have a large number of beggars and idlers.

However, comparison of the data for the 1951 and 1961 censuses reveals some improvement in the overall employment situation during the decade. While total population increased 27.0 per cent, the civilian labour force increased 32.1 per cent. The rise in the non-agricultural labour force was substantial (55.1 per cent), and the rise in the agricultural labour force (19.8 per cent) less than the rate of growth of the total population.

To sum up, Pakistan has a substantial total population (65 million), with a markedly uneven areal distribution. The rate of population growth is one of the highest in the world and it is this rate of growth rather than the present size which is of concern to economic planners. Urbanization, an index to industrialization, is on the increase, but its economic base needs reinforcement. The percentage of the population which is economically active or literate is low, but there are signs of improvement.

11. IMPORTANT URBAN CENTRES

An important urban centre, with a population of 100,000 or more, or with a lesser population but a high administrative status (e.g. capital of a province) is classified by the census as a 'city'. All other urban centres are known as 'towns'. At the time of the 1972 census, Pakistan had 20 cities, the populations of which are listed in Table 10. Of these 20 cities, eight are singled out, by reason of their economic, administrative, or historical importance, for discussion in this chapter. By way of preface, however, it is appropriate to set forth some general characteristics of Pakistan's cities.

FUNCTIONAL LANDSCAPE OF PAKISTAN CITIES

Urban land use or 'urban functional areas', are categorized differently by different authors. In the present work, six categories of urban land use are considered, namely: industrial, commercial, administrative and other public buildings, cantonment, residential, and open recreational land.

Industrial Areas

Zoning of industry into compact areas which is an important objective of modern town-planning, has begun in some cities. Karachi has a large, well-planned industrial site, and new industry is zoned in Hyderabad, Multan, and Lyallpur. Most of these industrial sites have a location peripheral to the urban complex. This affords a solution to a number of traffic problems by chanelling a large volume of intra-city daily commuting into a smaller number of highways, mostly avoiding the congested centre. It also makes economical the construction of railway extensions, power and water lines, and other requirements of industry. Industries located within Pakistani cities are generally either old-established industries, which had a peripheral location at the time of their installation, or non-noxious industries, permitted by municipal by-laws to be located inside the city.

Commercial Areas

The present arrangement of commercial areas in our cities is generally defective. Unlike Western urban centres, commerce in Pakistani cities is not concentrated in a large compact central area which can be identified as the commercial core. Commercial facilities fall into two broad categories, mandis and bazaars. *Mandis* are markets for agricultural produce, grains, fruit and vegetables. They commonly cover sizeable areas, away from the main streets, and are generally scattered throughout the city. In some cases even the regional entrepots for agricultural products are in the heart of the city. This is an example of the gravitational effect of the old-established markets on the flow of commodities. The result is an unnecessarily large volume of slow-moving vehicular traffic on the intra-city roads. *Bazaars* are shopping areas for local and foreign manufactured goods. Usually the bazaars are highly-elongated along the main streets, and not broken at adequate intervals by adjacent groups of shops. According to the principles of town-planning, it is desirable to break the continuity of long shopping streets by spreading subsidiary centres to back streets, at intervals.[1]

Administrative and other Public Buildings

The most suitable location for administrative buildings is the central district of the city. In our cities, the administrative buildings are usually located away from the centre. The explanation is historical. In pre-British days, settlements were compact. The larger the settlement the more crowded it tended to be. Under British rule, the larger of the existing settlements were generally selected as administrative headquarters. Owing to the prior occupation of the interior of these large agglomerations by other functions, mainly residential and commercial, the administrative function could not be conveniently located in the central district. Large areas for administrative buildings were set aside on the outskirts. Compact areas of administrative buildings exist in such cities as Karachi, Lahore and Lyallpur.

Modern educational institutions, with large space requirements are generally located on the outer fringes of the cities. Some universities are quite isolated. Hospitals, libraries, and other public buildings are dispersed through the urban complex, as and where space could be obtained.

Cantonments

Cantonments are permanent military stations and contain military administrative offices, barracks, parade grounds, rifle ranges, and even an air field. The impact of the West is most manifest in the cantonment sections of the cities. Roads are laid out rectilineally,

[1] L. Keeble, *Principles and Practice of Town and Country Planning.* London, 1952, pp. 297-8.

and the buildings, usually of red brick, have a low density, with patches of lawn between. The layout conforms to the contemporary aesthetic standards of the early days of British rule. The cantonments stand in 'sharp contrast to the congested confusion of the old bazaar towns'.[1]

Residential Areas

The residential areas in the various parts of the cities differ with respect to the type and density of dwellings. Over large areas in the centre of the cities, the percentage of the developed area to the total area approaches 100 per cent. In the next or middle belt, the density is almost equally high, the difference being that, whereas in the central section the buildings are generally taller than the narrow alleys on which they abut, in the middle belt, the residential lanes are wider, and congestion is less.

Narrow residential lanes are partly the outcome of climatic conditions. Such lanes are shady and cool, and minimize the effect of *luh* (hot winds) and dust in summer. But the lower storeys of buildings taller than the width of the adjoining lane become unhealthy as the supply of light and fresh air is restricted.

In the central and middle residential belts, the buildings are back-to-back, with small courtyards. In the outer residential zones density decreases, with both back-to-back and semi-detached houses, larger courtyards, and patches of vacant land. Here also are the *Civil Stations*, the residential areas of the rich, with broad boulevards and large detached houses, occupying one-half to one-third of their 1,000 and 2,000 sq. yard plots.

Growth of the suburban residential areas has taken three forms. The first of these is *sprawled growth*, in which rural settlements scattered over the suburban zone have been incorporated into the city. The rural *kacha* buildings of unbaked bricks are replaced by *pukka* (masonry) construction. The urban residential areas of village origin resemble the residential areas of the central city in having a high density of back-to-back buildings and an incoherent system of narrow winding lanes. Secondly, there has been *linear growth* along the regional through-roads radiating from the city and also, to some extent, along the ancillary outer roads of the cities. Here growth is related to the purchase by individuals of small agricultural holdings, and, as with the reconstruction of the villages, is unplanned. *Planned growth* has been largely confined to residential areas for the middle and upper class. Detached houses are set in spacious grounds and the approach roads and development lanes are set out in geometric patterns.

Open Recreational Land

There is a great shortage of open recreational land in the cities of Pakistan. The approximate acreage of open recreational land in

[1] J. Tyrwhitt and others, *Patrick Geddes in India*, London, 1947, p. 32

some of the cities is given in Table 11. The town-dwellers generally do not go to the cantonments for recreational purposes and both the acreage and population of these have been excluded from the Table.

TABLE 11

Acreage of Open Recreational Land per Thousand Population

City	*Acreage per Thousand*
Karachi	0.4
Lahore	0.5
Hyderabad	0.3
Rawalpindi	1.4
Multan	0.6
Lyallpur	0.5
Sialkot	0.2
Peshawar	1.0
Gujranwala	0.2
Quetta	0.3

Computed by the author from large-scale maps, and 1951 census figures. Acreage figures for 1972 population would be lower.

The figures fall far short of the requirements suggested for planning purposes in the cities of the West. Five acres of open recreational land per thousand population is widely accepted on the Continent and in Great Britain.[1] According to the American standard, every hundred of the population should have one acre of recreational land.[2]

Apart from the over-all shortage of open recreational areas, the spatial distribution of these areas within the urban complex is defective. Often they are located on the periphery, a considerable distance from the concentrations of population. This is the case with some of the old Moghul gardens, such as the Shalimar Garden of Lahore and the Wazir Bagh of Peshawar. More parks are needed in downtown areas. The effects of congestion on health, on crime and delinquency, and on death and morbidity rates are too well known to need to be repeated here.

IMPORTANT CITIES

Karachi

The capital of Pakistan until 1959 and now the capital of the province of Sind, Karachi is the largest city in Pakistan by a considerable margin, and the industrial and commercial hub of the country. It is also the port for both Pakistan and Afghanistan,

[1] P. Ambercrombie, *Town and Country Planning*, London, 1943, p. 147.
[2] E. A. Gutkind, *Creative Demobilisation*, Vol. I, London, 1943, p. 250.

the terminus of Pakistan's railway system, the location of its naval headquarters, the site of the principal international airport, and an important educational and service centre. It is a multi-functional city.

The early history of the settlement is obscure. About the beginning of the eighteenth century, it was a small fishing village called Dibro.[1] From 1730 or thereabouts, it began to attract the merchant class of the nearby urban centres of Sind. The merchant community established an autonomous administration and raised a small army. The name 'Karachi' seems to have been derived from a fresh water well, known as Kalachi Kun.[2] At the time of the British occupation in 1842, the settlement covered an area of 30–40 acres, and was surrounded by a defensive wall, which was by then in a dilapidated condition.[3]

It was the British who harnessed Karachi's potential as the 'gateway' to the Indus Valley and founded the modern city. Significant dates in the growth of the city were the establishment of the Indus Flotilla (1843), the creation of the municipality (1852), the railway linkage with Kotri (1859) and with the Punjab, railway system (1877), the founding of the Port Trust (1886), the establishment of a civilian airfield (1923–5), and its selection as the capital of the newly created Province of Sind (1936).

After Independence in 1947, a large number of Muslim refugees from India settled in Karachi and at the time of the 1951 census refugees made up 58.7 per cent of the population of the city. The immigrant businessmen added to the monetary resources of the city, and to its industrial and commercial activities. By 1951 the population of Karachi had outstripped that of Lahore, previously the largest city, and by 1972 it had reached 3,469,000, increasing about 80 per cent each decade.

This rapid increase in population called for a rapid increase in housing, water supply (including 280 million gallons a day from the Indus), sewage and transportation (including a two-track circular railway skirting the city).

Karachi has a strong industrial-commercial base. Of the total working population, 45.2 per cent is employed in these categories. Twenty-six per cent of the total industrial units[4] and 22 per cent of the industrial workers of Pakistan are in Karachi. The more important industries are textiles, footwear, metal products, food and beverages, furniture, machinery and chemicals. About 5,500 acres have been developed as industrial estates on the western margin of the city.

[1] H. E. A. James, *A Forgotten Chapter of Indian History*, Exeter, 1915, p. 36.

[2] Z. A. Khan, Karachi Before British Rule, *Pakistan Geographical Review*, Lahore, January 1969, p. 36.

[3] C. L. Mariawala, 'Karachi Town, its trade and taxation in the first half of the 19th century', *Journal of Indian History*, Madras, Vol. XIX, Part III, 1941, p. 336.

[4] Defined as establishments employing 20 persons or more.

The foreign sea-borne trade of Karachi has increased significantly. The total tonnage of exports and imports handled by the port rose from 3.4 million tons in 1950/51 to 9.3 million tons in 1971/72. A second port to serve the projected steel mill is being built nearby at Pitti Creek (fig. 41).

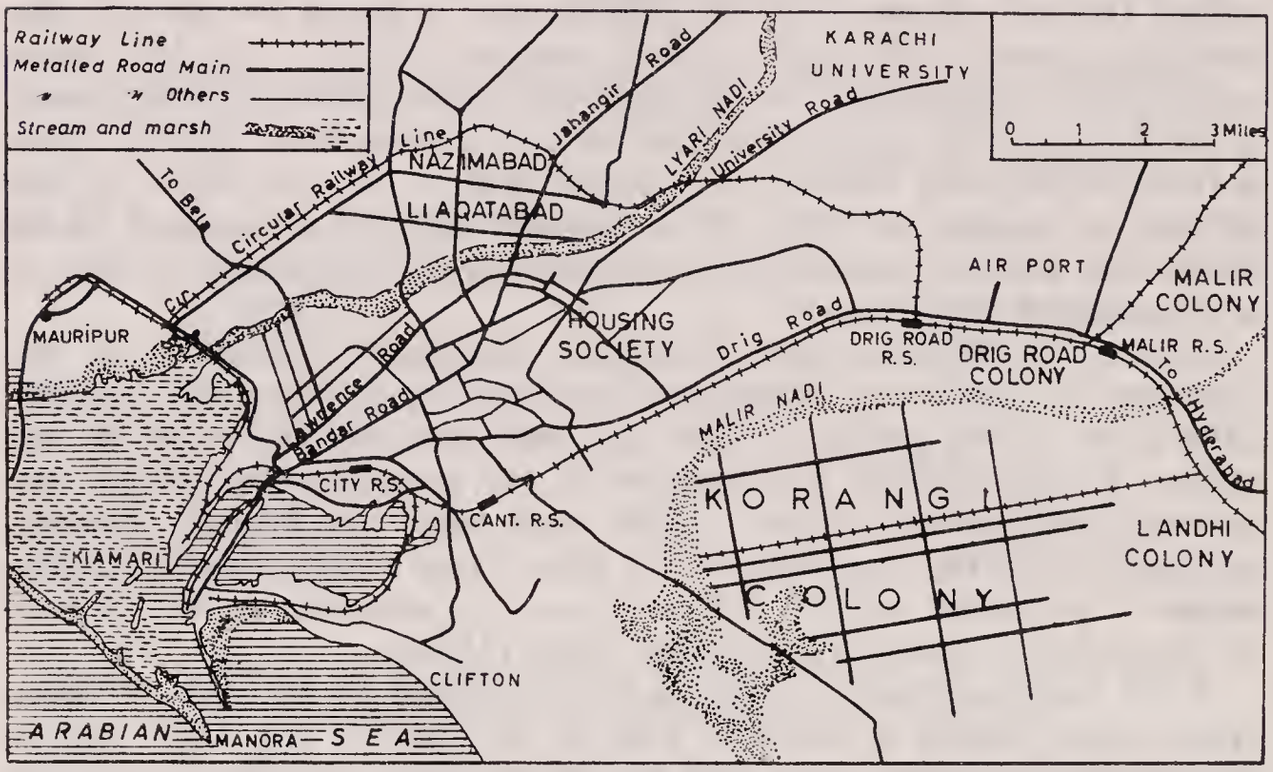


Fig. 41 Town Plan of Karachi

Hyderabad

Headquarters of the District and Division of the same name, Hyderabad is the fourth largest city of Pakistan (pop. 1972: 624,000). It is an important industrial and commercial centre of the Lower Indus Plain, a railway junction, a cantonment, and a university town. The percentage increase of population over the period 1961–72 was 43.4 per cent, less than the 80 per cent of the growth of each of the two preceding decades.

The city stands on the left bank of the Indus on elevated rocky ground, the northerly portion of north–south running flat-topped limestone ridge known as Ganjo Takkar. It is an ancient town, but its history before the Arab conquest is not well-known. The present town and fort were built by the Kalhora Chief, Ghulam Shah, in 1769. The citadel occupies a site at the southern end of the city and covers about 36 acres.

The old town, containing Shahi Bazaar is unplanned and very congested. Later additions, including Hirabad, Shah Latifabad, the Unit Colony, and the Amil Colony, are planned developments, with expensive modern structures. Across the Indus, in Jamshoro, is the new Sind University campus. The modern large scale industries have been located in a separate area, the Hyderabad Industrial Trading Estate. Hyderabad is traditionally famous for its glass

industry, silk, gold, and silver scarves, and embroidery work. Modern factory industries include cotton ginning, textiles, glass-work, vegetable-oil mills, and tanneries (fig. 42).

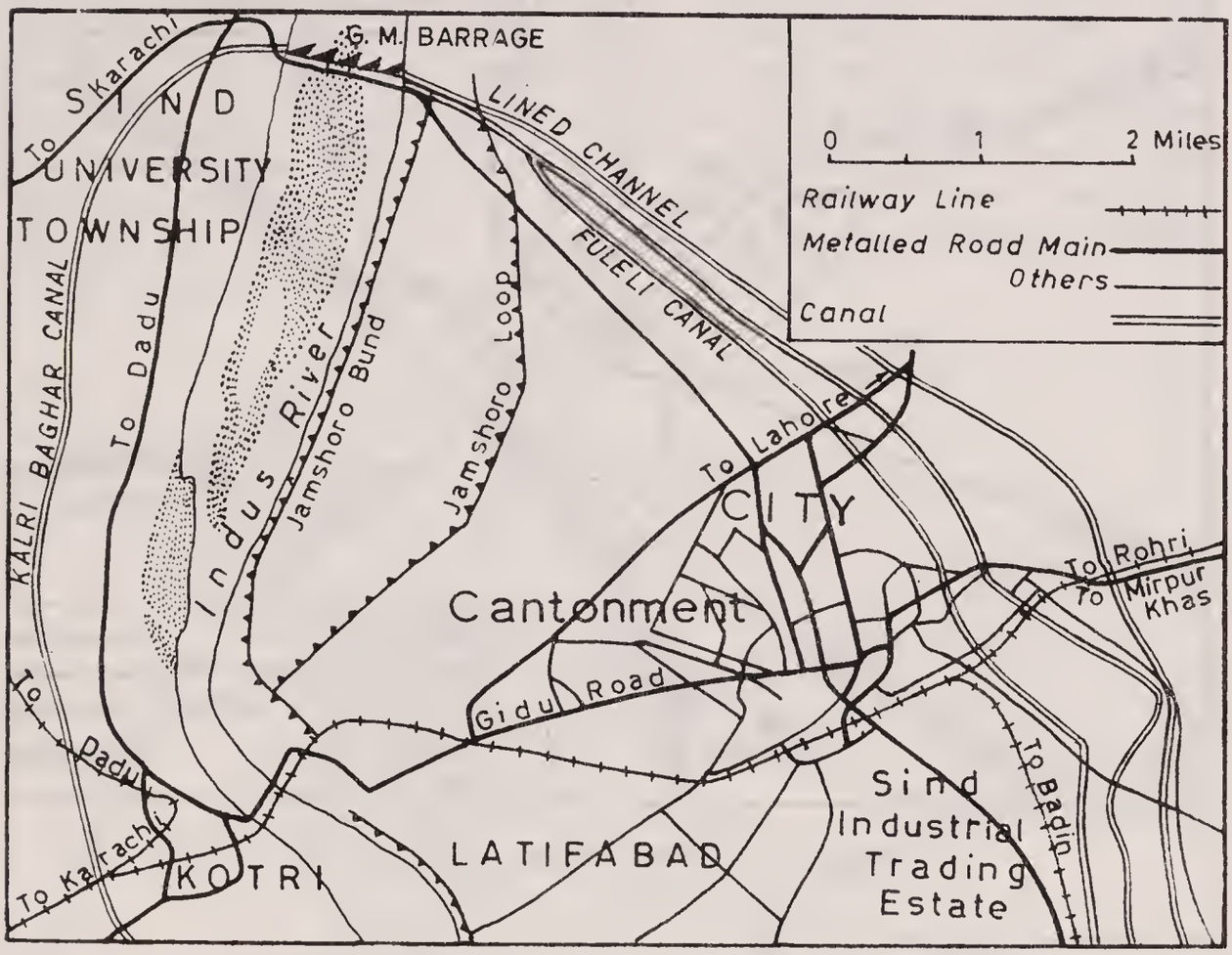


Fig. 42 Town Plan of Hyderabad

Lyallpur

This formerly little-known city is the fastest growing in the country. Ranked eleventh in population in 1901, by 1972 it was the third largest, with the population doubling or more than doubling over each of the past three decades. Lyallpur is situated in a fertile plain of markedly high productivity, and the agricultural prosperity of the surrounding area has been the cause of the exceptionally high rate of growth. Apart from being an important commercial centre for agricultural products, especially cotton and wheat, the city has witnessed a remarkable development of industries related to agriculture. Textiles are the most important industry, but others include cotton ginning, vegetable oil, fertilisers, sugar, hosiery goods, agricultural implements, and silk, rice and grain processing.

Lyallpur was established in 1870 and is a modern and well-planned city now covering an area of 29.1 sq. miles It is the District headquarters and the administrative centre of the Lower Chenab Canal organization. It is a nodal point of road and rail communications and contains the Agricultural University and the Institute of Textile Technology (fig. 43).

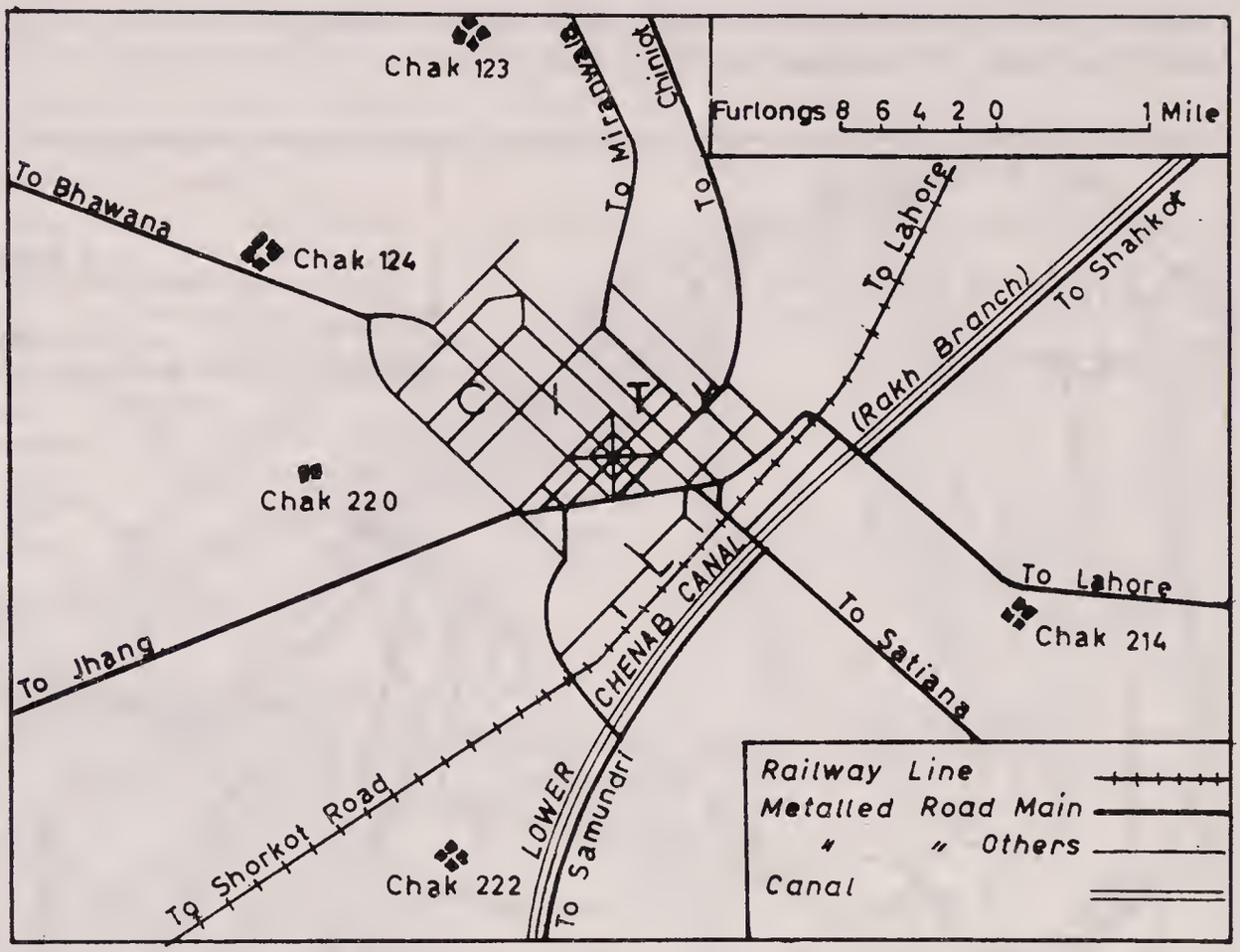


Fig. 43 Town Plan of Lyallpur

Lahore

Lahore ranks second in population among the urban centres of Pakistan (pop. 1972: 2,148,000). Set in the midst of the fertile alluvial plains of the Punjab, it occupies a focal position in the Upper Indus Plain, at the bridge-head over the Ravi on the historic route from Central Asia into the sub-continent. It has been the capital of the Punjab for about a thousand years. Before Independence, it was the capital of the undivided province of the Punjab. It is now the capital of Punjab Province, Pakistan.

Although Lahore is an ancient city, its earliest written record occurs in connection with the campaigns of Mahmood of Ghazni against the Rajas of Lahore between A.D. 1001 and 1008. From that time onward, Lahore figured prominently in the historical annals of the Punjab region. The period of Moghul rule, starting from 1524, was the golden period, when at times the Royal Court was held in Lahore. After the decline of Moghul power, Lahore suffered from the political instability of the region until the Sikh ruler, Ranjit Singh, came to power (1798–1839). It again suffered under the successors of Ranjit Singh and was reduced to 'a mere expanse of crumbling ruins' by the time it came under British occupation in 1849.

Before the British period, the city was mostly contained within a defensive wall, and occupied a bluff on the left bank of the Ravi. This area remains congested and overcrowded During the British period, it extended beyond the city walls in both planned and unplanned development. Planned development included the Mall (now the Shahrahe Quaid-i-Azam) and areas to the south of this road, and the cantonment section. Since 1947, development has been, for the most part, planned and includes upper and middle class residential districts and local marketing and other facilities. The city now covers 128 sq. miles, with an average population density of 16,780 persons per sq. mile.

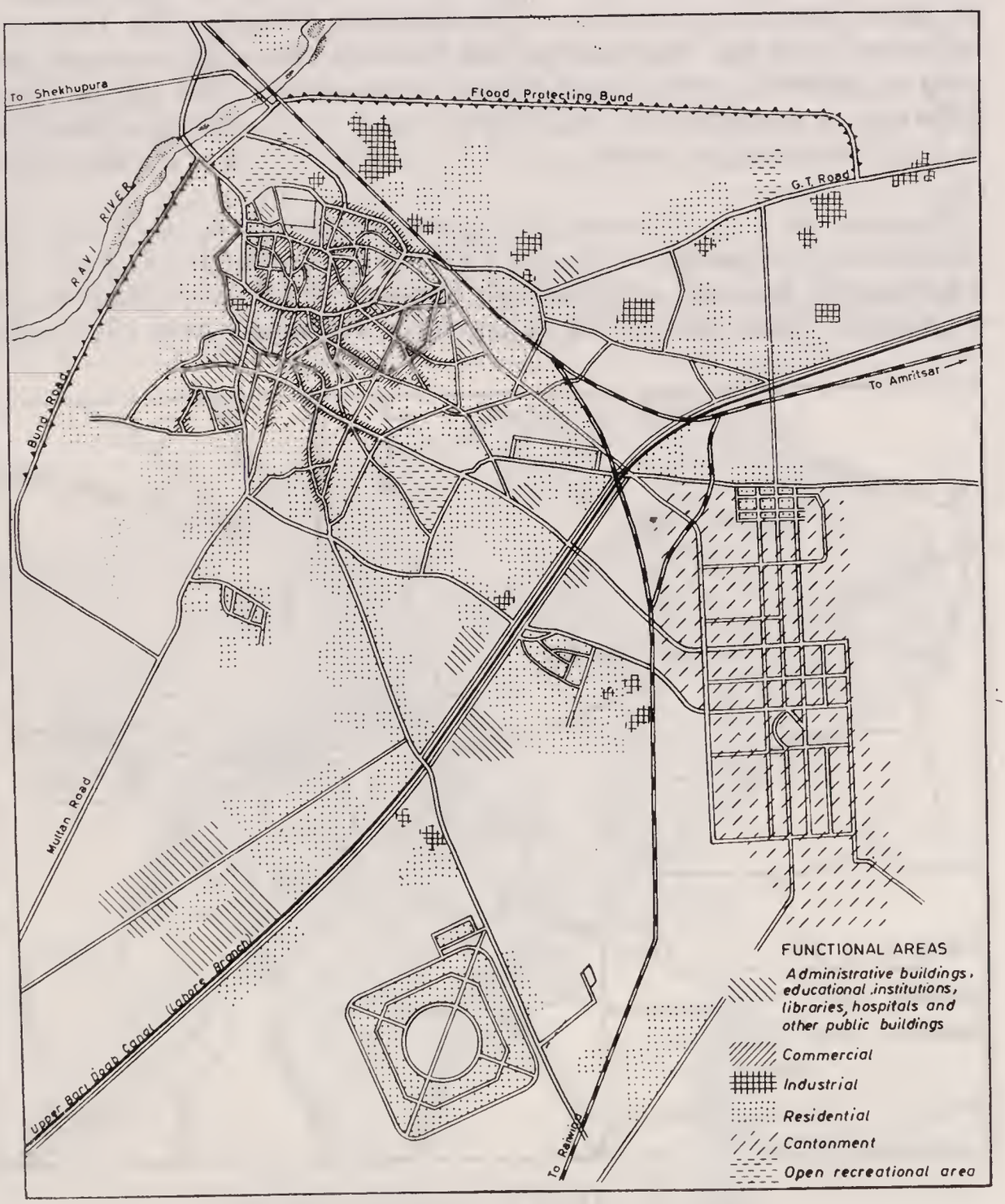


Fig. 44 Lahore: urban land use

Of the total population, one-third is gainfully employed, 30 per cent in industry, 25 per cent in trade and commerce and 26 per cent in services (Government, Community and personal). Eighteen per cent of all the industrial establishments in Pakisan, mainly textile factories, are in Lahore and these occupy about 10 per cent of the area of the city. Lahore is well connected with the other important cities of Pakistan by rail, road and air. Restricted communication has been re-opened with India through the Wagah border, about 17 miles to the east. Lahore is an important educational centre (fig. 44).

Islamabad–Rawalpindi

Islamabad and Rawalpindi, each of which has its own independent city administration, are often regarded as twin-cities because of their physical proximity. The distance between the two is 9 miles and with the expansion of the built-up area they may not take long to coalesce. Rawalpindi airport serves both. The two are very different in construction and layout, and in function: Islamabad is an administrative centre, while Rawalpindi is a multi-functional city.

Rawalpindi is a thriving city, growing more rapidly since the selection of Islamabad as the site for the new capital in 1959. It has a favourable location on the Pindi Plain of the Potwar Plateau, on the Grand Trunk Road 108 miles from Peshawar and 179 miles

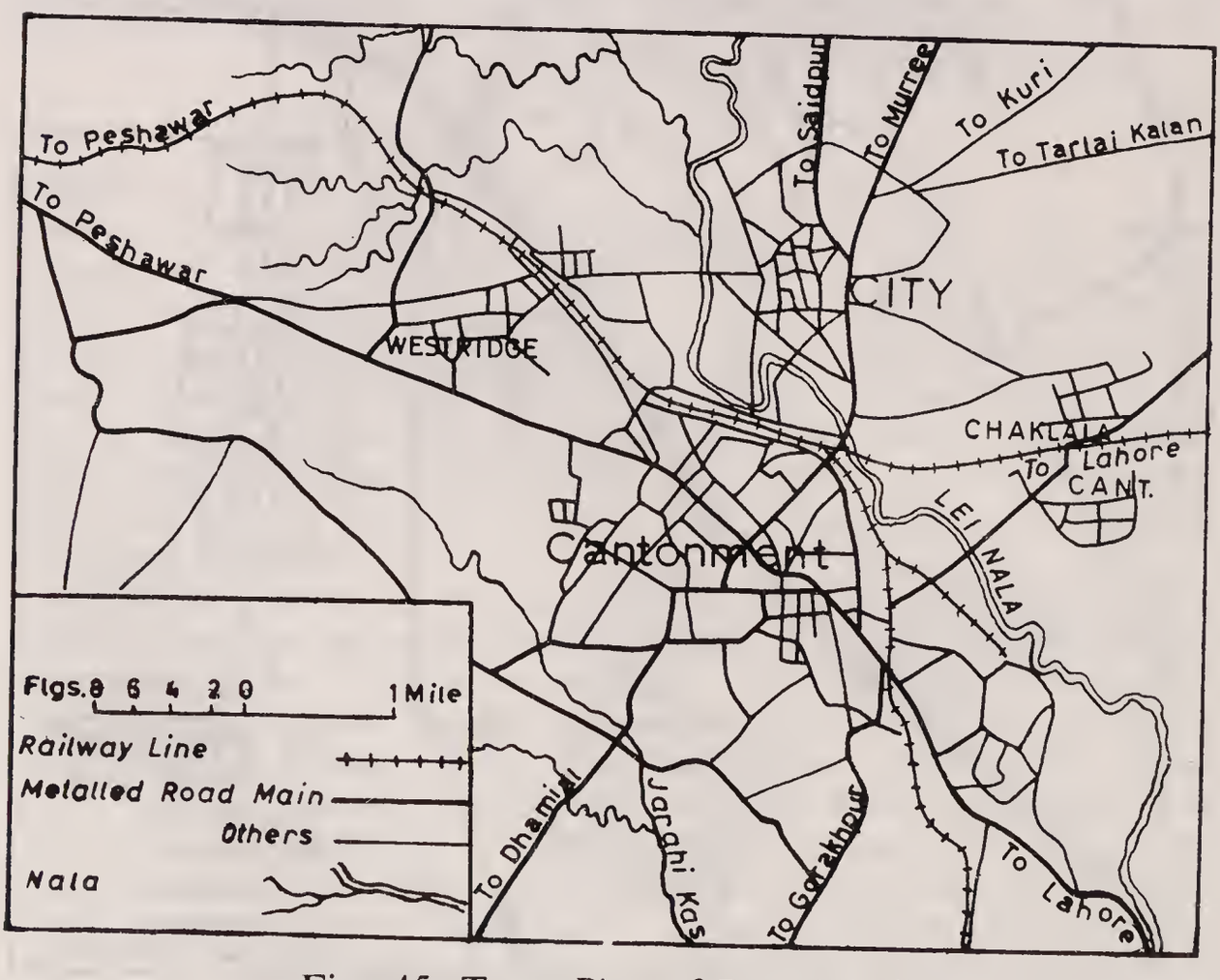


Fig. 45 Town Plan of Rawalpindi

from Lahore. It is also the junction of the main road through Murree to Kashmir. The main extension of the city in recent years has been along the Murree Road, where a sizeable residential area Satellite Town, was planned in 1952. Since then, the commercial function of the road between the satellite town and the old city has improved remarkably, furnishing an interesting example of re-adjustment in the functional landscape of a city. Recently Rawalpindi has also been growing as an industrial centre, with 2 per cent of Pakistan's industrial establishments now located there. Industries comprize cotton and silk textiles, hosiery, foundries, electrical goods, medicines, printing and publishing, an oil refinery, and a brewery (fig. 45).

Islamabad, the capital of Pakistan, with a population in 1972 of 77,000 is a city still under construction. The site consists of gently undulating land, with the Himalayan foothills forming a scenic background. The diversified topography has been utilized in a spacious and attractive layout, with different functional zones. The eight zones are (1) administrative sector; (2) diplomatic enclave; (3) special institutions; (4) industrial zones; (5) commercial areas (6) residential sectors; (7) National Park area including Islamabad University; and (8) Forest and Green Belt. As buildings are completed, more and more functions of the national government are transferred to Islamabad. The National Assembly meets there and

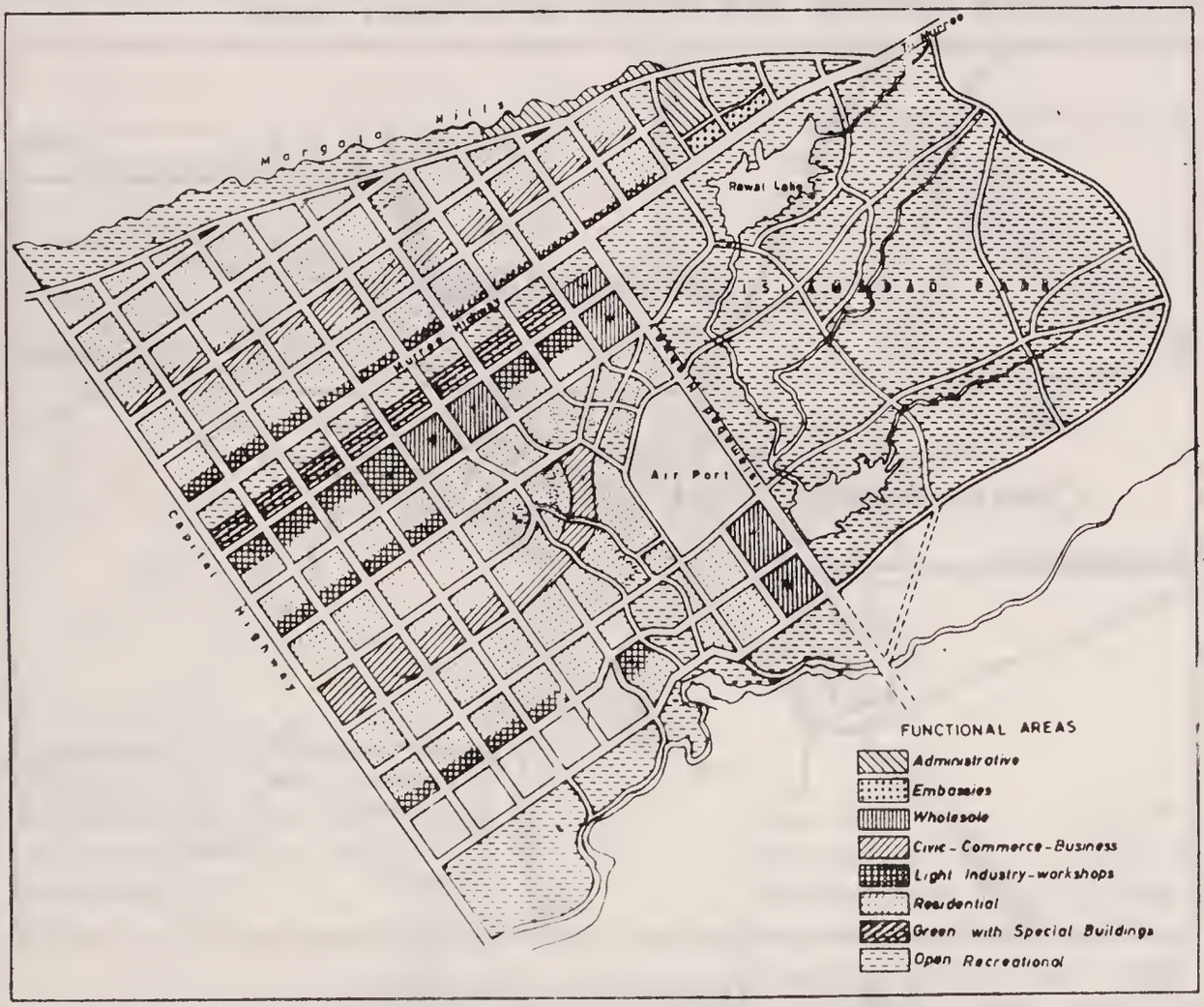


Fig. 46 Islamabad: urban land use

all foreign embassies have been transferred there from Karachi. The site of the ancient city of Taxila is nearby (fig. 46).

Peshawar

The capital of the N.W.F.P., Peshawar is an old city of great historical importance. It lies at the eastern end of the famous Khyber Pass through which came most of the past invaders of the subcontinent. The history of Peshawar goes back to the Buddhist Kingdom of Gandhara (first century A.D.), famous for its art works. Pushkalavati, identified by Cunningham[1] with the modern settlement of Charsadda, was the capital of Gandhara. By the time of the visit of the Chinese pilgrim, Hwen Thsang, in A.D. 630, Peshawar had become a 'great city' some 2–3 miles in circumference. It is next mentioned by the Muslim historian, Masudi, as being taken by Sabuktagin in 997, and being the rallying point of Mahmood's invasions of India in 1017 and 1023. Babar conquered Peshawar in 1505, and it remained under the control of the Moghuls until falling to Ranjit Singh in 1823. This was followed by British occupation in 1849.

The long and chequered history of Peshawar has resulted in the presence of several old structural remains. The fort, Bala Hisar, is said to have been built by Babar, but destroyed not long after by neighbouring Afghans, and re-built on a larger scale.[2]

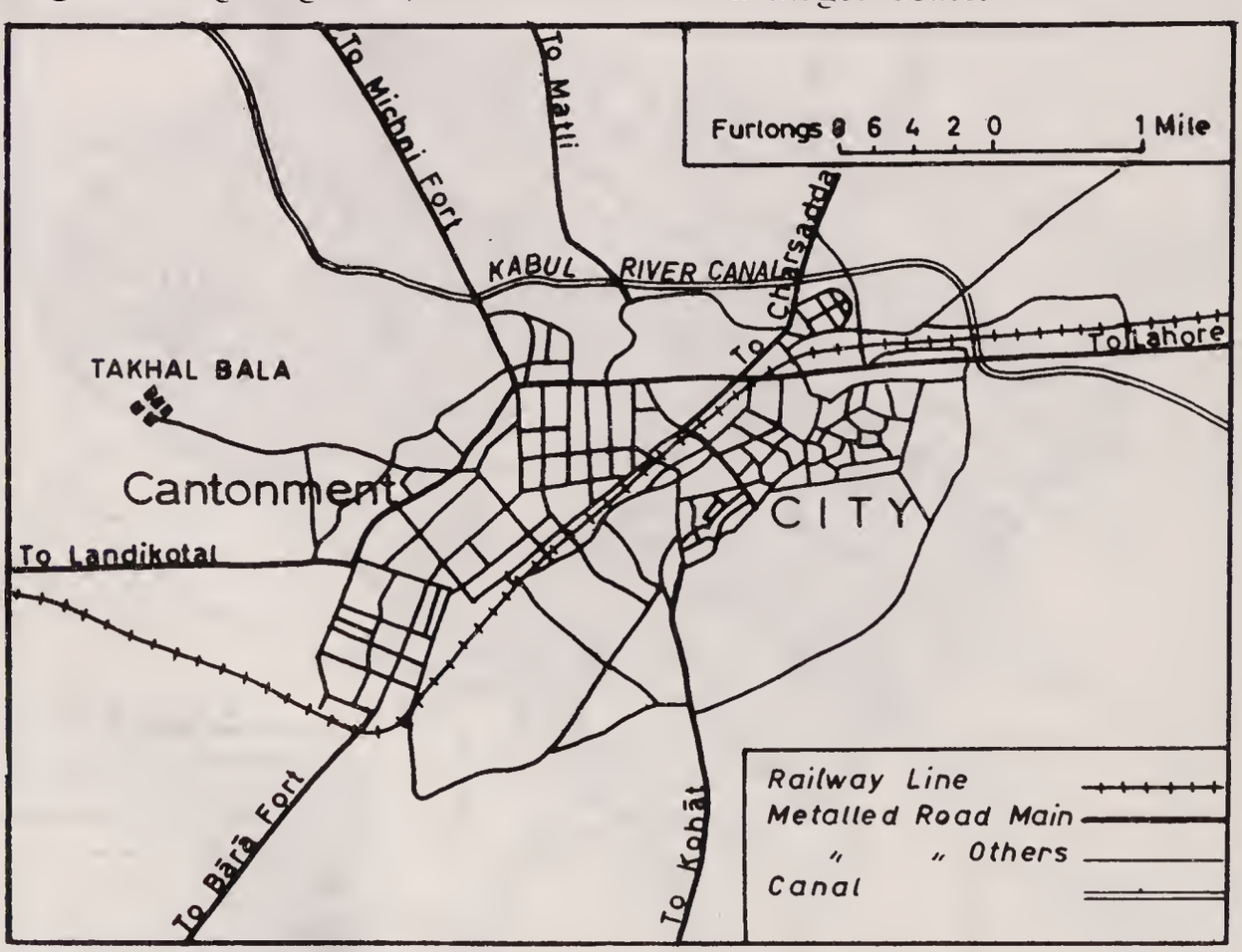


Fig. 47 Town Plan of Peshawar

[1] A. Cunningham, *Ancient Geography of India*, Calcutta, 1924, pp. 56-60 and 91.

[2] S. M. Jaffar, *Peshawar, Past and Present*, Peshawar, 1945, p. 98.

The population of Peshawar (273,000 in 1972) is steadily increasing. The Peshawar Plain in which the city is located is land of high fertility. In addition to being a local marketing centre, Peshawar is a way-station for trucks entering and leaving the Khyber Pass en route to and from Afghanistan and Central Asia. It is also the headquarters of the Pakistan Air Force, has a large cantonment, and a university. Industries include textiles, fruit canning, furniture, and various handicrafts (fig. 47).

Quetta

Quetta has the distinction of being the only sizeable urban settlement in the vast area of Baluchistan. It is the headquarters of Quetta-Pishin district, a divisional headquarters, and the capital of the province. The name 'Quetta' is derived from the Pashto word 'kwatta', meaning 'fort', and the immediate predecessor of the present settlement was located at Miri, which also means 'fort'. Quetta came into being after the treaty of Gandamak (1879) at the end of the Second Afghan War, and the permanent lease of the Bolan Pass area to British India by the state of Kalat (1883). To this day, the city derives most of its importance from its strategic location on the Khojak-Bolan Pass, and the cantonment population is about one-third that of the entire city.

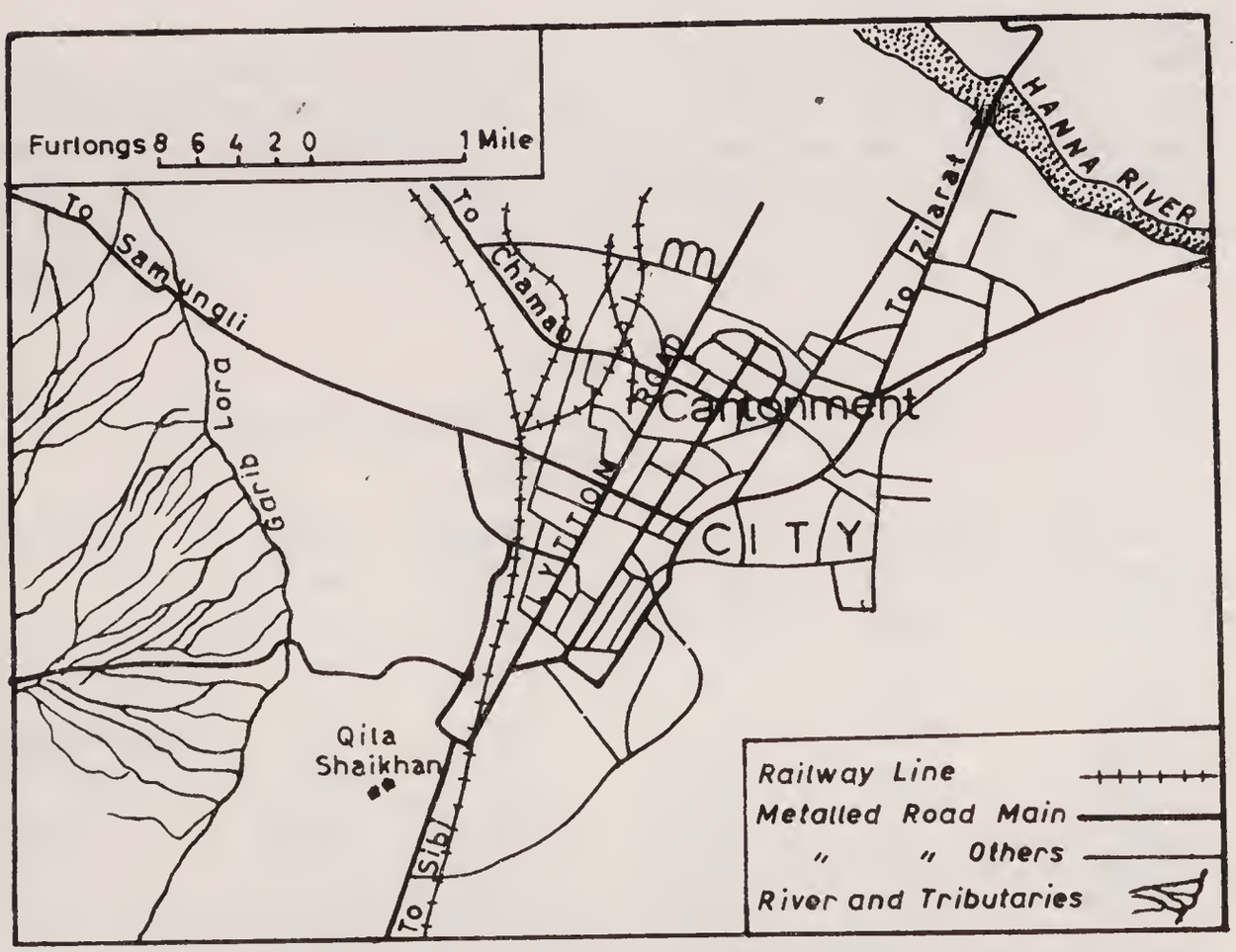


Fig. 48 Town Plan of Quetta

Quetta is also a commercial centre, an outlet for goods imported from Afghanistan. These include hand-woven woollen cloth, sheepskin coats, and carpets. The city is well planned, with rectilinear streets, and includes a university, the headquarters of the Geological Survey of Pakistan, and a centre for seismic studies—Quetta being in a sensitive location for the study of earthquakes (fig. 48).

Part IV

Agriculture, Livestock and Fisheries

12. AGRICULTURE: PERFORMANCE AND PROBLEMS

The economy of Pakistan is predominantly agricultural. Although of recent years the rate of growth of manufacturing has surpassed that of agriculture, the latter remains the most important single sector of the economy, contributing more than two-fifths of national income and employing two-thirds of the working population.

TABLE 12

Cultivated Area (Average 1966/7–1970/1).
(*million acres*)

Province	*Net Sown*	*Current Fallow*	*Total Cultivated (Cols. 2+3)*	*Sown More Than Once*	*Total Cropped (Cols. 2+5)*
1	*2*	*3*	*4*	*5*	*6*
Baluchistan	1.30	2.44	3.74	0.06	1.36
N.W.F.P.	3.08	0.87	3.95	0.49	3.57
Punjab	23.64	3.24	26.88	2.81	26.45
Sind	7.57	5.37	12.94	1.23	8.80
TOTAL	35.59	11.92	47.51	4.59	40.18

Yearbook of Agricultural Statistics, 1971-2, Ministry of Agriculture and Works, Islamabad.

Of the estimated total area of Pakistan (131.7 million acres) 47.5 million, or over 30 per cent, is cultivated. Of the area cultivated, more than half is in Punjab Province. On an average, three-quarters of the cultivated area is sown each year, and the remainder left fallow. About 13 per cent of the sown area is double-cropped. Agriculture is highly dependent on irrigation, and 65 per cent of the cultivated area is irrigated.

AGRICULTURAL PERFORMANCE

The agricultural growth rate increased from 3.8 per cent in the Second Plan, 1960–65, to 5.7 per cent in the Third Plan, 1965–70. Agriculture is progressing toward the objective of self-sufficiency in food grains. Pakistan grew 80 per cent of her food grain requirement in 1972/73. The advance in agricultural production has resulted from several interrelated efforts:

Improvement of Irrigation Facilities

During the five years, 1965/6 to 1969/70, the supply of irrigation water increased by 20 per cent. The uncertainty of agriculture resulting from aridity and variability of rainfall was thus reduced and farm incomes commensurately stabilized. During the Fourth Plan (1970–5), an additional area of 1.2 million acres is to be irrigated and 7.5 million acres of presently irrigated land are to receive supplementary supplies.

Use of Chemical Fertilizers

With a view to encouraging the use of chemical fertilizers, the government subsidises prices to the extent of 35 per cent. In 1970/1, consumption was 289,000 tons, with an average use of 12 lbs. per acre of arable land. Additional fertilizer plants are being established in the country and, with government assistance, applications will soon be heavier and more widespread.

Plant Protection Programmes

The environmental conditions of Pakistan are promotive of pests and plant diseases. Plant protection programmes have two aspects, preventive and curative. Preventive measures comprise the breeding and treatment of seeds to be resistant to diseases, and curative measures entail spraying with insecticides against pests and diseases. The plant protection programme covered 2.5 million acres under preventive measures and 1.6 million acres under curative measures in 1969/70 and is being further intensified.

Introduction of High-Yielding Varieties

Much of Pakistan's 'green revolution' is attributable to the introduction of scientifically-bred varieties of seed which have much higher yields per plant than the varieties previously used. These new varieties include Mexi-Pak for wheat, Irri-Pak for rice, and

MS-39 and MS-40 for cotton. All have responded well under conditions of adequate watering and heavy manuring. High-yielding varieties of maize, oil-seeds, and fodder crops, including strains adapted to the hilly areas, have also been developed. In the *barani* or rain-fed areas, where application of the new technology of improved seeds remains limited, the emphasis is on soil conservation programmes.

Mechanization

The recent break-through in agriculture has prompted increased mechanization, as evidenced by the increasing number of tractors, the total number of which is now about 20,000. A substantial proportion of these are privately, rather than co-operatively or governmentally, owned. (Only 2 per cent are owned and used co-operatively.) Their use is almost entirely in irrigated, rather than *barani*, areas.

Land Reforms

Under the West Pakistan Consolidation of Holdings Act of 1960, about 12.5 million acres in small, sub-marginal farms were consolidated into larger holdings of greater economic viability. The minimum 'economic' holding is adjudged 12.5 acres of irrigated, and 16 acres of un-irrigated land. On the other hand, under the Land Reforms of 1959, about 2.4 million acres was resumed from big landlords and sold to 200,000 tenants, to intensify the use of this land. The Land Reforms of March 1972 were designed to further arrest the concentration of landed wealth and to rationalise the landlord–tenant relationship.

The 1959 reforms fixed the ceiling for individual ownership of irrigated land at 36,000 produce index units, that is 500 acres of irrigated or 1,000 acres of un-irrigated land. This apparently high ceiling was further liberalized by allowing a series of exemptions for orchards, stud farms, and *shikargarh* (areas reserved for game). The recent reforms lowered the ceiling to 15,000 produce units, that is, 150 acres of irrigated or 300 acres of un-irrigated land. An additional area of 3,000 produce units is allowed to an existing owner of a tractor or a tube-well. Lands resumed from big landlords are to be distributed on easy instalment terms among landless tenants or holders of below-subsistence farms. Prior to the reforms, 79 per cent of the farms were of 10 acres or less. To check sub-division and fragmentation into sub-marginal holdings, the previous restrictions on the division of joint holdings and the alienation of holdings remain in force.

Tenant–landlord relations have been modified to assist the tenant. According to the new rules, the *batai* or tenant's share of a farm's produce will be increased, the landlord becomes responsible for the payment of all land taxes, and the tenant is given security of tenure and the right of pre-emption in the event of sale of the land.

AGRICULTURAL PROBLEMS

Agriculture in Pakistan has its numerous problems. It is occasionally exposed to the vagaries of nature, such as failure of rains, floods, pests, diseases, and locust swarms. In addition to plant protection and breeding, irrigation and flood control, four other major programmes are directed toward improving agricultural productivity. The first of these, the SCARP projects for the reduction of salinity and water-logging, has already been discussed. Through government agency 8,270 tube-wells have been installed to depress the water-table, leach salts, and supply additional irrigation water.

Other programmes now under way relate to the control of *soil erosion*. Soil erosion is adversely affecting extensive areas, particularly in the rough and undulating hilly lands and plateaux, where sheet and gully erosion are much in evidence and the land has been badly dissected. No detailed official survey of eroded lands in Pakistan has yet been made, but a survey for the Punjab places the eroded acreage at 3 million, of which 0.5 million acres have been totally destroyed, and 1 million acres seriously damaged.[1] In the N.W.F.P., almost the whole area, apart from Mardan District, suffers from soil erosion, while in Sind wind erosion is a serious problem in Tharparkar and Khairpur Districts. In large areas of Baluchistan, bedrock has been exposed as a result of loss of topsoil.

Control of soil erosion requires a planned system of land use in the catchment areas, afforestation and re-grassing of the land surface, proper management practices in agriculture and livestock grazing, and a variety of engineering projects to re-direct and delay run-off. At present, several government departments are working separately on such problems in individual drainage basins. No co-ordinated master plan has yet been prepared to tackle the problem on a large scale.

A third problem, and one to which attention is being directed is that of *farming techniques*. The average Pakistani farmer is unable to put his land to the best possible use and maximize its productivity because he lacks the professional know-how and necessary monetary resources to do so. To assist him, the government offers various facilities. The Food and Agricultural Commission was set up in 1959. Since then, the Agricultural Development Corporation and the Agricultural Research Council inter alia have been established to advise farmers on various technical aspects of agriculture, to facilitate the flow of such supplies as seed and fertilizer, and to encourage co-operation. Demonstration farms illustrate modern agricultural methods and monetary assistance is provided in the form of loans. In 1970/1, the Agricultural Development Bank provided Rs. 92.6 million in loans to needy farmers. In addition, *taccavi* loans[2]

[1] *Soil Erosion in the Punjab* Board of Economic Enquiry, Lahore, 1955, p. 7.

[2] State loans granted to agriculturalists at a concessionary rate of interest.

Ushu, Upper Swat, N.W.F.P.

Lowari Top Road, N.W.F.P.

Bolan Pass, Baluchistan

Khyber Pass, N.W.F.P.

worth Rs. 8.8 million were sanctioned. Also, the 29,000 agricultural co-operative societies have some Rs. 100 million on loan to members.

A fourth problem, and the most significant in human terms, is the quantity and quality of the food supply, in other words, the national *diet*. The Pakistani diet is low when measured both by calorific content and nutritional value. It is lower than the requisite levels by 250 calories, and 14 grams of protein, per capita, per day. About 75 per cent of the calories and 80 per cent of the proteins are obtained from grains. The per capita food intake, although still deficient, is improving.

TABLE 13

Daily Per Capita Consumption of Calories and Proteins

Nutrient	*1959/60*	*1964/65*	*1969/70 (est.)*
Calories (numbers)	1,890	2,052	2,097
(a) foodgrains	1,395	1,540	1,584
(b) fats & oils	46	62	63
(c) other sources	449	450	450
Proteins (grams)	44	48	49
(a) Plant sources	37	40	41
(b) animal sources	7	8	9

Fourth Five Year Plan, Govt. of Pakistan, p. 120.

Since the normal diet is exceptionally deficient in protein, the government wishes to promote the production of protein-rich and fat-bearing foods, including soya-beans, groundnuts, and pulses. Some pilot work has been started on the establishment of agricultural estates in Rawalpindi, Islamabad, Lahore, and Karachi. Growth of population must not outstrip the growth of food supply.

13. PRINCIPAL CROPS

Pakistan has a diversified agriculture resulting from the variety of climates and landforms. In 1971/2, the value of food crops was Rs. 564.4 crore, and that of cash crops, excluding fruits, Rs. 333.7 crore. The agricultural year has two main cropping seasons, *rabi* or *asari* and *kharif* or *saoni*. *Rabi crops* are sown after the rainy season in October and November, and harvested in spring in April and May. They include wheat, barley, gram, and oil-seeds. These crops require lower temperatures and lower rainfall than *kharif crops* which are sown between April and June and harvested in October and November. *Kharif crops* include rice, maize, millets (jowar and bajra), cotton, and sugar-cane. In any one year, about 55 per cent of the sown area is under cultivation in rabi, and 45 per cent in kharif. Land use in the Indus Plain is illustrated in fig. 49.

TABLE 14

Acreage under Principal Crops (Average 1965/6 to 1969/70)
(*thousand acres*)

Crop	*N.W.F.P.*	*Punjab*	*Sind*	*Baluchistan*	*TOTAL*
Wheat	1,488	10,323	1,959	498	14,268
Rice	116	1,718	1,711	112	3,657
Maize	751	666	36	13	1,466
Barley	144	209	30	16	399
Millets	149	1,783	1,154	204	3,290
Cotton	6	3,126	1,043	—	4,175
Sugar-cane	202	1,057	180	—	1,439
Tobacco	81	76	2	3	162

Yearbook of Agricultural Statistics, 1971-2, Govt. of Pakistan, Islamabad, 1972.

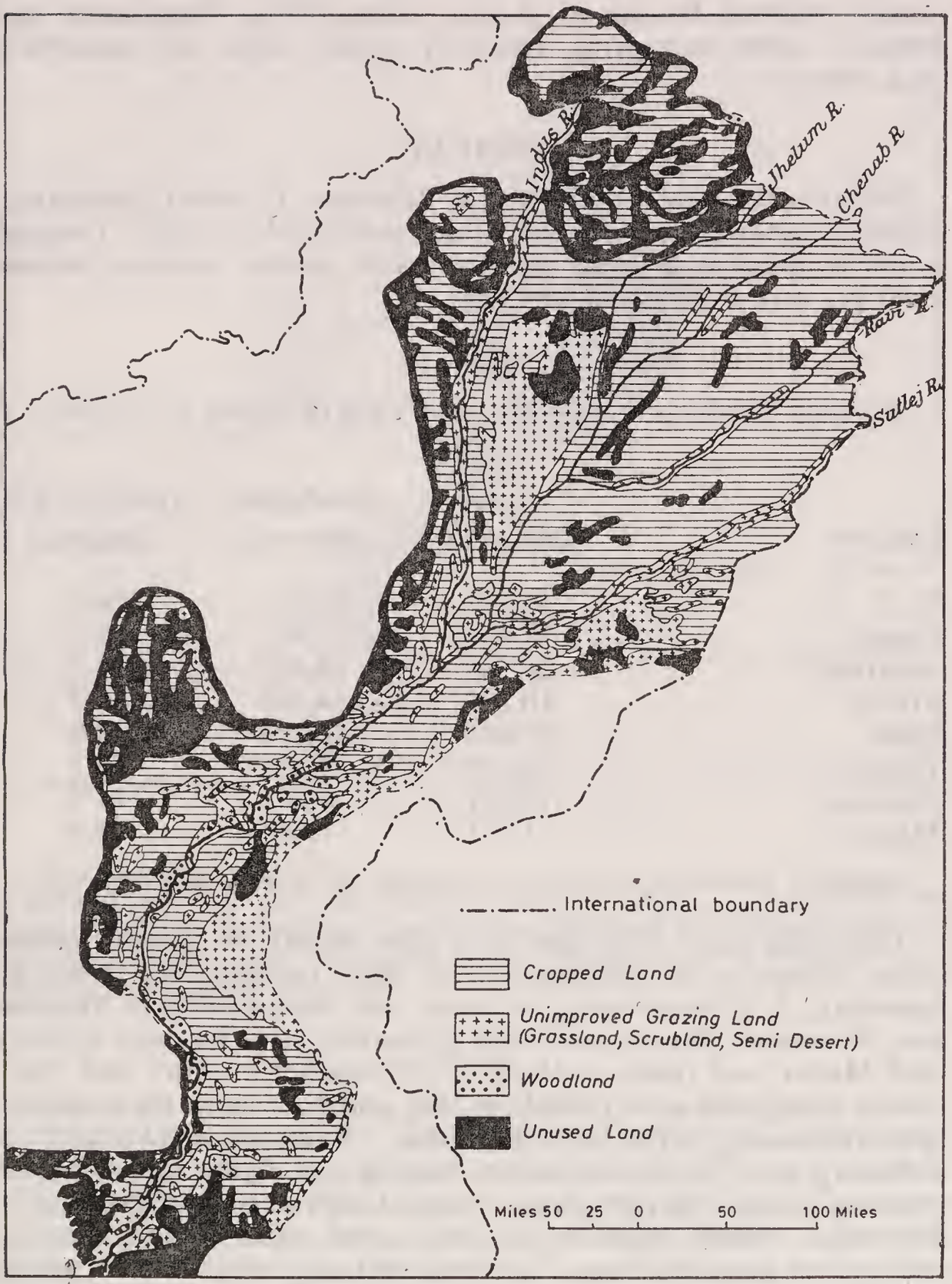


Fig. 49 Indus Plain: Land use

Two-thirds of the acreage under these important crops is in a single province, the Punjab. Acreage in Sind is about one-third that of the Punjab, and N.W.F.P. has half that of Sind, while the cropped acreage in Baluchistan, the biggest province, is relatively small. In terms of acreage, wheat is the most important crop, occupying 36 per cent of the cropped area. Next comes cotton (10%)

closely followed by rice (9%) and millets (8%). Sugar-cane and tobacco, while occupying relatively small areas, are important cash crops.

WHEAT

Wheat is the staple food grain of Pakistan. In wheat production, Pakistan ranks eleventh in the world, and fourth in Asia. Tonnage is not as great as in some countries with smaller acreages because yield per acre is still relatively low.

TABLE 15

Acreage, Production, and Per Acre Yield of Wheat by Country
1968

Country	*Area* (000 acres)	*Production* (000 tons)	*Yield per Acre* (maunds)
U. S. A.	55,237	42,221	20.7
Canada	28,921	17,407	16.3
Australia	26,585	14,416	14.7
France	10,102	14,748	39.7
India	37,045	16,279	12.0
Turkey	20,629	9,451	12.5
Pakistan	15,511	6,605	11.6
Mexico	1,771	1,864	28.6

Yearbook of Agricultural Statistics, 1971-2, Govt. of Pakistan, Islamabad, 1972.

The wheat plant is adapted to a wide variety of climatic conditions, excepting a combination of high temperatures and high humidity. It is sown during the cooler and drier months of October and November, thrives well with occasional rains between January and March, and ripens in the hot, dry weather of April and May. Fairly strong and steady winds in May and June assist the threshing and winnowing of the harvested grain. Rain and wind storms in February and March can cause 'lodging', or 'lying down' of the growing plants. In many areas, natural rainfall is supplemented by irrigation. Wheat requires soils with good water-holding capacity and fair to good drainage. Climatic and soil conditions for wheat occur over an extensive area of the Indus Plain, particularly the Punjab, where 70 per cent of the total acreage is found (fig. 50).

Annual production increased in the five years ending 1969/70 to 6.6 million tons, largely as a result of increased yields per acre. Average yields rose from 9.0 to 11.6 maunds per acre during this interval, primarily on account of the introduction of high-yielding Mexican varieties. The yield per acre of Mexican varieties is 19.2 maunds, about two and a half times that of the *desi* or local varieties, and the acreage under these is now double that of desi varieties.

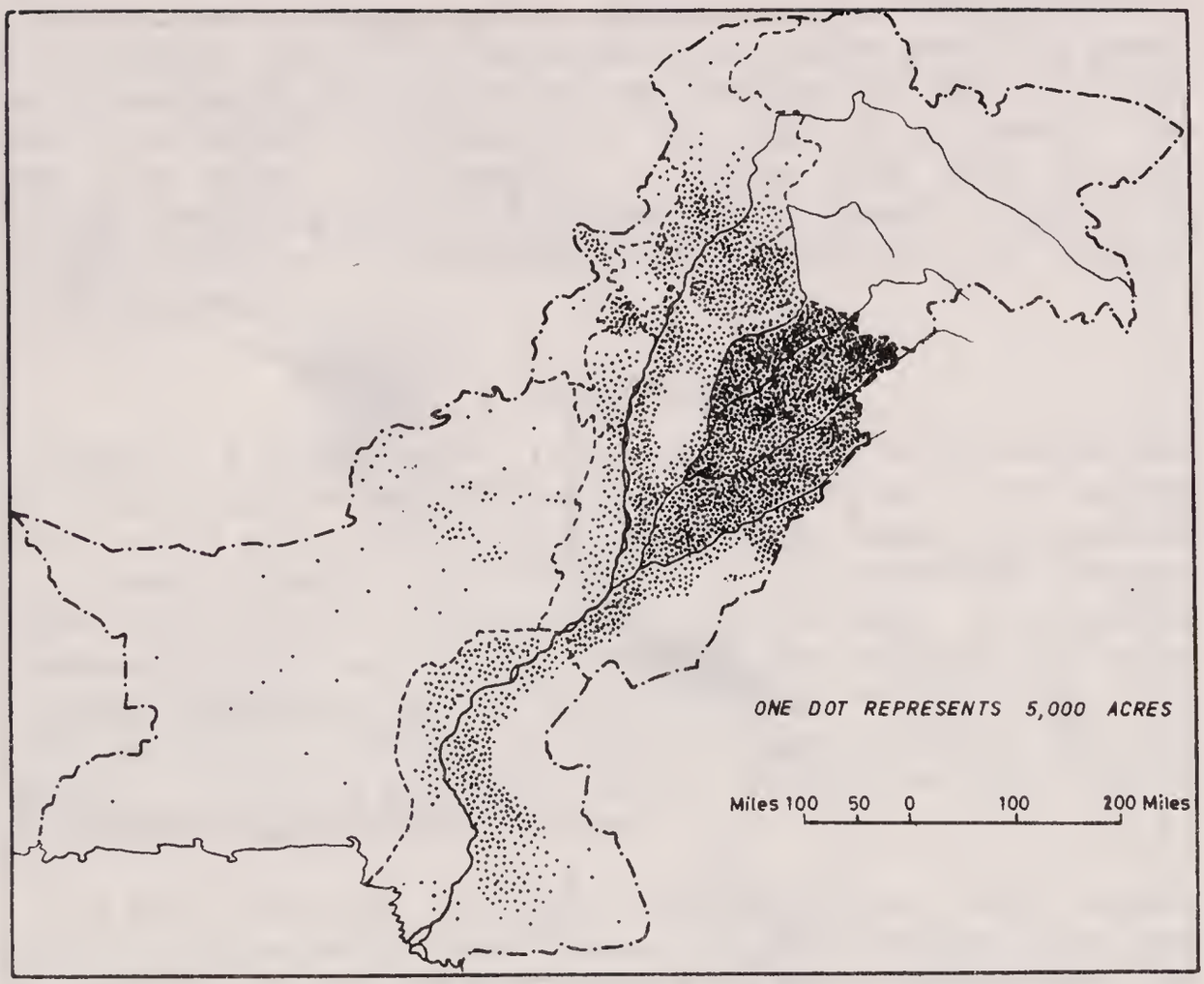


Fig. 50 Pakistan: Wheat

Lyallpur District has the highest average yield, 15.3 maunds per acre. Despite increasing production, Pakistan is not self-sufficient in wheat production. Imports were 227,000 tons in 1969/70, and 270,000 tons in 1971/2.

RICE

Rice is the second most important cereal, in terms of both acreage and production, with 3.7 million acres and a production of 1.7 million tons. The climatic and soil requirements of rice limit its distribution (fig. 51). Rice requires heavy rainfall or its equivalent in irrigation, and a rich alluvial soil with relatively impervious subsoil. For this reason, most of the rice acreage is localized to a few districts of the Punjab (Gujranwala, Sheikhupura, and Sialkot) and of Sind (Jacobabad, Larkana, Hyderabad, Sukkur, and Thatta).

Since rice is grown almost exlusively on irrigated land, recent improvements in the irrigation system have added to acreage and increased yields. The yield of *desi* varieties increased from 9.5 maunds per acre at the time of Independance, to 12.7 maunds in 1969/70. Use of the Irri-Pak variety, with yields almost double those of *desi* varieties, began in 1967/8, and by 1970/71 had spread to 1.4 million acres with a production of 1 million tons. Before the loss of

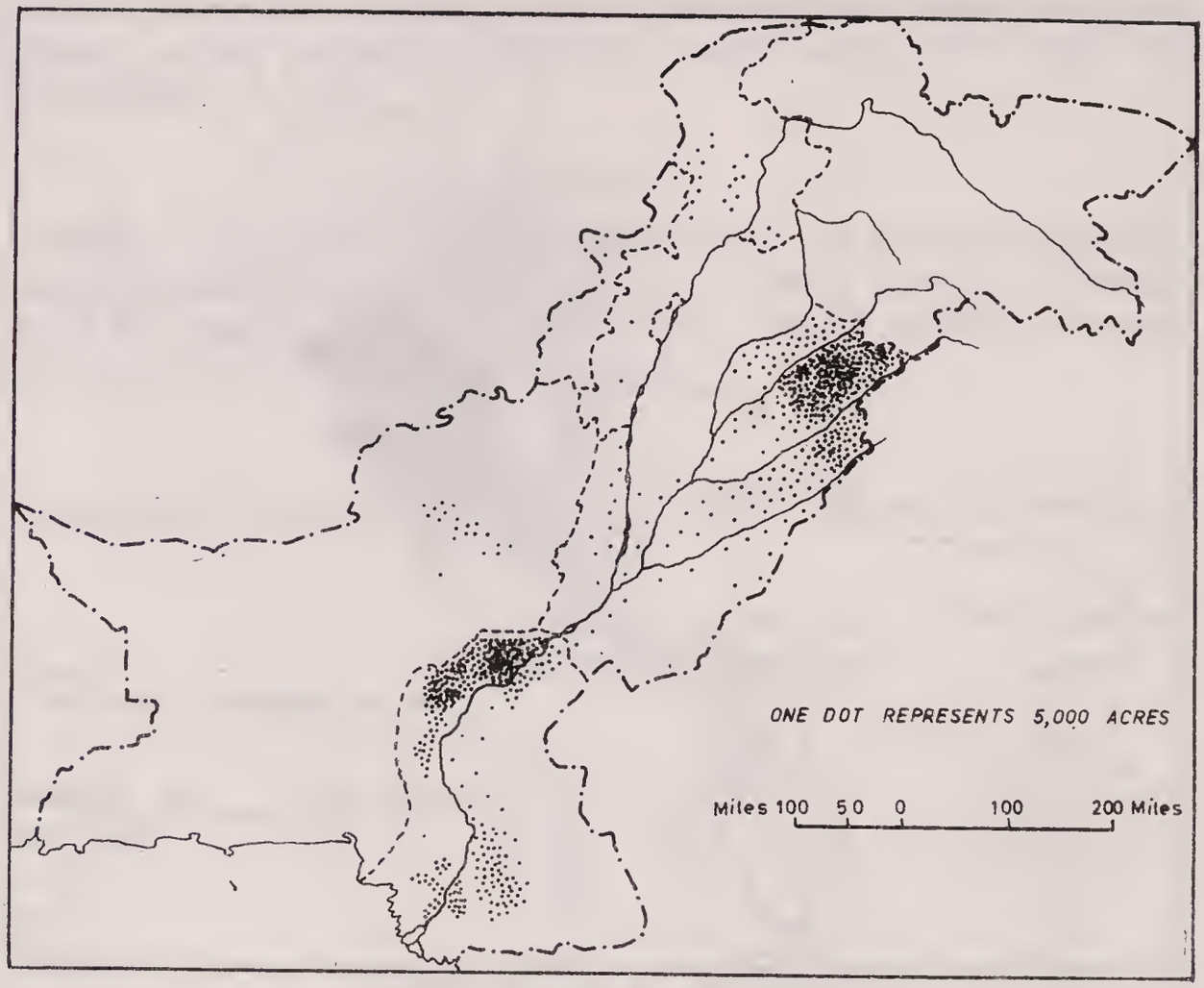


Fig. 51 Pakistan: Rice

the eastern wing, West Pakistan was shipping one to two lakh tons of rice annually to East Pakistan. Exports, principally of high-quality basmati rice, continue and in 1970/71 were 176,000 tons, worth Rs. 170 million.

MILLETS (JOWAR AND BAJRA)

Jowar and *bajra* taken together come third among cereals in terms of acreage, *bajra* occupying a larger area than *jowar*. The average annual production of millets is 625,000 tons. Per acre yield is low. Millets are coarser cereals, occupy poorer sandy lands, and have a short growing season. The young plant demands a fair amount of moisture, but after getting established it becomes fairly drought-resistant. Millets are grown mostly on poorer lands of the Punjab and Sind. Some *jowar* is grown also in Baluchistan, where its yield per acre is higher than that of the Punjab, but lower than that of Sind.

MAIZE

Maize requires sufficient moisture and warm sunny weather for its growth, and is thus a *kharif* crop. It is primarily a food crop,

although some is used as fodder. Maize is grown under both *barani* and irrigation conditions. In humid sub-montane areas it is grown as a *barani* crop. It occupies an area less than half that of millets but its production is slightly more than that of the latter. The per acre yield, 12.2 maunds, is higher than that of other cereals, excepting rice. The production of maize is highest in N.W.F.P., followed by the Punjab, but the yield per acre is higher in the Punjab.

BARLEY

Barley is a poorer crop. It is raised mostly in soils which are not rich enough for wheat cultivation, does well even in poor upland areas and is also more drought-resistant than wheat. It matures in a shorter growing period, when it requires moderate temperatures. One of its soil requirements is good drainage. It withstands moderate concentrations of soluble salts. The production of barley is small, 95,400 tons, mostly from the Punjab and N.W.F.P. The yield per acre, 6.5 maunds, is higher than that of millets. The production of barley is small in Sind, but the yield per acre there is appreciably higher, being 8.7 maunds.

The total area under foodgrains (excluding grams) taken together is 23.1 million acres, of which 63 per cent is in the Punjab, 21 per cent in Sind, 12 per cent in N.W.F.P. and 4 per cent in Baluchistan. The five-year average figures of acreage under foodgrains have registered a constant increase since 1950/51, with the greatest increase during the years 1965/66 to 1969/70. Production of food grains stands at 8.7 million tons, of which as much as 5.9 million tons is contributed by the Punjab, and 1.8 million tons by Sind. Along with acreage, production has also been on the increase, this increase being more marked during the years 1965/66 to 1969/70. In the year 1970/71, the production rose further to 10 million tons.

COTTON

Cotton forms the most important cash crop of Pakistan and plays an important role in the economy of the country. The export of raw cotton and cotton manufactures annually earns foreign exchange of 725 million rupees (average figures, 1966/67 to 1970/71). Pakistan is the sixth largest cotton growing country of the world (1969 statistics), after the U.S.A., U.S.S.R., China, India and Brazil. The annual production of cotton in Pakistan is on a par with that of the U.A.R. and Mexico. The area, production and per acre yield of some of the important cotton growing countries of the world are given in Table 16. The cotton acreage in Pakistan constitutes about 5 per cent of world acreage. Similarly, the production of cotton in Pakistan is about one-twentieth of that of the world.

TABLE 16

Area, Production and Per Acre Yield of Cotton in Some Important Countries, 1968

Country	*Area* (000 *acres*)	*Production* (000 *tons*)	*Yield per acre* (*maunds*)
U.S.A.	10,157	2,346	6.3
India	18,982	934	1.4
Brazil	5,597	587	2.7
Pakistan	4,347	522	3.3
Mexico	1,828	529	7.9
U.A.R.	1,519	430	7.6

Yearbook of Agricultural Statistics, 1971-72 Pakistan Islamabad, 1972.

In Pakistan, cotton is a kharif crop and is mainly grown on irrigated lands where its water requirements are much larger than the natural rainfall. Between five and eight irrigations are necessary during the growing season. Cotton also requires fertile soils of good moisture-retaining capacity, but well-drained and aerated (fig. 52).

Acreage and production are constantly increasing, primarily owing to improved inputs and seed technology. The last published

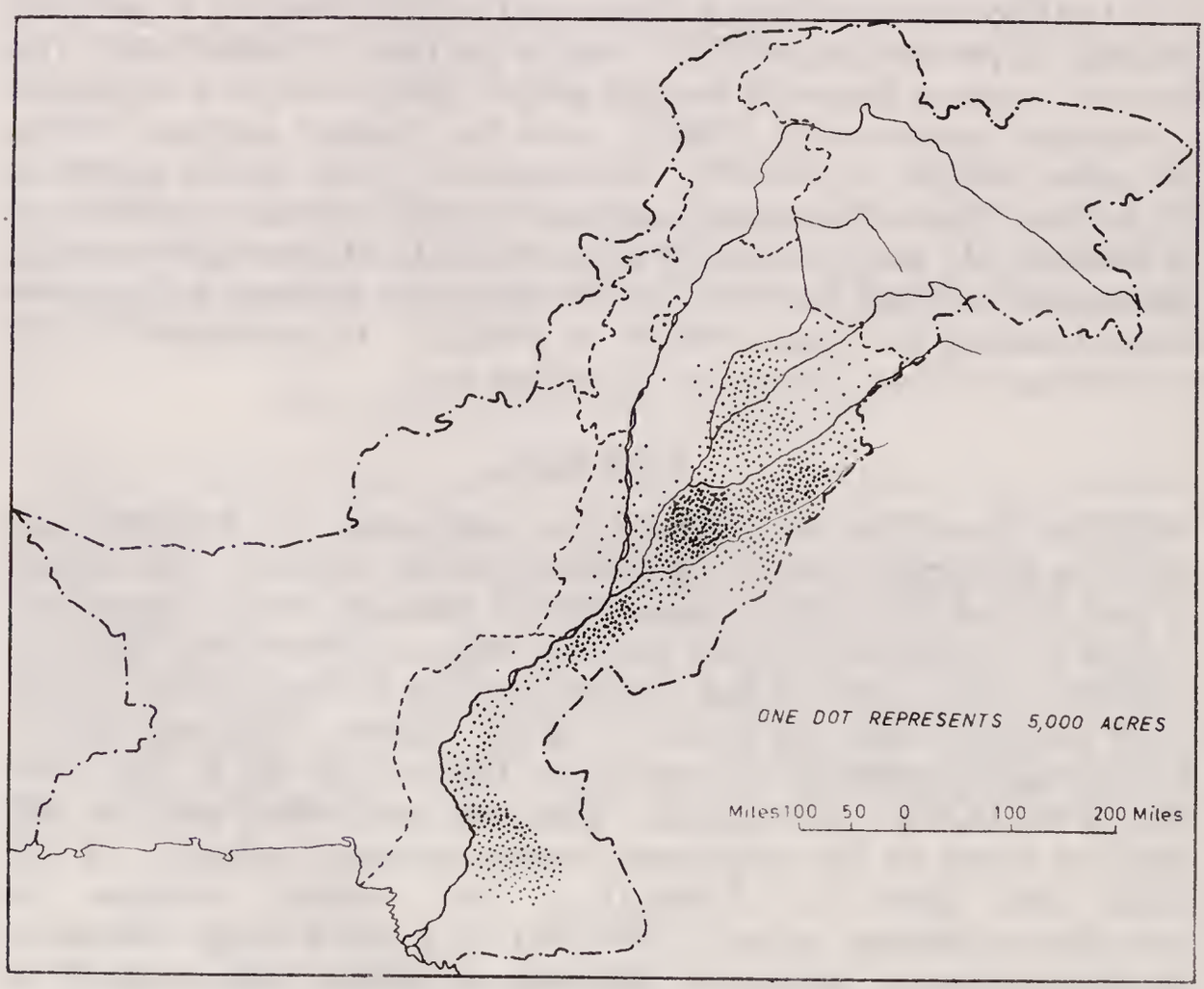


Fig 52 Pakistan: Cotton

data are for 1970/1, when production was a record 3.1 million bales. This compares with an average 1.1 million bales, 1947/8 to 1949/50. Three-quarters of the acreage is in the Punjab, and the remaining quarter in Sind, but Sind averages slightly higher yields.

While some high-yielding varieties have recently been introduced, with encouraging results, the traditional grouping of varieties is in Pak Upland and Desi. Pak Upland is the long staple American Upland variety with a much higher yield than the short staple Desi variety. The yield per acre of the former is 3.3 maunds, while that of the latter is 1.8 maunds. Pak Upland variety is grown over 90 per cent of the area sown with cotton, and accounts for 94 per cent of the total production.

SUGAR-CANE

Sugar-cane is one of the important cash crops. The plant requires plenty of moisture and fertile soil. In addition to normal rainfall, about sixteen irrigations are required for raising a good crop. Irrigation is needed more in the pre-monsoon period. Manuring is very helpful in increasing the output. The first three weeks of March are the best time for planting.

The area under sugar-cane has shown a marked increase, from 468,000 acres in 1947/48, to 1.6 million acres in 1970/71. Production increased during this interval from 5.4 million tons to 22.8 million tons. An improvement also took place in yield per acre, from 317 maunds to 395 maunds.

Acreage under sugar-cane is highest in the Punjab, followed by N.W.F.P. and Sind. About three-fourths of the total acreage is in the Punjab, where extensive suitable areas with irrigation facilities are available. The Punjab enjoys the advantage of having a long and defined summer, while in N.W.F.P. the duration of the frost-free period is limited. However, the yield per acre in the Punjab is less than that of Sind and N.W.F.P. The most important district for the production of sugar-cane is Lyallpur. Other important districts are Peshawar and Mardan in N.W.F.P.; Sargodha, Gujrat, Sahiwal, Multan, Bahawalnagar and Rahimyar Khan in Punjab. In Sind, Hyderabad district is prominent in the production of sugar-cane (fig. 53).

TOBACCO

Tobacco is one of the cash crops occupying a comparatively small area but yielding high returns to the farmer per unit area. Its cultivation in small areas to meet local requirements is quite widespread thoughout the plains. Such areas are generally scattered around urban agglomerations at some distance from the periphery of the urban centres. Larger acreage of tobacco fields is found in Mardan, Peshawar, Sahiwal, Gujrat and Lyallpur districts. The

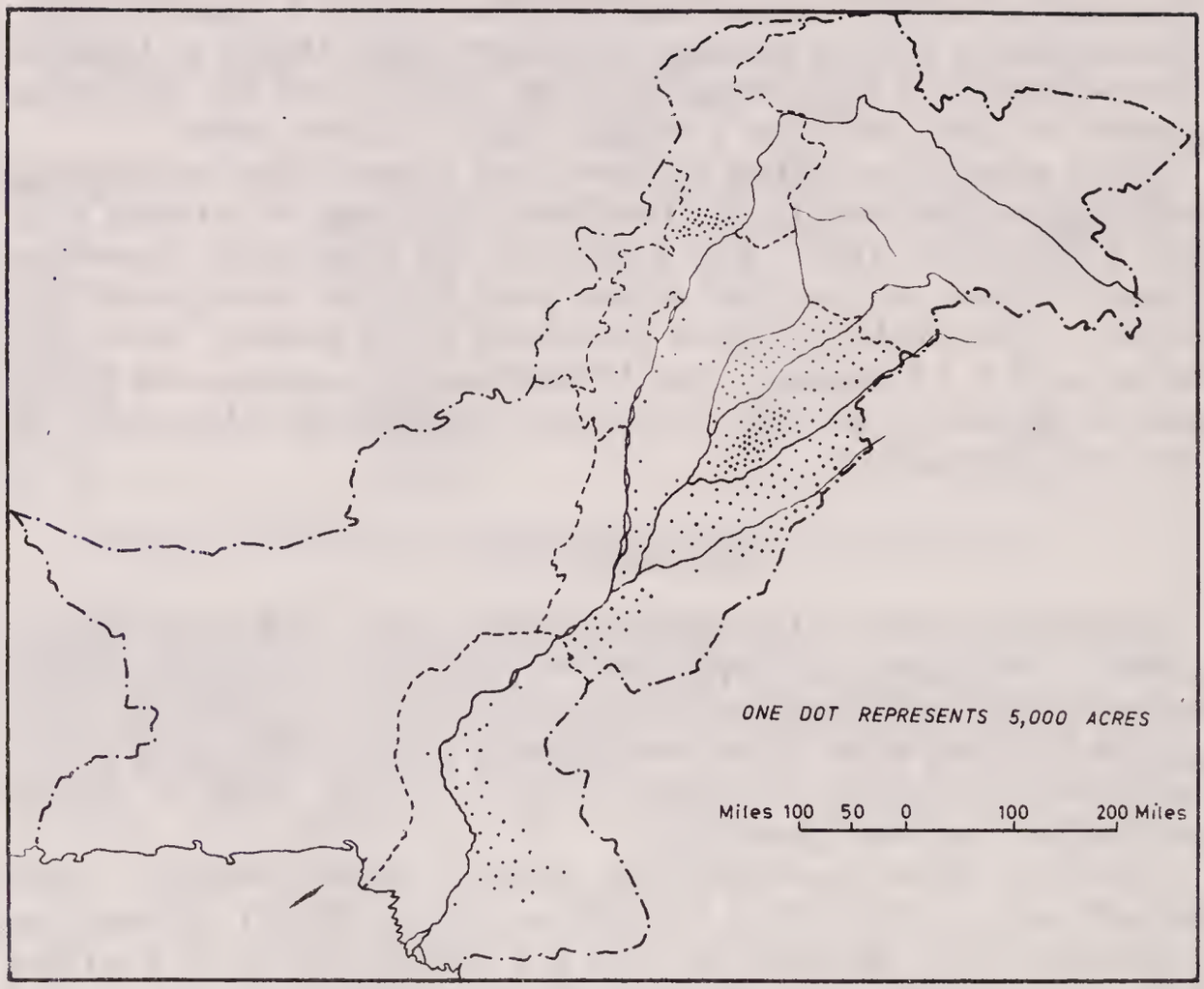


Fig. 53 Pakistan: Sugar-cane

district of Mardan is the most important tobacco-growing area, accounting for as much as 32 per cent of the total acreage under tobacco in Pakistan.

The tobacco plant grows under varied climatic and soil conditions, but for more remunerative commercial cropping fertile soil and a plentiful water supply are essential. It is, therefore, mostly grown under irrigation in heavily manured soils. Tobacco cultivated in Pakistan mostly comprises *desi* varieties, accounting for about 80 per cent of the production. Better quality Virginia tobacco has been introduced recently for the manufacture of cigarettes, and is concentrated in the Swabi *tehsil* of Mardan and the nearby Chach plain of Campbellpur District. Good quality *niswar*, chewing tobacco, is grown in Mastung in Kalat District.

The average yield per acre of tobacco in Pakistan is 1,330 lbs. Among the important tobacco producing countries, it is 1,950 lbs in U.S.A., 780 lbs in India, 1,340 lbs in U.S.S.R., 830 lbs in Brazil and 2,100 lbs in Japan. Within Pakistan the per acre yield is, in places, very high, in Mardan 2,343 lbs. Because of high yield and the large area sown to the crop in Mardan, production from this district is as much as 43 per cent of the total of Pakistan.

OILSEEDS

Oilseeds add to the nutritional quality of the diet, as the oil obtained from these crops, apart from other uses, improves the fat content of the food. Several oilseeds are produced in Pakistan in various quantities. These include cotton-seed, rape-seed, and mustard (*toria*, *sarson*, *raya*, *rai*, and *taramira*), and ground-nuts. Sesame, linseed, and castor are other important oilseeds. There has been an appreciable increase in the production of cotton-seed and ground-nuts during recent years. The total production of oilseeds, mainly obtained from irrigated lands, now stands at 1.25 million tons, including 0.97 million tons of cotton-seed.

PULSES

Pulses are an important protein-rich ingredient of Pakistani diet. In the past, however, no effort has been made to encourage their production. It is now proposed to increase the production by about 25 per cent during the Fourth Plan period.

FRUITS AND VEGETABLES

Fruit-growing received a fillip as a result of the 1959 Land Reforms, in which fruit gardens were exempted from the upper limit of individual land ownership. The realisation has also recently come that horticulture is more profitable than field-cropping. Further, the government, with a view to encouraging fruit production, permits additional supplies of irrigation water for this purpose. The annual production of fruits is about 1.5 million tons. Citrus fruits and mangoes are most important. The former are principally grown in the Punjab, and the latter in Sind and the Punjab. Areas of winter rainfall in Baluchistan and N.W.F.P. grow good quality apples, apricots, grapes, peaches, pears and pomegranates. Banana cultivation is almost wholly restricted to Sind, where it was introduced on a commercial scale only a few years ago. Dates are mostly obtained from Baluchistan and Sind.

Urban centres are the large consumers of vegetables. Since most of the vegetables are of perishable nature these are, for ease of marketing, generally grown in fertile lands on urban fringes. The total production of potatoes and other vegetables is about 1.4 million tons.

FODDER CROPS

Various fodder crops are grown, mostly in the intensively cultivated irrigated areas. However, the ratio of area under fodder crops varies widely even within irrigated regions. In general, there is greater concentration around large urban centres. The more important fodder crops include berseem, lucerne, shaftal, maize and millets. Most of these green fodders are grown as a part of a prescribed rotation of crops and are useful in improving the texture of the soil and increasing its supply of nitrogen.

14. LIVESTOCK AND FISHERIES

LIVESTOCK

In the predominantly agrarian setting of Pakistan, livestock assumes a special importance. As agriculture is not widely mechanized, *draught animals* are the main source of power for farm operations: for ploughing the fields, threshing the crops, and turning the Persian wheel. *Production animals* add protein and fats to the food supply, and thus also form an important component of the agricultural sector. For the farmer, animal husbandry is a part of his overall agricultural pursuits. An average farmer owns a pair of bullocks as work animals, and cows or buffaloes for the production of milk and *ghee*. Cattle, goats, and sheep provide meat, hides, and skins. The latest available estimates of animal population are for 1965.[1] At that time, there were 15.1 million cattle, 8.5 million buffaloes, 2.4 million other work animals (horses, camels, and donkeys), and 17 million sheep and goats.

Most grazing is done on the dry, unirrigated grasslands, and these are heavily over-grazed. The village *shamilat* (common grazing grounds) are also over-populated. In the drier parts of Pakistan, Baluchistan for example, nomadism is common, as the people travel from place to place in search of pastures.

During the Third Plan (1965 to 1970), animal husbandry made little progress. Of an allocation of Rs. 89.9 million, the utilization was only Rs. 41.5 million. However, production of milk and meat increased 9.5 and 8.7 per cent respectively. Under the Fourth Plan the allocation is Rs. 92.7 million.

Cattle

The general stock of cattle in Pakistan is of low quality. However, some good breeds are also found, though in small numbers. Of the work animals, the Dhani and Bhagnari breeds of oxen are well known. Dhani oxen are of short but stout build, and are mostly bred in the northern mountains and adjacent areas. Bhagnari cattle

1 *Water and Power Resources of West Pakistan*, World Bank Study Group, Vol. 1, p. 59.

are strong and heavy, and are acclimatized to the scorching summer heat of the plains. The breed was first reared in the Kachhi and Sibi Plains of Baluchistan, but is now found all over the Indus Plain. Among milch animals, Sahiwal and Red Sindhi are good-quality dairy animals of Zebu breed, well-known the world over. Similarly, Nili Bar and Kundi are the best breeds of she-buffaloes, famous for producing milk in large quantities, with high fat content. The Tharparkar breed ranks high both as a work animal and milk producer.

To improve the quality of cattle, government and grantee cattle farms have been established at Rakh Ghulman and Rakh Kishori in the Thal, Qadirabad (Sahiwal), Sahiwal, Bahadurnagar (Sahiwal), Jahangirabad (Multan), Jahanian (Multan), Fazilpur (Dera Ghazi Khan), Bahawalpur, Mirpur Khas, Sakrand (Hyderabad), Tarab Mohammad Khan (Hyderabad), Dadu and Malir (Karachi). Some sizable private farms are located in Lahore, Kalabagh, Sargodha and Multan.

Dairy farming is not carried on in Pakistan as an organized large-scale industry, except in a few places, mainly in the public sector. Large government dairy farms are at Sahiwal and Khairpur Mirs. Important military dairy farms are in Peshawar, Rawalpindi, Lahore, Okara (Sahiwal) and Malir (Karachi). Large dairy farms for the general public have been set up in Lahore and Lyallpur. Dairy milk supply schemes are in operation in Karachi and Lahore and it is proposed to have these facilities also in Hyderabad and Islamabad.

Sheep and Goats

Sheep are bred for meat, wool and skins. Good stocks of sheep, including the fat-tailed sheep, are adapted to the cold climatic conditions of the northern mountainous areas and tribal territories. In the plains, sheep are mostly reared in drier uncultivated areas with poor grasslands, such as the Thal and Thar regions. Sheep farms have been set up at Jaba in the Kaghan valley, near Abbottabad, Okara (Sahiwal), and Jhimpir (Thatta).

The quality of wool obtained is generally poor. Efforts are being made to improve it by establishing fine-wool sheep-breeding farms and cross-breeding local and imported animals. Annual production increased 11.9 per cent during the Third Plan, and is now 40 million pounds. Of this, less than half is used locally for coarse rugs, carpets and clothing, and the remainder exported. For the manufacture of high quality woollens, about 5 million pounds are imported annually.

Goats are bred for meat, milk and skins, although the quantity of milk is small. Some varieties found in the cold mountainous areas such as the Kaghan valley, produce fine hair (*pashmina*) used in the weaving of shawls. An Angora goat farm has been set up at Rakh Khairwala (Muzaffargarh). Goats badly damage the pastures and add to soil erosion. On this account, their breeding is discour-

aged by the government. This, however, does not apply to stall-fed goats and those of better strains. The better strains are being developed by selective breeding, and by cross-breeding of local varieties with foreign.

Poultry

Improvement of poultry farming is a pressing need to supplement the food supply and improve its protein content. Most of the poultry stock presently consists of *desi* (indigenous) birds, which are estimated to number 10 million. The number of improved breeds, supplying both meat and eggs, was expected to be 2.4 million by 1975.

FISHERIES

Pakistan has about 600 miles of coastline, about 150 miles of which are in Sind. The Sind coast has a number of creeks and a wide shallow sea beyond. Some 40,000 men are engaged in fishing in this area. Further west, on the Makran coast, fishing employs about 20,000 men, largely from the small ports of Pasni, Ormara, and Gwadar. The Sind fisheries are known for prawns, and these and other fish are distributed from Karachi, where there are facilities for ice production. About 80 per cent of the 40,000 ton catch of the Makran coast is dried for export to Middle Eastern countries.

Fishing from inland waters occurs all over the country, but the lakes or *dhands* of Sind are the principal producers. These include Manchhar Lake in Dadu, and Kalri and Haleji Lakes near Karachi. On the Indus, Sukkur, Kotri, and Thatta are important fishing centres.

TABLE 17

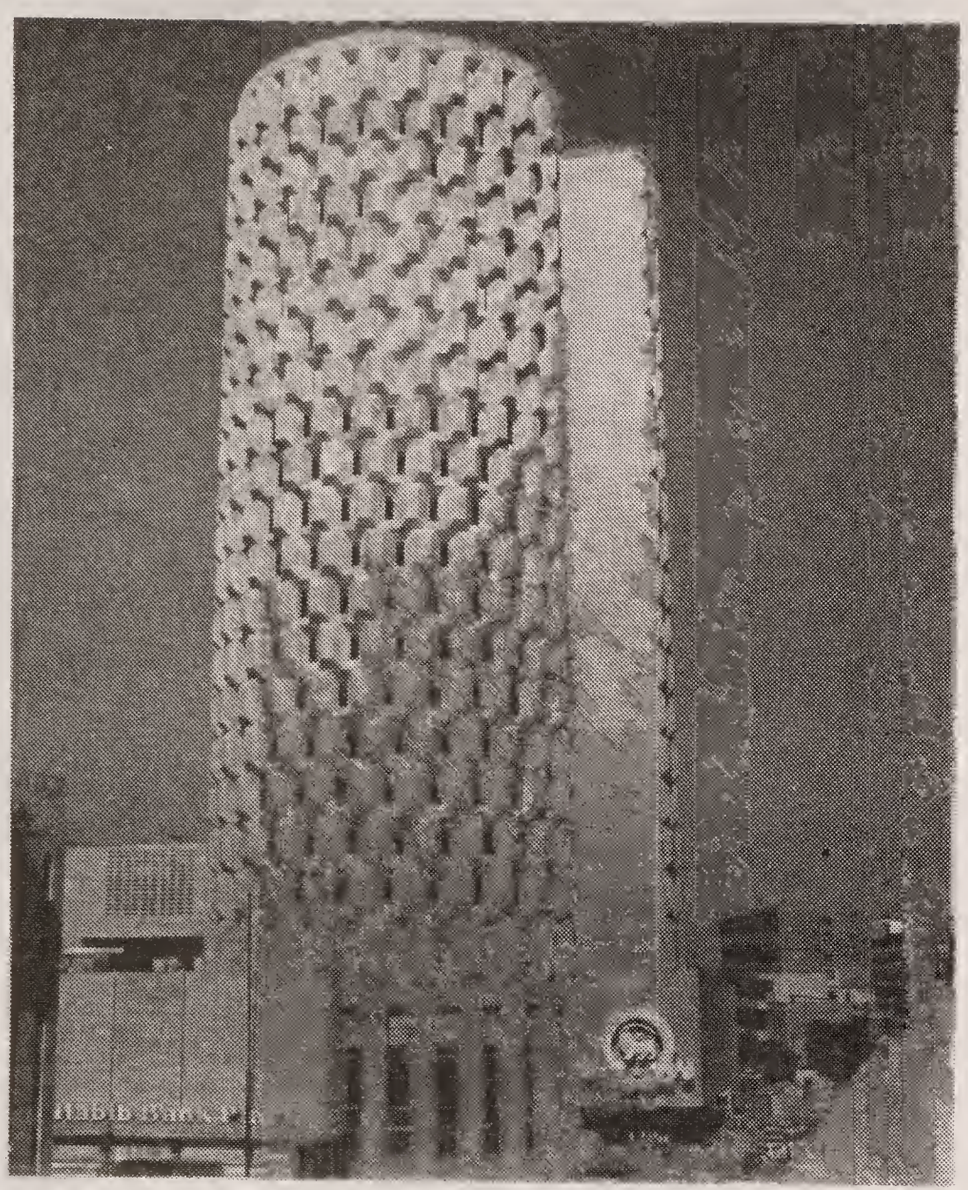
Fish Production in 1964 and 1969

Fisheries	*Production (000 metric tons)*		*Precentage Increase*
	1964	*1969*	*1964–9*
Inland	21	24	14
Marine	92	143	55
TOTAL	113	167	48

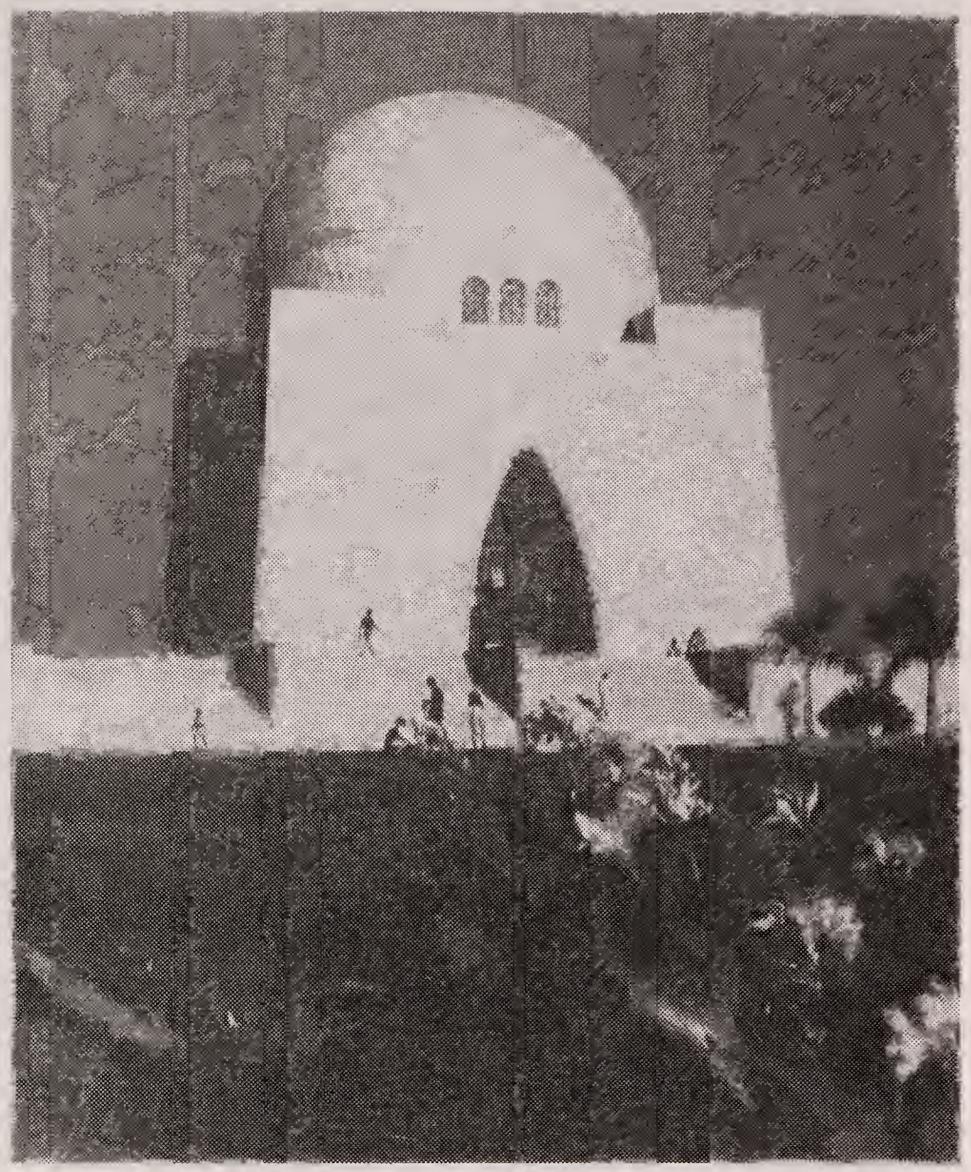
Marine Fisheries Dept. Ministry of Agriculture and Works, Govt. of Pakistan, quoted in *Fourth Five Year Plan*, p. 138.

Efforts are being made to increase further the exploitation of marine fish resources by increasing the efficiency of existing boats and the number of powered boats. Research surveys of deep off-shore waters are being conducted to promote deep-sea fishing. Biological and technological research facilities are being developed. Inland, over 1,200 fish farms have been established. The dams, reser-

voirs, and abandoned channels of irrigation canals have been utilized for fisheries. However, the total catch of 1972/3 had risen only to 169,300 tons. Of this, a large part was exported, earning $17.33 million in foreign exchange.



Habib Bank Plaza, Karachi



Tomb of Quaid-i-Azam, Karachi

Islamabad, an aerial view

Qissa Khwani Bazar, Peshawar

Part V

Industry

15. INDUSTRIAL DEVELOPMENT

The industrial base of Pakistan at the time of Independence was very weak. In 1949/50 manufactures accounted for only 1.5 per cent of the total national income. After about ten years, the ratio improved to 5.0 per cent, and improved again to 8.4 per cent in 1968/9. These figures refer to combined Pakistan including both the Eastern and Western wings. For present Pakistan, the 1970/1 figure was 16.6 per cent. Industry is, thus, the second largest sector of the economy, next to agriculture.

In 1970/1, Pakistan's 3,289 industrial establishments produced goods worth Rs. 914 crore. Sind, principally Karachi, had 49 per cent of the factories and 49 per cent of the value of manufacturing production. The Punjab almost equalled Sind in the number of factories (48 per cent of the total), and provided 43 per cent of the value of factory production. N.W.F.P. and Baluchistan have very little industry.

At the time of Independence and for some time thereafter, industry was concentrated in Karachi, which was then the national capital. Further, many of the old Muslim trading communities of India migrated to Karachi, making this city also the financial capital. Karachi is still the outstanding manufacturing centre, but from the time of the Second Plan, some effort was made to minimize regional disparities by the dispersal of industry. A recent study of industrial concentration[1] found a very high concentration of industry in Karachi District with Lyallpur District ranking second, with a concentration one-fourth that of Karachi. Lahore District came next, followed by the districts of Hyderabad and Multan. Other less important centres were Peshawar–Nowshera, Mardan, Rawalpindi–Taxila, Sheikhupura and Gujranwala. Industrial Estates have been established at Karachi, Hyderabad, Sukkur, and Peshawar, and are planned for Rahimyar Khan, Multan, Sargodha, Lyallpur, Lahore, Jhelum, and Nowshera.

[1] *Location of industries project*, Dept. of Geography University of Dacca.

Industry now provides employment for 400,000 people. The average number of employees per factory is 121. Factories with less than 20 employees account for 3 per cent of total factory employment and 2 per cent of the value of manufactures; those with 20–49 employees, for 13.5 per cent of employment, and an equal proportion of value; establishments with 50–499 workers contribute 35 per cent of the value with only 24 per cent of the workers; and factories with 500 or more employees engage 59.8 per cent of the industrial labour, but provide 47.4 per cent of the value of manufacturing. These figures clearly suggest that productivity per worker is highest in plants of medium scale (50–499 workers).

With the growth of manufacturing industry, manufactured goods are entering the export trade in increasing amounts and increasing diversity. This has resulted in a remarkable change in the composition of the export trade. In 1949/50, raw materials constituted 87 per cent of exports. By 1969/70, the proportion derived from raw materials had dropped to 31 per cent, and that of manufactures had risen to 55 per cent. Manufactured goods are now the principal element in the export trade. Furthermore, development of manufactures is being promoted as a measure of import substitution. The engineering industry, for example, is being assigned high priority for the production of replacements and spare parts for imported capital equipment.

Investment in industry has been derived from both local and foreign sources. The percentage of local investment to the total has been increasing. In combined Pakistan, it rose from 59.9 per cent in 1960 to 71 per cent in 1968. Total foreign investment in Pakistan at the end of 1971 was Rs. 1,114.9 million, and foreign and joint enterprises accounted for 4 per cent of the total number of factories and 18 per cent of the total value of factory production.

Cotton textiles are the overwhelmingly predominant industry. In 1970/71, cotton textiles contributed 48 per cent of the total value of industrial output, followed by cigarettes (10 per cent), sugar (7 per cent), edible vegetable oil (6 per cent), basic metals, electrical goods, and transport equipment (5 per cent each), and cement and fertilizers (3 per cent each).

In the industrial development of the country, both private industry and the government have participated. Some 'basic' industries, including banking have been taken over by the government. In 1972, despite the take-over of the industries of 'national import', 82 per cent of the investment in organized industry continued to remain in private hands.[1]

Industrial Development is promoted by various public institutions, including the Pakistan Industrial Development Corporation (PIDC) and the Pakistan Small Industries Corporation (PSIC). PIDC was set up in 1952 and its basic function has been to promote industries for which private capital was deficient. Major PIDC investments

1 *Pakistan Economic Survey*, 1971-72, op. cit., p. 28.

have been in fertilizers, natural gas, cement, minerals, and ship-building. Other undertakings include the manufacture of sugar, paper and board, and textiles. About 61 per cent of PIDC investments have been in the Punjab, and some 29 per cent in Sind. PSIC was established in 1965 to promote cottage and small-scale industries. With its aid, nine small industrial estates have been set up in Peshawar, Gujrat, Gujranwala, Sialkot, Lahore, Bahawalpur, Sukkur, Larkana, and Quetta. PSIC also runs several Developmental Centres to impart technical skills, provides credit and marketing facilities, and has established sales and display depots for these wares.

TABLE 18

Value and Production of Manufacturing Industries

Item	*Production*[1] *(1970/1)*	*Value (million Rs)*[2] *(1967/8)*
Cotton Cloth	787 million yards	1,672
Cotton Yarn	670 million lb.	
Cigarettes	24,170 million	432
White Sugar	500 thousand tons	421
Vegetable Ghee	153 thousand tons	464
Basic Metals		294
Electrical Equipment		327
Transport Equipment		280
Machinery (other than electrical)		124
Cement	2,660 thousand tons	255
Fertilizers	285 thousand tons	88
Paper Board	40 thousand tons	—
Art Silk & Synthetics	68 million sq. yards	—

1. *Pakistan Economic Survey:* 1971-2, Govt. of Pakistan, p. 7.
2. *Census of Manufacturing Industries of West Pakistan*, 1967-8, Lahore, 1970

16. FACTORY INDUSTRIES

Various factory industries are illustrated in fig. 54. A description of the more important industries follows:

COTTON TEXTILES

The manufacture of cotton textiles is Pakistan's biggest industry and in the past twenty years it has made outstanding progress. In

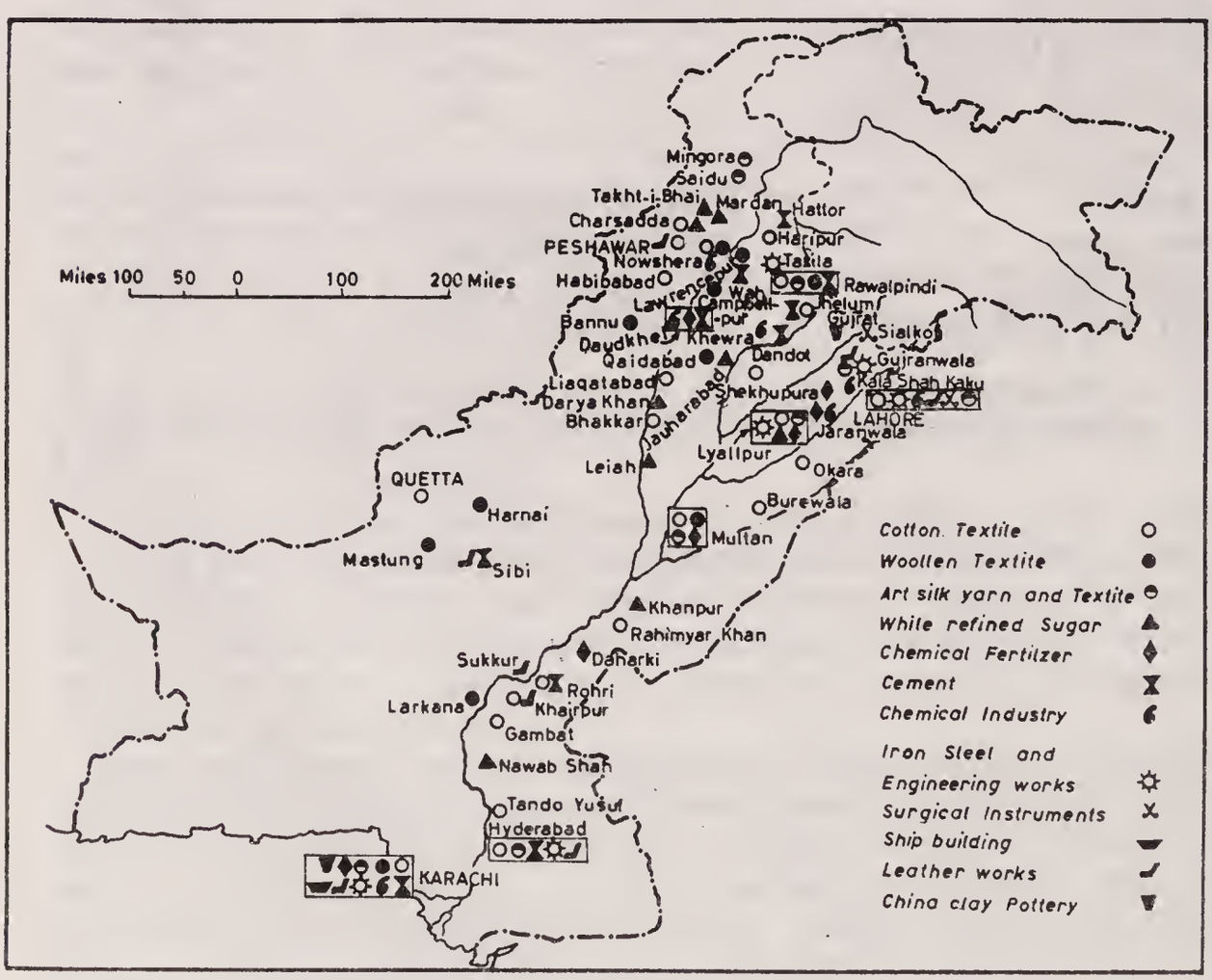


Fig. 54 Pakistan: Factory Industries

1948, there were 17 cotton textile factories, with 177,000 spindles and 5,000 looms, in combined Pakistan. In the Pakistan of today there are 116 cotton textile mills, with 2.6 million spindles and 30,000 looms. From being a big importer of cotton cloth, the country has not merely become self-sufficient, but developed into a large exporter of yarn and cloth. This has occurred despite an increase in per capita domestic consumption of cloth, from 5.2 yards a year in 1948 to 14 yards in 1970.

In the beginning, the industry was concentrated in Karachi, outside the cotton-growing area. More recently there has been a shift to up-country centres within the cotton belt. Lyallpur is now second to Karachi. Other centres within the cotton belt are Hyderabad, Tando Yousaf (Hyderabad District), Gambat (Khairpur Mirs), Rahimyar Khan, Khairpur, Multan, Golra (Lyallpur), Okara (Sahiwal), Burewala, Sargodha, and Lahore. Other centres, located outside the cotton-producing areas but near local markets, are Rawalpindi, Peshawar, Nowshera, Habibabad (Kohat), Haripur (Hazara), Kala (Jhelum), and Saryab (Quetta). At Liaqatabad and Bhakkar, in Mianwali District, cotton textile factories were established as a part of a colonization scheme in the Thal region.

The cotton textile industry has considerable scope for expansion. Of the annual production of cotton of about 3.9 million bales, 0.6 million bales are exported as raw cotton. These exports earn over Rs. 314 million per annum, but if exported as cloth, the earnings would be higher. The same is true of cotton exports in the form of yarn. The value of cotton manufactures exported already exceeds the value of raw cotton exported, and could be much greater with an increase in the export of cotton cloth and piece goods.

WOOLLEN TEXTILES

The woollen textile industry is small by comparison with cotton. There are 20 spinning and weaving mills employing over 6,000 people. These are located at Mastung, Harnai, Bannu, Nowshera, Lawrencepur, Campbellpur, Rawalpindi, Ismailabad (Multan), Quaidabad (Thal), Larkana, and Karachi. Hyderabad has a yarn factory. The industry is concentrated in the north where the cooler climate creates a demand for warm clothing and where sheep are grazed. For fine quality woollens, the wool is imported. The value of production (1967/8) is Rs. 113.5 million.

SILK, ART SILK, AND SYNTHETIC TEXTILES

There are 148 units, at different places, producing silk and art silk textiles, largely shawls and scarves (dupatta) for women. The more important centres are Karachi, Gujranwala, Lyallpur and Lahore. Other centres include Hyderabad, Rohri, Multan, Rawalpindi, Mingora (Swat), and Saidu Sharif (Swat). Synthetic fibres involve modern technology, and are produced at Karachi and Lyallpur.

SUGAR

The acreage under sugar-cane varies with the weather and the availability of irrigation water, but is increasing. Only about 30 per cent of the cane reaches the mills for refining into sugar. Most is eaten either as unrefined sugar or consumed raw. Production of sugar in 1970/71 was 0.5 million tons. Sugar beets are not widely grown although cultivation is being encouraged in the northwest. The quantity of sugar beet sliced at mills in 1970/71 was 257,000 tons.

There are 19 sugar mills: 4 in N.W.F.P., 10 in the Punjab, and 5 in Sind. The important centres are Mardan, Charsadda, Lyallpur, Nawabshah, Khanpur, and Jauharabad. The mills at Mardan, Charsadda, and Takht-i-Bahai are also equipped for processing beets. The percentage of sugar recovered is highest in Sind (8.7 per cent) and lowest in N.W.F.P. Yields per acre are also low by comparison with such countries as India, U.S.A., Ecaudor, Puerto Rico, and Mauritius. Local production is inadequate, and every year large quantities are imported.

CHEMICAL FERTILIZERS

Production of chemical fertilizers has been given high priority by the government in order to improve agricultural output. Although local production had increased to 372,000 tons by 1969/70, in that same year 651,000 tons were imported. By 1973, the sanctioned capacity for local plants had been increased to 853,000 tons, with proposals for additional plants still under review.

Production of nitrogenous fertilizers is facilitated by the availability of natural gas. Production of phosphatic fertilizers in the past has been dependent upon imported ingredients, namely rock phosphates and sulphur. However, it is now established that phosphatic fertilizers can be produced with sulphuric acid obtained from locally available gypsum. The potassic fertilizers will continue to be imported as local potash is not available. The present aim is to achieve self-sufficieny in nitrogenous and phosphatic fertilizers, perhaps as early as 1975.

CEMENT

Growth of the cement industry has kept pace with the huge demand for cement for developmental works. Limestone and gypsum, the two important raw materials of the industry, are indigenous and available in large quantities, and cheap fuel is available in the form of natural gas. The import of machinery for the future development of the industry is likely to be appreciably reduced after the complex for the manufacture of heavy machinery at Taxila comes into full production.

There are nine cement factories, employing over 51,500 workers, and producing 3.2 million tons valued at Rs. 255 million.

The plants are located at Wah Hattor (Hazara), Danadot, Daudkhel, Ismailwal (Jhelum), Rohri, Hyderabad, and Karachi. The Fourth Five-Year Plan calls for a production of 6.3 million tons in 1974/5. The installed capacity of existing plants is being increased and new factories are planned for Rawalpindi District and Sibi.

CHEMICALS

The industry includes a large number of basic industrial chemicals, such as sulphuric acid and non-edible oils, as well as dyes and colours, paints, varnish, and lacquers, medical and pharmaceutical preparations, disinfectants, insecticides, soaps, washing and cleaning compounds, and the like. It also includes fertilizers, which have been discussed under a separate head because of their importance. The chemical industry is thus made up of numerous large and small factories manufacturing various products. The number of such factories is about one-tenth of the total number of industrial units. The percentages of employment in the industry and the value of production in relation to the total, are about six and nine per cent, respectively.

Important centres of the industry are Karachi, Lahore, Kalashah Kaku (Sheikhupura), Daudkhel (Mianwali) and Nowshera. Soda ash is manufactured in Khewra and Karachi; caustic soda in Kalashah Kaku; sulphuric acid in Jaranwala (Lyallpur); drugs in Nowshera; insecticides in Kalashah Kaku and Nowshera; and paints and varnishes in Karachi and Lahore.

The raw material bases for a petro-chemical industry, namely natural gas and naphtha (a by-product of oil-refining) are available in large quantities. The prospects for the establishment of these sophisticated industries at some time in the future are, therefore, bright.

IRON AND STEEL AND ENGINEERING WORKS

Pakistan has many small engineering works turning out small machines and replacement parts. It has had no steel mill but one is shortly to be constructed east of Karachi at Pitti Creek. It will have a capacity of about 1 million tons of crude steel per annum and is being built with the technical and economic assistance of the U.S.S.R. The construction and operation of the port to serve the steel mill, and possibly other industries, will be controlled by a special Port Authority established by the Government of Pakistan. A machine-tool factory, close to the port, has been in partial operation since 1968 and is ultimately expected to manufacture machine-tools, automobile parts, and military equipment.

In the northern part of the country, at Taxila, west of Islamabad, an important centre of heavy machinery and electrical equipment has been established with the assistance of China, and is already in partial production. The foundry and forge project at

Taxila will provide the country's first large-scale facilities for iron and steel casting and for the forging of billets. The heavy electrical complex will produce transformers, circuit breakers, switch gears, and capacitors.

MISCELLANEOUS INDUSTRIES

There are several other industries worthy of note. General engineering works are located at Karachi, Hyderabad, Lyallpur, Lahore and Gujranwala. Surgical instruments are manufactured in Sialkot and Lahore. Nazimabad (Karachi) and Sialkot are important centres for cutlery. Electric fans are produced in Gujranwala, Gujrat, Lahore, and Karachi. The shipyards at Karachi are capable of buildings ships of 10,000–13,000 tons capacity and undertaking the repair of ships.

Glass factories are located in Karachi and Hyderabad. The making of glass and mirrors is a traditional industry of Sind, with its large quantities of suitable sand. More recently, Lahore, Gakhar (Gujranwala District), and Jhelum have been producing increasing quantities of glass.

Pakistan produces large numbers of hides and skins, some of which are exported, and others tanned for use within the country. Local lime, salt, and the bark of trees like the *babul* and mangrove are used in the tanning process, which is helped by the dry climate. Gujranwala, Khairpur, Sibi, Sukkur, and Hyderabad are all important centres for the industry. The associated industry of shoe- and sandal-making is concentrated in the large cities of Karachi, Lahore, and Hyderabad. The value of footwear, leather goods, and leather exported in 1969/70 was Rs. 200 million.

Chinaware is made at Karachi, Gujrat, and Lala Musa. Flour mills are widely scattered, with the chief centres at Karachi, Sukkur, Lyallpur, Okara (Sahiwal) and Lahore. Rice-husking mills are mostly found in the districts of Sheikupura, Gujranwala, Dadu, and Larkana. Lyallpur, Hyderabad, Lahore, Karachi, Chichawatni (Sahiwal), and Nowshera are important centres for vegetable ghee. Rubber goods are produced in Karachi, Lahore and Sialkot, and Karachi also has P.V.C. and plastics factories. Sialkot is famous for its sports goods. Hand-woven woollen carpets are made at numerous places, but machine-loomed carpets are now made in Karachi.

17. SMALL AND HOUSEHOLD INDUSTRIES

Small and household industries can play a vital part in increasing rural incomes and reducing the pressures to migrate to the cities. Small-scale rural industries have their origin in the historical self-sufficiency of the village. Every village had its own weavers, carpenters, tailors, shoe-makers, blacksmiths, gold and silver smiths, and other craftsmen. These rural crafts were based on skills passed on from generation to generation. As urban centres developed, craftsmen migrated to the cities where they are able to ply their skills for a larger market and in some instances expand their operations to small-scale industries (fig. 55). Some of the typical Pakistani fancy goods have developed a market abroad. It is convenient, therefore, to distinguish between those industries which have remained in the rural areas, and those which are more strongly developed in the cities.

RURAL AREAS

Most rural settlements are not well-connected with outside areas and tend to fulfil most of their requirements within the village itself. These cottage industries and rural crafts are largely governed by local raw materials and local demand. Such industries include *atta chakies* (flour milling), rice-husking, oil-seed milling, rope-making, bakery, and basketry, and these are found in almost all villages. A survey of these agro-based industries by the Pakistan Small Industries Corporation showed them to be second to agriculture itself in providing employment in rural areas.

A wide range of articles and consumer goods are produced by the village craftsman. Carpentry, shoe-making, leather tanning, weaving, dyeing, printing, pottery, and tailoring, together with the working of iron and gold and the making of bricks, are the most common and widespread rural crafts. Carpenters produce cart-wheels, agricultural instruments, cots, doors, and other small items

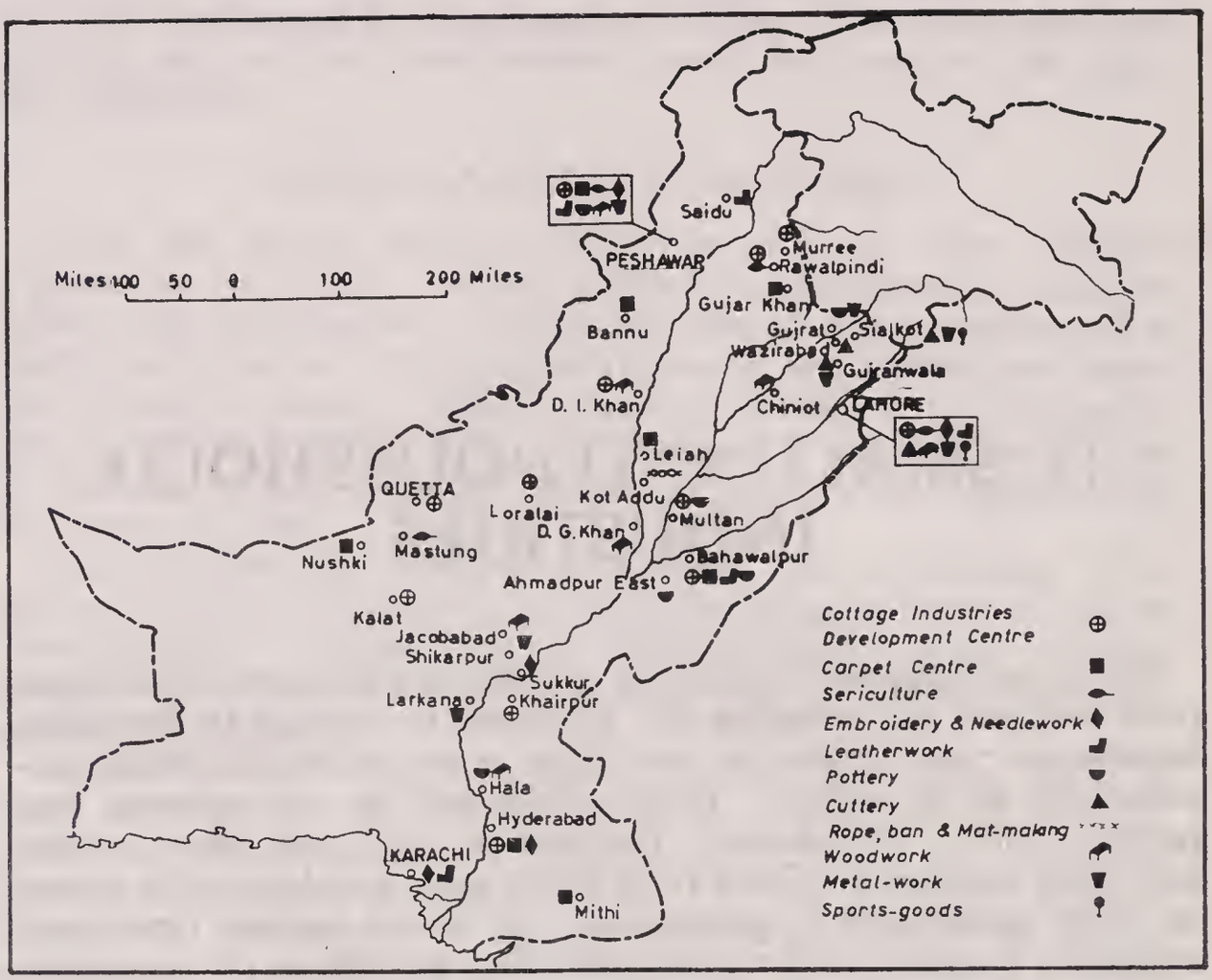


Fig. 55 Pakistan: Small-scale Industries

of furniture. Tanners and shoe-makers produce sandals, horse-bridles and saddles, whips, and other leather goods. Iron and other instruments are produced by the blacksmiths. Certain of these artifacts are made in distinctive local styles: locally made *Khaddar* cloth and *Durrees* (coarse rugs) have their traditional designs. Earthen wares are made from local clay, and in some instances, such as the glazed tiles of Hala, have achieved national repute.

The total value of these crafts is easy to under-estimate. In most areas, it is three to four times that of the agro-based industries, and in some rural districts employs 16 per cent or more of the population. Per capita income in the villages is very low, varying from Rs. 250 to Rs. 550 a year in different regions. This lack of spending-power handicaps the artisan in acquiring more proficient tools and improving his techniques. As agriculture becomes more mechanised, the need will be for tractor drivers, tube-well mechanics, auto mechanics and maintenance men. Some way should be found to help the traditional artisan transfer to modern skills.

URBAN AREAS

The small and craft industries of urban areas fall into two categories, household units and small manufacturing units. House-

hold units are located in residential premises and have assets not exceeding Rs. 15,000. Small manufacturing units have fixed assets up to Rs. 500,000, excluding land. Altogether, there are some 50,000 household and small manufacturing units, employing more than 2 lakh of people, and having a total value of fixed assets of Rs. 425 million. About half the units employ 2–4 workers and about one-quarter employ only one person, in addition to family members. Larger units employing more than 50 persons are very few. Most are in the major cities and the larger the city, the greater the number. According to the survey, 87 per cent of all the small and household units were in Karachi, Lahore, Sargodha, Multan, Peshawar, Rawalpindi, and Hyderabad.

Textiles

Among these small industries, textiles are the most important group. Cotton spinning and weaving of rough *Khaddar* cloth is widespread, and some centres have gained greater importance because of their production of a special type. *Lungis* and *Khases* are made in Peshawar, Kohat, Multan, D. I. Khan, Thatta and Gumbat. *Durrees* are made in Karachi, Lahore, Sahiwal, Gujranwala, and Gakhar and cotton carpets in Lahore, Multan, and Jacobabad. Blankets, *lois*, and *pattu* are prepared from home-spun wool. Blankets are a speciality of Multan, Jhang and D.G. Khan. *Lois* come from Mingora (Swat), and thick rough woollen cloth is woven in Swat, Chitral, Gilgit, and Kalat. Woollen carpets are made in Lahore, Multan, Hyderabad, Peshawar, D. I. Khan, Kalat, Bannu, Leiah, Bahawalpur and Landhi. Silk cloth and turbans are made in Peshawar and Kohat.

Embroidery and Fancy Needlework

This industry is centred in urban areas such as Karachi, Lahore, Hyderabad, Multan, Bahawalpur, and Quetta. *Phulkari* work, silk embroidery over rough cotton cloth, is done in many centres in the Punjab, Swat and N.W.F.P. Sindhi and Makrani embroidery and golden thread embroidery is done in Quetta, Karachi, Lahore, Hyderabad, Multan, Bahwalpur and Peshawar. These goods are exported in substantial quantities.

Leather, Pottery, and Furniture

Embroidered leather sandals and shoes are a speciality of Peshawar, Multan, Bahawalpur, Lahore, Karachi and Rawalpindi. These fancy sandals and embroidered handbags have found a market in America and Europe. Fine pottery is prepared from good quality clay in Sialkot, Gujrat, Gujranwala, Peshawar, Bahawalpur and Multan. Articles like ashtrays, flower-vases, fruit bowls and plates are exported to the Middle East. Carved wooden articles and art furniture, inlaid with copper, brass, and ivory, are made in Lahore, Chiniot, D. G. Khan, Gujrat, Karachi, and Peshawar.

Miscellaneous

Utensils made from brass, copper, silver, iron, and aluminium are hand-made at many places. Peshawar, Gujranwala, Sialkot, Larkana and Shikarpur are the main centres. Sialkot produces sports goods from mulberry wood. Other Pakistani crafts include glass bangles (Hyderabad), marble lamps, bowls and ashtrays (Karachi), camel-skin lamps (Baluchistan and Multan). These latter items are exported and also appeal to tourists.

Part VI

Transport and Trade

18. TRANSPORT

Transport and communication systems are vital to the economic health of a country, and the density of the communications network is an index of economic development. As the economy becomes more complex and inter-linked, adjustments and improvements must be made in the means of transport and communication. The growth of agriculture in Pakistan has resulted in a large increase in marketable surpluses of agricultural products. These are bulky, and largely transported by rail. Similarly, industrial production, now growing at a rate of 10 per cent per year, necessitates an expansion of vehicle capacity and facilities for rapid communication.

Pakistan is a relatively large country (310,403 sq. miles), of diverse topography. Development of communications in the plain areas is comparatively easy and economically rewarding. The reverse is true of the mountainous areas and this fact is reflected in the present distributional pattern of communications. The density of the communications pattern is very low in the northern and north-western hilly areas and in the Baluchistan Plateau. In these less developed areas, only large urban centres have good means of communication. Vast tracts of land are either totally devoid of any modern facilities or very inadequately served. Service to these isolated areas should be improved to assist in the social, economic and political integration of the country.

TRANSPORT SYSTEMS

Railways

Railways are a convenient and quick means of transport of people and goods, particularly heavy items, over long distances. As is evident from the map (fig. 56) the railways are concentrated in the

plain areas. Total route mileage is 5,334.8 miles, of which 4,678.3 are broad gauge, 276.8 metre gauge, and 379.7 narrow gauge. The ratio of route mileage to total area is low—1.7 miles of track per 100 sq. miles of territory. This compares unfavourably with 6.6 for U.S.A., 12.4 for France, 22.5 for Britain, and 54.9 for Belgium. The system is operated by Pakistan Railways.

The principal routes are:

PESHAWAR–KARACHI (1,045 miles). Important stations on this route are Rawalpindi, Jhelum, Lala Musa, Gujrat, Gujranwala, Lahore, Sahiwal, Multan, Bahawalpur, Rohri, Khairpur, and Hyderabad. From Lala Musa, an alternative route (266 miles) runs via Sargodha and Lyallpur to rejoin the main route at Khanewal. An extension (13 miles) from Sargodha connects Shorkot.

ROHRI–QUETTA (239 miles). This route runs through the Bolan Pass via Habib Kot. The track is continued from Quetta to Chaman (8 miles).

KARACHI–HABIB KOT (323 miles). This route runs via Kotri and Dadu to join the Rohri-Quetta route at Habib Kot, where it links with the route to Quetta.

LAHORE–MARI INDUS (276 miles) via Lyallpur, Sargodha and Kundian.

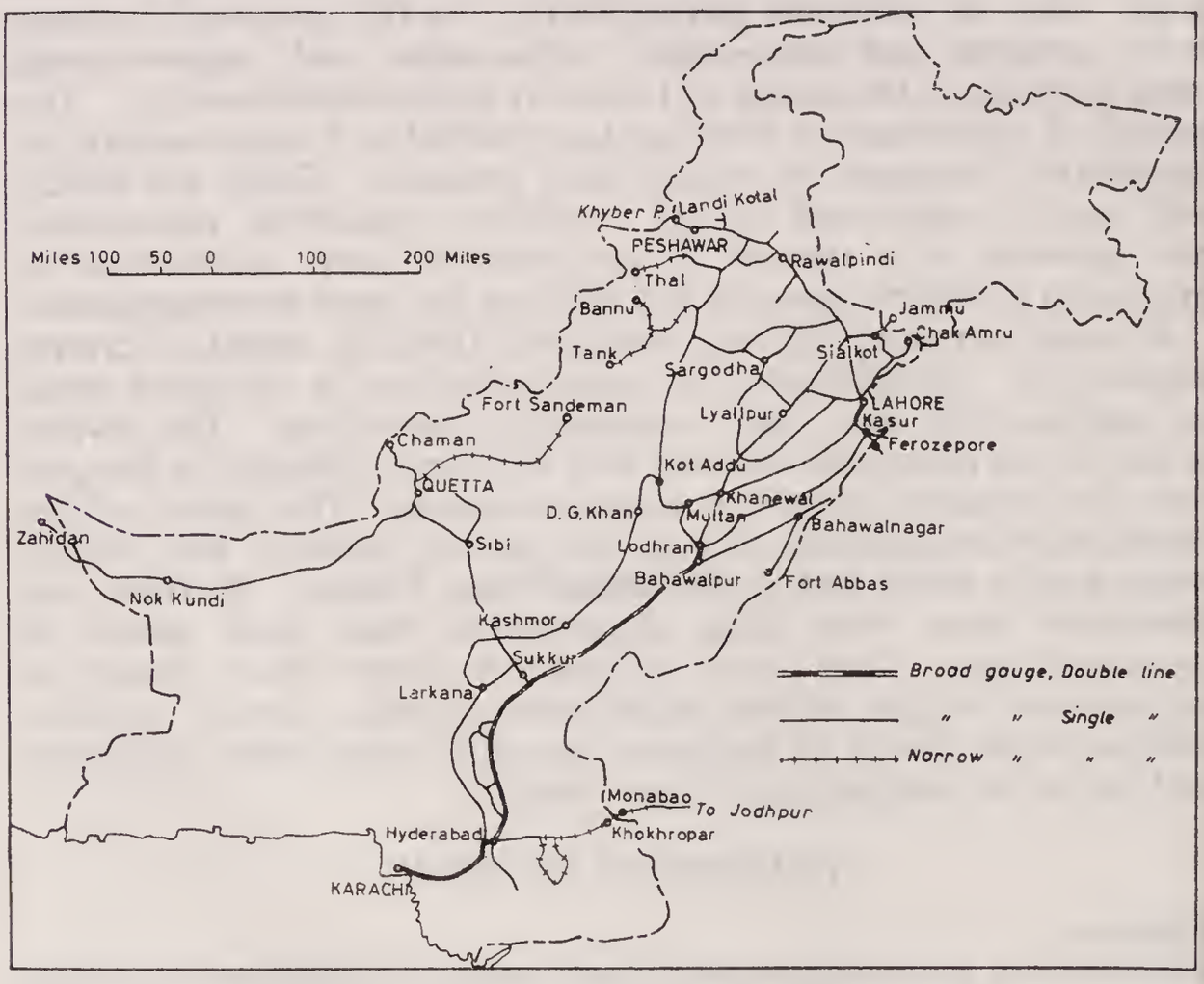


Fig. 56 Pakistan: Railways

Apart from the principal routes, there are several smaller and branch routes, including the long, but little used, Spezand–Mirjawa route (441 miles). The railways connect with the Indian railway system at Wagah and Khokhrapar.

TABLE 19

Movement of Passengers and Freight, Pakistan Railways.

Year	*Passengers (thousands)*	*Passenger-miles (millions)*	*Freight (000 tons)*	*Freight ton-miles (millions)*
1965/6	190,085	7,792	20,948	5,439
1971/2	124,207	5,914	12,599	4,772

Monthly Statistical Bulletins, Govt. of Pakistan, Karachi, 1973.

It can be seen from Table 19 that there has been a decrease in railway traffic in recent years; road traffic is increasing at the expense of rail. The bulk of the freight carried by rail is wheat, cotton, rice, coal and coke, fuel oil, fire-wood, cement, marble, stone, and salt.

Roads

Although road traffic is increasing rapidly, the density of the road network is still inadequate (fig. 57), and the condition of most roads, unsatisfactory in quality, width, and separation of up-and-down carriage-ways. Slow-moving carts mingle with modern vehicular traffic and accidents and traffic jams are frequent.

Roads are of two kinds, *pucca* (metalled) and *kacha* (unmetalled). At the end of the Third Plan there were 12,500 miles of all-weather pucca roads and an additional 2,500 miles are to be completed by the end of 1975. Most pucca roads are in the plains and involve the construction of sizeable bridges. In the Third Plan period, new bridges were constructed at Shahdara and near Jhelum, on the Ravi and the Jhelum respectively, and near Bahawalpur on the Sutlej.

The principal roads are:

THE GRAND TRUNK ROAD. Running from Peshawar to Lahore, this road is of vital economic and strategic importance. It passes through densely populated areas and is heavily travelled and, with the growth of Islamabad as the capital of the country, will become, even more so.

LAHORE–KARACHI. This road is used not merely by local traffic, but by trucks heading to and from the port of Karachi. The section between Hyderabad and Karachi has been rebuilt as a superhighway.

LAHORE–QUETTA. This road is heavily travelled in the Punjab sector but little used in Baluchistan.

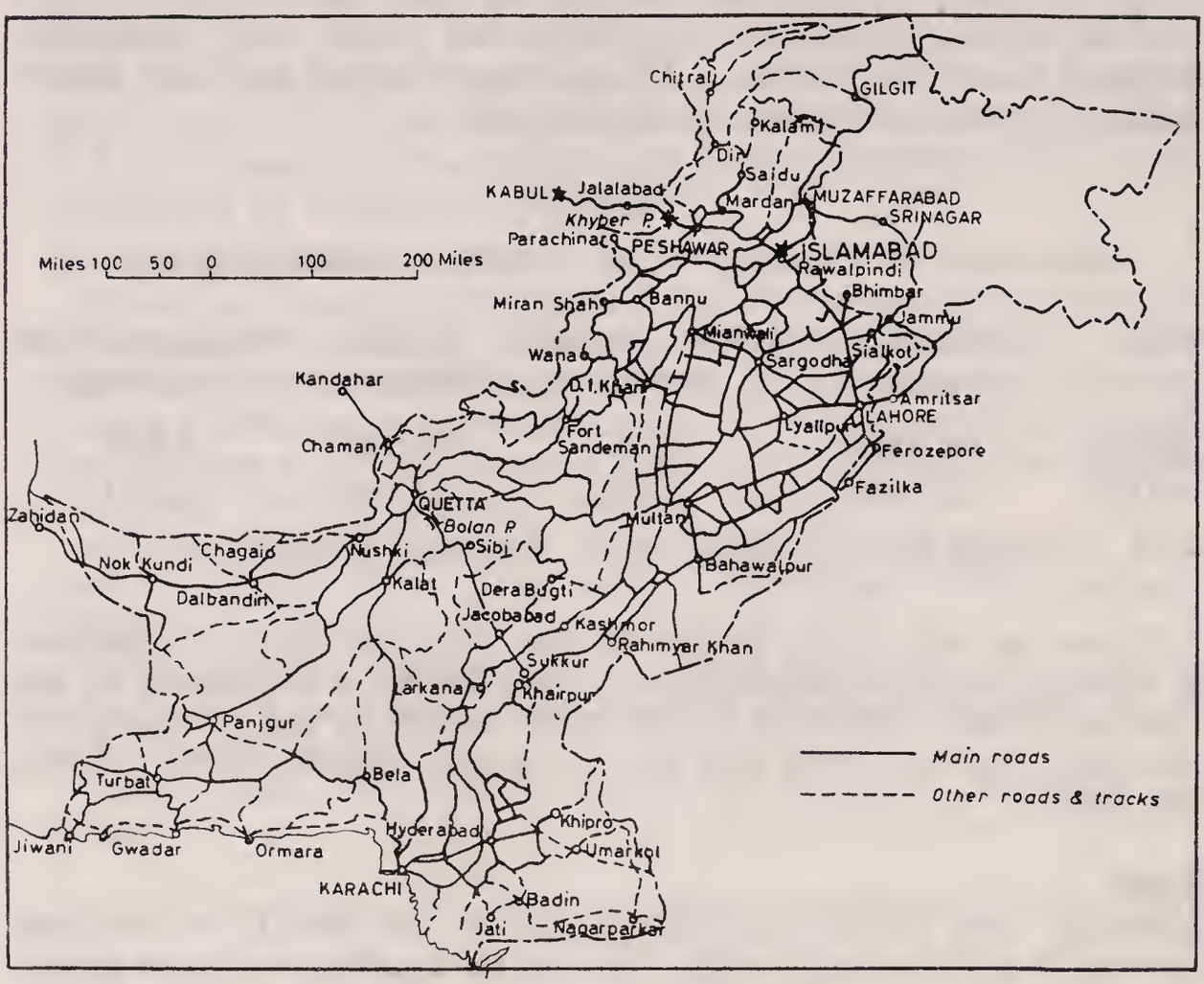


Fig. 57 Pakistan: Roads

KARACHI–QUETTA. Beyond Sukkur the road is not heavily travelled. Through traffic from Karachi to Quetta is mainly by rail.

In 1969/70, the total number of trucks and buses was 46,000. The number of buses operated by the Provincial Road Transport Corporations rose from 1,640 in 1965 to 3,040 in 1970, and the number of passengers carried from 168.7 million to 296.2 million. No data are available for the operations of trucks but the increase in mileage and tonnage carried during this period was probably about 75 per cent. Equal growth is expected during the Fourth Plan and particular attention is being paid to the improvement of the through route, Karachi–Peshawar. It has also been proposed that the RCD Highway (being built under the aegis of Regional Co-operation for Development, an economic alliance between Turkey, Iran and Pakistan) be extended eastward to connect with this route.

Inland Waterways

Although the Indus and its tributaries are one of the great river systems of the world, there is little river transport. The flow of the rivers is highly seasonal and reduced by the off-take of irrigation canals. In fact, in most months there is little flow below Sukkur.

The course of the rivers is interrupted by dams and barrages and, because of the low gradient, it is extremely tortuous and long, with many meanders. The distance between Hyderabad and Karachi, for example is 125 miles by road, but closer to 1,000 by the river. Further, the lower reaches are cut off from the sea by the silted, tidal distributaries of the delta. The building of Port Qasim at Pitti Creek, in connection with the steel mill, involves the dredging of a channel and the deepening of a turn-around basin for ships at the port.

At various times, different proposals have been made for the development of river transport. One proposal is to link Port Qasim, by a navigable channel, to Gharo and thence to Kalri Lake, and on to Kotri through the Kalri Bagar canal. The economic benefits to be obtained, compared with a similar expenditure on roads and rail ways, are doubtful.

Shipping

Transport links between the two wings of combined Pakistan were by sea and air. Development of these forms of transport therefore assumed national importance and saved foreign exchange. In 1963, the National Shipping Corporation was established to modernize the existing fleet and enhance its scale of operations. By 1970, Pakistan had a fleet of 71 vessels (63 cargo and 8 cargo-cum-passenger), totalling 770,000 tons deadweight. Of these, 32 belonged to the Corporation. These vessels handled only a small portion of the country's sea-borne trade.

TABLE 20

Cargo Handled at Karachi Port
(000 tons)

Year	*Imports*	*Exports*	*TOTAL*
1967/8	6,405	2,258	8,663
1971/2	6,296	3,010	9,306
1972/3	7,235	3,087	10,322

Monthly Statistical Bulletin, Govt. of Pakistan, July 1973, p. 564.

Karachi, a major port by world standards, is Pakistan's only large port. It has a vast hinterland, comprising not merely Pakistan and that part of Kashmir which is not under Indian occupation but also Afghanistan. The port has more than 20 berths, plus a petroleum dock. The East Wharf, constructed over 50 years ago, has been modernized. The West Wharves and a dry dock for the construction and repair of ships have been built since Independence. The nominal handling capacity of the port is 4.3 million tons but the actual amount of cargo handled is more than double this figure. As a result, the harbour is very crowded, with most ships double-berthed, and

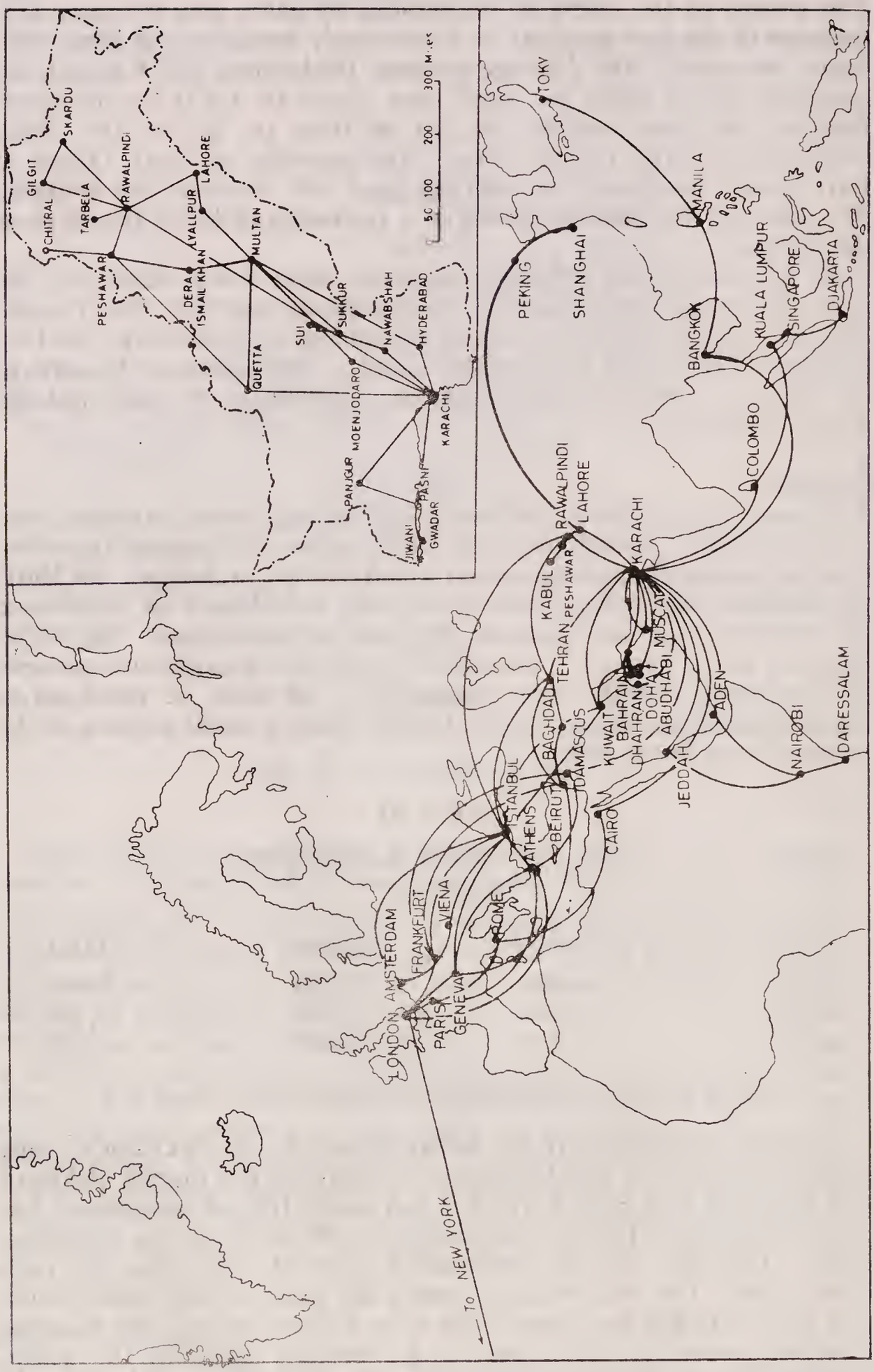


Fig. 58 Pakistan : Airways

long delays in entering the port are usual. Sonmiani has been mentioned as a possible second port to relieve the congestion at Karachi. It seems more probable that Port Qasim, with its close access to road and rail routes north, will become a second general port as well as serving the steel mills. In fact, the Act constituting the Port Authority provides for such a development.

Airlines

Pakistan is served by numerous international airlines, which converge on Karachi. In many respects, Karachi enjoys a position in air navigation similar to that of the global naval bases, like Singapore, for ships. A glance at the flight-board at Karachi Airport shows it to be one of the aerial crossroads of the world. It is a stopping point for flights from Europe to the Far East and Australia, and also for flights from China to Africa. From Karachi there are connecting flights to many points in the Middle East. Recently, international flights have also begun from Rawalpindi.

Because the country is elongated in a north–south direction, and some of its major centres of population are separated by large expanse of desert and sparsely-settled country, domestic air travel is unusually well-developed for a country of Pakistan's economic status. There are 277 domestic flights weekly to 20 different airports.

The development of domestic air travel began as early as 1955, in large measure as a means of linking the eastern and western wings. That year saw the establishment of Pakistan International Airlines (PIA), which now operates modern jets on both domestic and international flights. Today the international service is world-wide (fig. 58).

19. TRADE AND COMMERCE

This chapter deals mainly with foreign trade rather than internal commerce. This is not because the volume of commerce is less than that of external trade but because it has yet to be statistically measured.

INTERNAL COMMERCE

Within Pakistan, there is an increasing flow of goods. Agricultural production is increasing—at a sufficient rate both to furnish the needs of the growing urban population and to supply a surplus for export. Some trade is carried on between various rural areas because of diversities in climate and terrain. For example, Sind sends bananas and mangoes north, and imports apples and citrus fruits. Within the cities ***mandis*** distribute agricultural produce and bazaars and shops sell manufactured goods. Small shopkeepers and stall-vendors characterize the urban centres. Manufactured goods move within the city, between cities, and overseas, while a reverse flow distributes imports. Although no monetary value can be placed on the various elements of commerce, altogether it gives employment to nearly one quarter of the population.

FOREIGN TRADE

The value of imports has generally exceeded that of exports, giving a negative balance of trade. Such a situation is a normal accompaniment to economic development. Imported goods not merely supply deficiencies in local production but help build the infra-structure for future growth. The deficiency in foreign exchange resulting from the negative balance of trade has been made good by invisible income earnings, such as foreign assistance, loans, and remittances from Pakistani nationals living abroad.

In order to reduce, and if possible eliminate, the negative ratio of exports to imports, many measures have been adopted. The

Export Promotion Council and Export Promotion Bureau have been set up to provide assistance and information to potential foreign buyers. Pakistan has participated in international trade conferences and fairs, and sent trade delegations abroad. For a time, an Export Bonus scheme was in operation, tying ability to import to the amount of exports achieved. The most decisive measure was a large devaluation (140 per cent) of the Pakistan rupee in May 1972. This measure curtailed the growth of imports by making them more expensive and at the same time stimulated exports by making Pakistani goods relatively cheaper on the world market. This, together with a good cotton crop at a time of high prices for this fibre, so boosted exports that for the first time their value exceeded that of imports in 1972/3. Further, exports to the East Wing, which amounted to Rs. 1,667 million in 1969/70, were diverted to overseas markets.

TABLE 21

Value of Exports and Imports, 1968/9 to 1972/3
(U.S.$ million)

Year	*Imports*	*Exports*	*Balance of Trade*	*Exports as % of Imports*
1968/9	640.1	357.1	−283.0	55.8
1969/70	690.1	338.0	−352.1	49.0
1970/1	756.7	419.8	−336.9	55.5
1971/2	638.6	589.1	−49.5	92.3
1972/3	839.8	855.2	+15.4	101.8

Pakistan Economic Survey, 1972-3, Islamabad, 1973, p. 95, and *Monthly Statistical Bulletin*, July 1973, Karachi, 1973, p. 594.

EXPORTS

The export target for 1972/3 was initially set at U.S.$618 million, later revised to U.S.$645 million and finally to U.S.$750 million. Table 21 shows that the final target was exceeded by U.S.$105.2 million. Targets were fixed not only for total exports but for major individual items, including raw cotton, cotton yarn, cotton cloth, rice, and leather.

COMPOSITION OF EXPORTS

Under the Second and Third Plans efforts were made not merely to increase exports but to diversify them and reduce dependence on a limited number of primary products. This policy is gaining momentum under the Fourth Plan. By replacing the export of unprocessed primary products with that of manufactured products, foreign exchange earnings are increased. Table 22 reveals an increase in the value of both primary and manufactured exports.

TABLE 22

Value of Primary Commodities and Manufactured Exports, 1968/9–1972/3.
(U.S.$ million)

Year	*Primary Commodities*	*Manufactured Goods*	*%Manufactured to Total Export*
1968/9	147.8	209.3	58.6
1969/70	111.7	226.3	66.9
1970/1	136.6	283.2	67.5
1971/2	264.0	325.1	55.1
1972/3	336.0	518.5	60.6

Pakistan Economic Survey, 1972-3, p. 97, and
Monthly Statistical Bulletin, July 1973 p. 627.

The increase in the value of manufactured exports has come largely from an increase in the export of processed cotton. At the beginning of the fifties, cotton was exported unprocessed. Raw cotton remains a major export commodity but, with increasing industrialization, first cotton yarn and twist, and more recently cotton fabrics, have been exported. Foreign trade remains heavily dependent on cotton: exports of raw cotton, cotton yarn, and cotton cloth together contributed 52 per cent of total exports in 1972/3.

TABLE 23

Principal Exports, 1972/3

(U.S.$ million)

Item	*Value*
Cotton Yarn	197.4
Cotton Fabrics	124.7
Raw Cotton	116.7
Rice	113.6
Leather	54.5
Carpets and Rugs	28.1
Fish and Fish Preparations	23.4
Sports Goods	13.6
Petroleum and Products	12.8

Monthly Statistical Bulletin, July 1973, Table 8.5

Other items, the export value of which was U.S.$5–10 million, included oilseeds, *guar* and *guar* products, raw wool, synthetic textiles, cement, footwear, fruits and vegetables, tobacco, towels, ready-made garments, and handicrafts (fig. 59).

Cotton

The more important buyers of cotton yarn in 1972/3 were Hong Kong (U.S.$62.3 million), Japan (U.S.$61.2 million), Indonesia

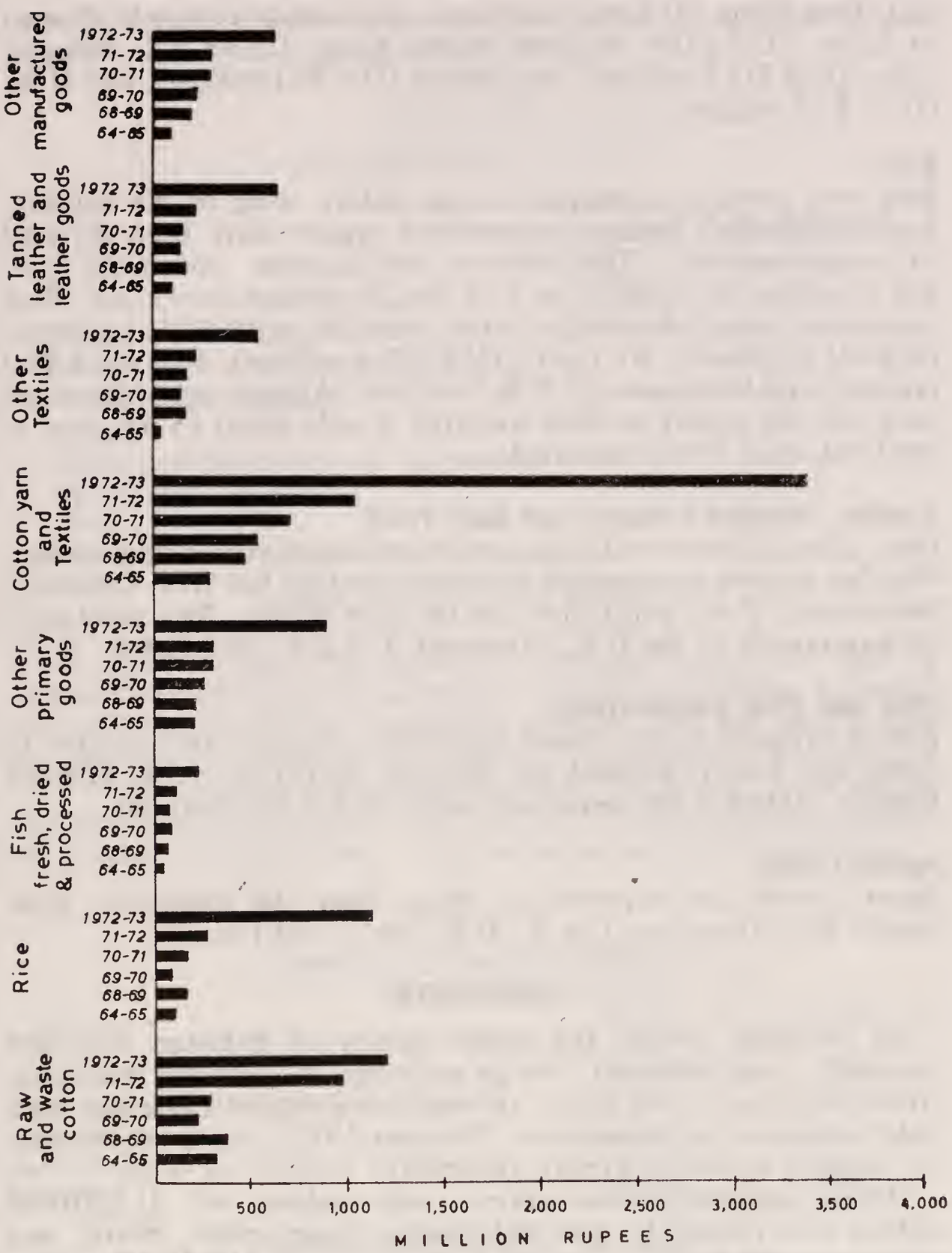


Fig. 59 Exports by commodity groups

(U.S.$23.7 million), and Singapore (U.S.$8.9 million). The export of cotton fabrics, second in value to cotton yarn, increased by 74 per cent during the year. Principal buyers were Japan (U.S. $27.0 million), U.K. (U.S.$16.8 million), U.S.A. (U.S.$11.5 million), U.S.S.R. (U.S.$9.7 million), Singapore (U.S.$7.5 million),

and Hong Kong (U.S.$6.3 million). Raw cotton is largely shipped to Japan (U.S.$35.4 million), Hong Kong (U.S.$24.1 million), China (U.S.$18.6 million), Yugoslavia (U.S.$9.1 million), and U.K. (U.S. $5.8 million).

Rice

Rice was previously shipped to the eastern wing of the country. Since Bangladesh became independent exports have been diverted to foreign markets. The value of rice exported rose from U.S. $36.3 million in 1970/71 to U.S. $113.6 million in 1972/3. Rice exports are mostly directed to Asian countries, particularly Indonesia (U.S.$41.8 million), Sri Lanka (U.S.$12.4 million), Iraq (U.S.$8.9 million), and Singapore (U.S.$6.5 million). African countries come next, but the export to these countries is only about 15 per cent of the total value of rice exported.

Leather, Woollen Carpets, and Raw Wool

Italy, Japan, France and Spain are the principal markets for leather. Woollen carpets are exported to many countries but West Germany, Switzerland, U.K., and U.S.A. are the main buyers. Raw wool finds its way mainly to the U.K., Australia, U.S.S.R., and U.S.A.

Fish and Fish Preparations

Fish is exported fresh, canned and dried. Shrimps are exported to Japan and U.S.A. Canned fish finds its market mostly in Western Europe. Japan is the important buyer of fish preparations.

Sports Goods

Sports goods are exported to more than 100 countries, principally West Germany, U.S.A., U.K., Italy, and France.

IMPORTS

As indicated earlier, the import policy of Pakistan has been variable. Availability of foreign exchange has been the main constraint. During recent years, the expanding export trade has been able to sustain larger imports. The year 1972/3 was a record year for imports as well as exports (table 24).

Other imported commodities with values of U.S.$10–20 million were chemicals; dyes and colours; paper, paste, board, and stationery; and textiles. Imports with a value of U.S.$5–10 million each comprised drugs and medicines; cutlery and hardware; rubber goods; and wood and timber (fig. 60).

Food grains are imported mainly from U.S.A. and Canada; metals and ores from the European Common Market, Japan, U.S.A., and Canada; electrical goods from U.K., U.S.A., Japan, and West Germany; petroleum from the Middle East, principally Iran and Saudi Arabia; sugar from Brazil; transport equipment from U.K., U.S.A., Japan, and West Germany; tea, the import of which increa-

sed substantially after the loss of East Pakistan, from Sri Lanka; and vegetable oils from U.K. and U.S.A.

TABLE 24

Principal Imports, 1972/3

(U.S.$ million)

Item	*Value*
Grains, Pulses, and Flour	82.8
Metals and Ores	56.5
Machinery (excluding electrical)	53.0
Petroleum Products	41.2
Sugar	38.1
Electrical Machinery & Appliances	34.2
Transport Equipment	33.7
Tea	25.3
Animal and Vegetable Oils and Fats	21.2

Monthly Statistical Bulletin, July 1973

The general trend has been for consumer goods to form a decreasing percentage of total imports, both because of the emphasis on capital goods for the developing economy and the substitution of domestically manufactured products for imports. However, in 1972/3 the percentage of consumer goods to total imports rose largely because items formerly imported from East Pakistan had to be imported as items of foreign trade. Tea and sugar were two such items.

TABLE 25

Imports by Category, 1972/3.
(U.S.$ million)

Category	*Value*	*% of Total*
Consumer Goods	248.5	29.6
Raw Material for Consumer Goods	258.5	30.8
Capital Goods	249.8	29.7
Raw Material for Capital Goods	83.0	9.9
TOTAL	839.8	100.0

Monthly Statistical Bulletin, July 1973.

DIRECTION OF TRADE

Before the loss of East Pakistan, trade was, by and large, with a small number of countries, although limited commercial contacts existed with most countries of the world. The separation of Bangladesh necessitated expansion of the existing foreign markets and development of new ones (fig. 61). In 1972/3, over 60 per cent of the export trade was directed to Asian countries, principally Japan and

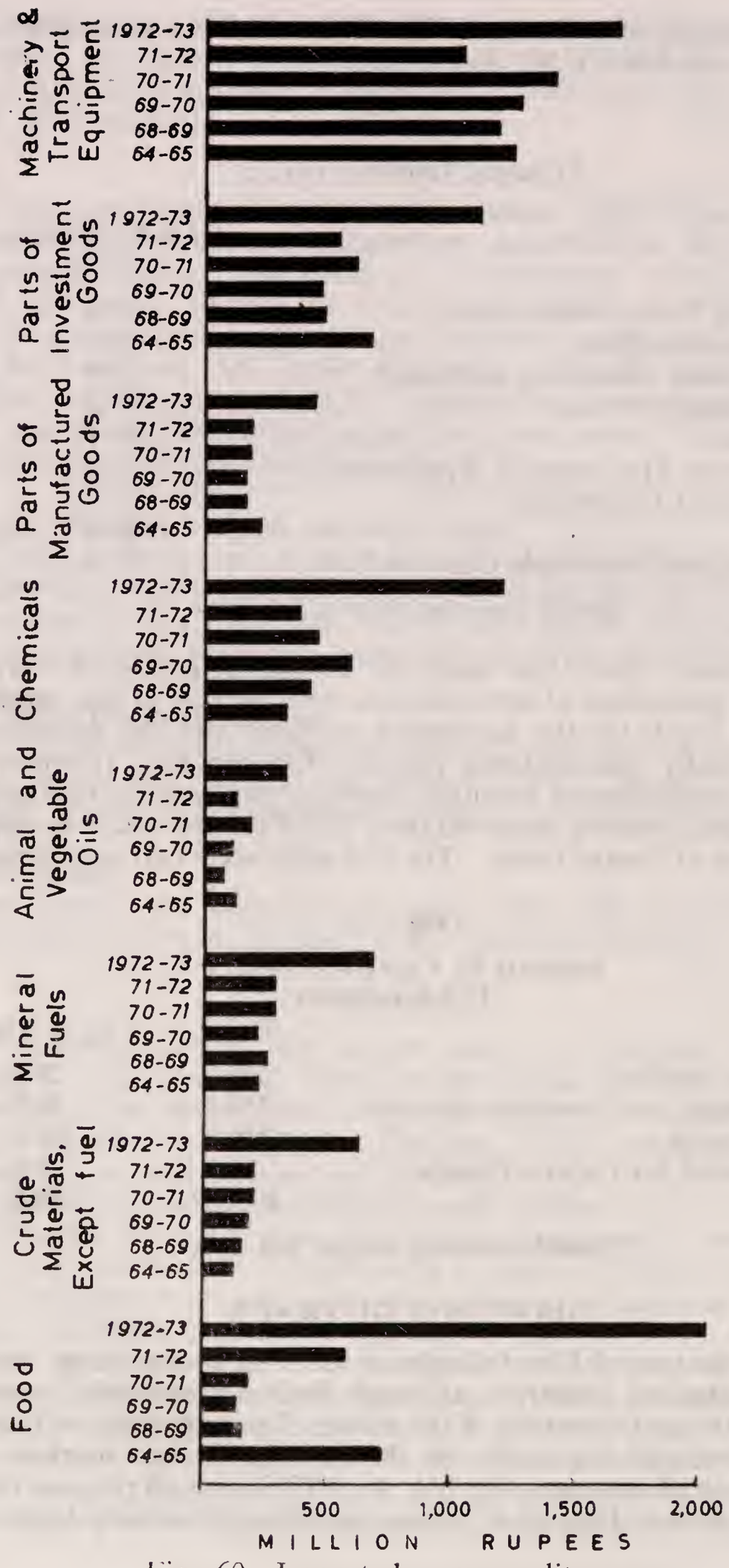


Fig. 60 Imports by commodity groups

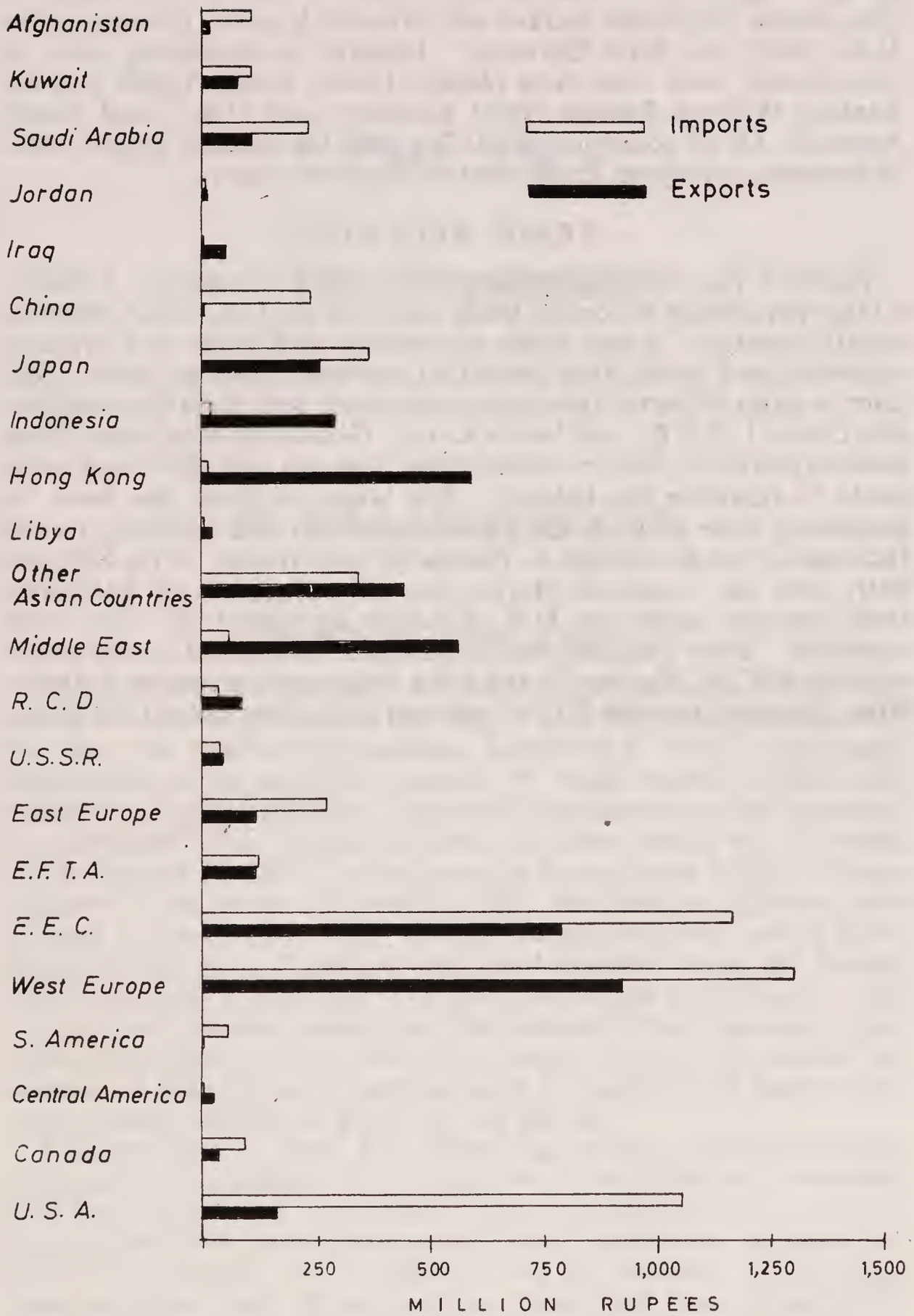


Fig. 61 Imports and Exports by areas and countries/territories, 1973

Hong Kong, but also Indonesia, Sri Lanka, China, and Singapore. The second important market was Western Europe, principally the U.K., Italy, and West Germany. Imports, in descending order of importance, were from Asia (Japan, China, Saudi Arabia and Sri Lanka), Western Europe (West Germany and U.K.), and North America. Of all countries, the U.S.A. was the greatest single source of imports, supplying 25 per cent of the total value.

TRADE RELATIONS

Pakistan has trade agreements with many countries. Initially, a large percentage of foreign trade was with the U.K. and Commonwealth countries. Later, trade agreements were made with Western countries, and some other important countries, such as Japan. Still later, a series of barter agreements were made with socialist countries, like China, U.S.S.R., and North Korea. Goods imported under these barter agreements have exceeded those exported and efforts are being made to liquidate the balance. The latest emphasis has been on expanding trade with Middle Eastern countries and obtaining transit facilities for trade through to Europe by land routes. With Britain's entry into the Common Market the old safeguards of Pakistan's trade interests under the U.K.–Pakistan agreement of 1951 were annulled. Since Pakistan has a significant balance of trade deficit with the E.C.M., the need is felt for a long-term agreement with the latter. Imports from the E.C.M. amount to 18.5 per cent of the total.

Part VII

The Provinces

20. BALUCHISTAN

PHYSICAL GEOGRAPHY

The province of Baluchistan extends over a large area (132,207 sq. miles) in south-west Pakistan (fig. 62). It is by far the largest province but has the smallest population, 2,409,000 in 1972. Physically, Baluchistan is an extensive plateau of rough terrain divided into basins by ranges of sufficient height and ruggedness to form obstacles to movement. The upper highlands, known locally as *Khorasan*, rise as high as 12,000 ft., with the valley floors about 5,000 ft. above sea-level. The lower highlands include the Makran, Kharan, and Chagai Ranges in the west, and the Sulaiman, Pab, and Kirthar Ranges in the east. There are only three sizeable plains, the Kachhi Plain, the plain of Las Bela, and the plain of the river Dasht. The north-western section is desert with an area of inland drainage, dissipating into *hamuns,* lakes that are generally dry. On the whole, the plateau of Baluchistan presents a scene of rugged and barren land with isolated patches of green on the plains.

The coast-line is about 470 miles long, with a number of peninsulas and promontories. The coastal area is not effectively connected with the interior: the precipitous table hills rising abruptly beyond the narrow and unproductive coastal plain. Ports, such as Sonmiani, Pasni and Gwadar, are unsheltered and the shoaling of the water does not allow entry of large ships. Since they have no extensive hinterland, they remain undeveloped.

Climatic conditions are as varied as the topography, in the plains and lower highlands, summers are very hot, and winters mild. In the upper highlands, winters are cold, and summer temperatures

relatively low. As the province lies outside the influence of the monsoons, rainfall is scanty and uncertain.

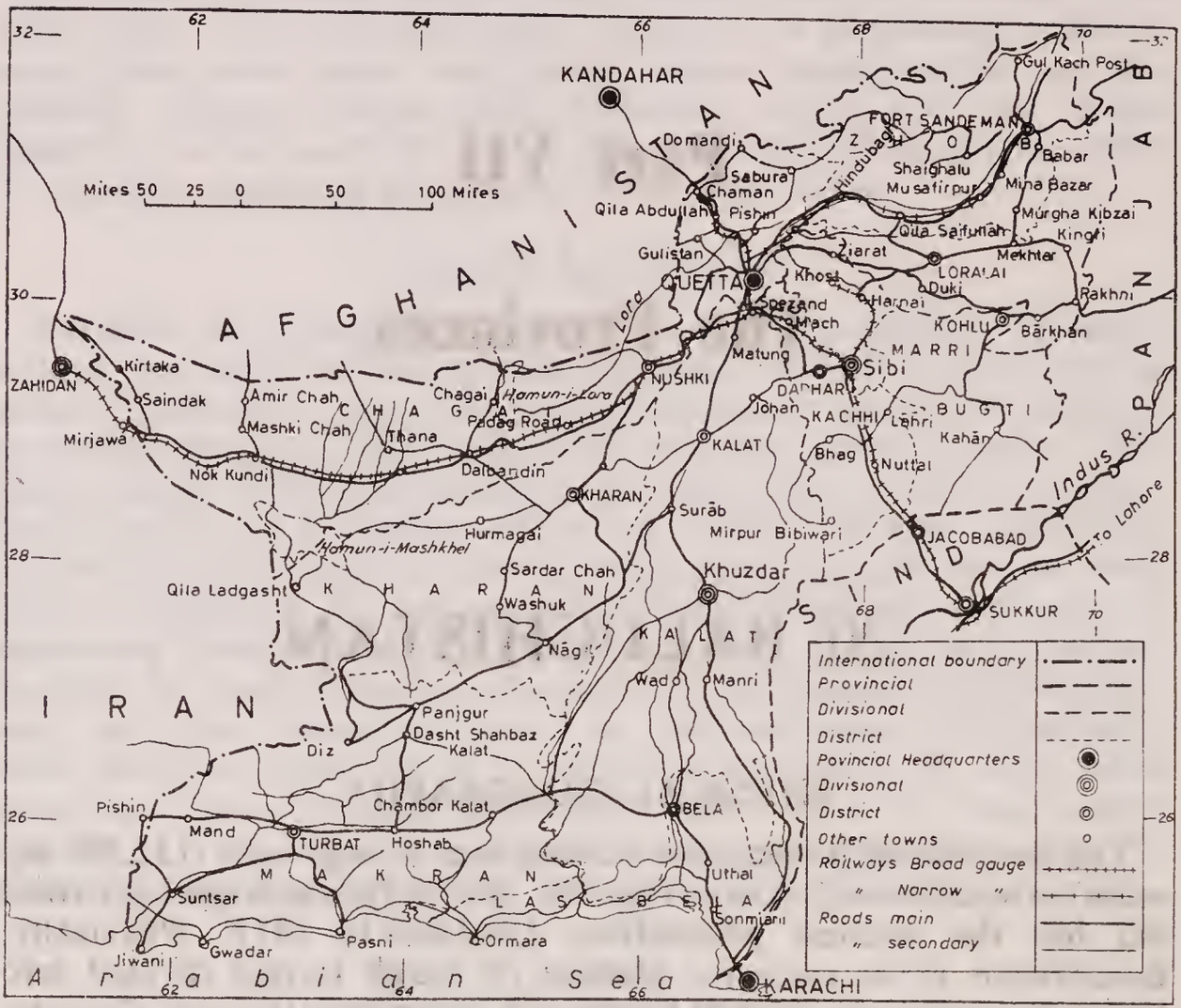


Fig. 62 Baluchistan Province

HISTORY

Archaeological evidence points to the existence of rural communities in Baluchistan even before the Indus Age (2,500–1,500 B.C.) revealed by the excavations at Moenjodaro, Harappa and elsewhere. The inhabitants lived in small villages in various basins, separated from one another by hills, and each developed its own culture. The population was not as sparse as it is today and the rainfall greater, possibly 15–20 inches. In southern Baluchistan relics of bunds built in those days have been found, suggesting the use of irrigation. These settlements, preceding the Indus Civilization, were the cradle of civilization on the Indo-Pakistan sub-continent.

The earliest available historical records show the region formed part of the Archaemenian Empire under Darius Hystaspes. Alexander the Great returned from India via Las Bela and Makran. After the death of Alexander, Baluchistan came under the rule of Seleucus Nicator, from whose descendants the Graeco-Bactrians

snatched power. They were in turn overthrown by the Sakas, between 140 and 130 B.C. Under Nauersherwan (A.D. 529–77), Baluchistan became part of the Sassanian Empire. In A.D. 635–6, Rai Chach from Sind conquered Makran and the Rai Dynasty later extended their rule northwards in Baluchistan.

The Arabs reached Makran in A.D. 643 and their power lasted until the end of the tenth century. Afterwards, Baluchistan came successively under Ghaznivids and Ghorids. In 1219, the territory was annexed to the kingdom of Sultan Mohammad Khan of Khwarizm. In 1223, the Mongols swarmed as far south as Makran. During the fifteenth century, the country was ruled by Arghuns, who were vanquished by Babur. From 1556 to 1595, Baluchistan came under the Safavid Dynasty. It then fell to the Moghuls. In 1638, Persian rule was again established, lasting until the rise of Ghilzais in 1708. By the Treaty of Gandamak (1879), Baluchistan came under British occupation.

PEOPLE

According to the census figures, the population of Baluchistan increased by 78 per cent between 1961 and 1972, despite some emigration to Sind. Population movements make accurate enumeration difficult. Seasonal migration is a common practice amongst the highland population. They migrate towards the plains in autumn, and return to the highlands in spring.

A number of tribes inhabit the province, chief of which are the Pathans, Baluchis, Brahuis, and Lasis. The Pathans are mostly found east of a line from Sibi to Chaman, while their nucleus area is the land around Takht-i-Sulaiman. The Baluchis are to be found in the Marri and Bugti Hills, and parts of the Kachhi Plain. The mountain land between Quetta and Las Bela is held by the Brahuis. The Lassis are mostly found in Las Bela. In keeping with the racial and tribal diversity, a number of languages are spoken in the province. They include Pashtu, Baluchi, Brahui, and Lasi.

ECONOMY

Baluchistan is the least advanced of the provinces economically. Of a total fixed capital formation for all of Pakistan in 1972/3 of Rs. 6,881 million, Baluchistan's share was only Rs. 220 million. Agriculture is handicapped by the limited amount of arable land, scanty rainfall, and lack of irrigation. Irrigation from surface flow is extremely limited, and mainly in the form of flood irrigation. In some parts of Baluchistan, *karez* irrigation is practised but increase of ground-water supplies awaits further investigation. Some pilot projects have been initiated. Development is in essence handicapped by (a) difficult terrain, (b) immense distances, (c) lack of communications, and (d) sparse population, and its isolation in mutually separated basins.

AGRICULTURE

Only 3 million acres are cultivated, and of these as many as 2 million are fallow at one time. During the last five years, the irrigated area has increased three-fold but is still only 1.2 million acres, or 4 per cent of the total irrigated area in Pakistan. Most of the cultivated land is under food grains, principally wheat. More than half of the wheat land is irrigated. The second crop is *jowar*, grown mainly on *barani* land. Rice is also grown where irrigation is sufficient. Most of the acreage is in Sibi District. Rape seeds, mustard, tobacco, potatoes, and onions are other crops. Some areas with winter rainfall and irrigation facilities grow fruit, including grapes, apples, apricots, pomegranates, peaches, and plums. Fruits are exported to other parts of Pakistan and are the cash crop of the province. Orchards are concentrated in the Quetta-Pishin District because this area has access to transport. The Makran coastal area is famous for the production of dates.

INDUSTRIES

Baluchistan is the least industrialized province. Factories are virtually non-existent. In 1967/8, there were only sixteen, with a total of 2,200 workers. Far better known are Baluchi handicrafts. These include the unique mirror work (embroidery on cloth, ornamented with pieces of glass), various leather goods, embroidered silk, *durrees*, mats, and baskets.

MINERALS

The province has considerable mineral wealth. It produces natural gas, coal, chromite, lead, sulphur and marble. Natural gas was discovered at Sui in Kachhi District in 1952. The reserves are among the largest in the world. From Sui, gas is piped to Karachi, Hyderabad, Sukkur, Multan, Lyallpur, Lahore, and Rawalpindi, and is used for industrial power. About two-thirds of the coal produced in Pakistan comes from Baluchistan. Chromite is mined at Hindubagh, mostly for export. Other reserves have been located in the Chagai area. Marble of good quality and beautiful shades occurs in several places, particularly Dalbandin and Chagai. Sulphur is worked at Koh Sultan in Chagai.

TRANSPORT FACILITIES

Because of the difficult nature of the land and the long distances involved, construction of railways and roads in Baluchistan is expensive, and large areas, remain untouched.

The province is connected with Sind by a rail line from Jacobabad via Sibi, Mach, and Spezand to Quetta. From Quetta the line extends to Chaman on the Pakistan-Afghan border. Another line connects Sibi with Harnai and Khost. From Spezand, another

line goes to Qila Sofed, near the Pakistan-Iranian border, via Nushki-Dalbandin and Nokkundi. A further line runs from Port Sandeman to Hindubagh.

Metalled roads are also sparse in Baluchistan. The Zhob and Loralai areas are best served. Northern Baluchistan is connected with Punjab by a road from Quetta to D. G. Khan via Loralai. Kharan, Makran, and Kalat are also linked by a road. Other roads run from Kalat to Khuzdar, and from Sorab to Pasni.

21. NORTH WEST FRONTIER PROVINCE

As indicated by its very name, this province is located in the north-west part of the country. It extends from latitude 31° 4′ to 37° 8′ N. and from longitude 69° 16′ to 74° 7′ E., an area of 39,283 sq. miles (fig. 63). Population in 1972 was 8.4 million.

PHYSICAL GEOGRAPHY

The terrain of the province ranges from lofty mountains with rugged valleys, to undulating and dissected sub-montane plateaux and flat plains. The northern and western parts of the province are dominated by mountains, with the highest peaks perpetually snow-clad. East of Tirich Mir (25,263 ft.), the highest peak in the Hindu Kush, the glaciers are an impressive sight. The western mountains, on the contrary, are dry, with aridity increasing toward the south, as the height decreases.

The most useful part of the province is the Vale of Peshawar, a fertile plain covered with alluvium and rimmed by a piedmont area in which surface gravels predominate. Kohat is a table land formed of sandstone and limestone and dissected by streams. Bannu is a plain underlain by sandstone and conglomerates and bordered by hills. D. I. Khan is, for the most part, a plain formed of alluvium, limestone, and gravels, and dissected where erosion by torrents is active. Hazara District in the north-east is generally mountainous, with small plains between the ranges in its southern part.

Because the terrain of the province is so highly diversified, climatic conditions vary substantially. The mountainous areas are very cold in winter, and remain cool in summer. In the plains the summers are hot, and the winters cool to cold.

HISTORY

The history of N.W.F.P. is long and chequered. Most of the invasions of the sub-continent from Central Asia came through the easily negotiable passes of this province.

Fig. 63 North Western Frontier Province

The historical record goes back to 518 B.C., when the region was conquered by the Persian ruler, Darius Hystaspes. It remained part of the Persian Empire until 359 B.C. Between 327 and 317 B.C., the area was under the Macedonian suzerainty established by Alexander. Soon afterwards, it came under Mauryan rule. This was the time of the ancient state of Gandhara, in which an amalga-

mation of Buddhism, fostered by the Mauryan ruler, Asoka, with Grecian art forms produced unique sculptures and a high level of civilization. The Mauryan rule was followed successively by the Bactrians, Sakas, Parthians and, in the early years of the Christian era, the Kushans. The old civilization centering on Taxila and the Mardan Plain was destroyed. The Sassanid dynasty of Persia established hegemony about A.D. 226 and dominated the area until the incursions of the White Huns began in the third quarter of the Fifth Century.

Muslim rule began with the conquests of Subuktigin in A. D. 998. Subuktigin's son, Mahmud of Ghazni, invaded the area a number of times between 1001 and 1027. Mohammad of Ghor ruled from 1179 to 1206. Then came the Mongol invasions. Babur crossed the region in 1505 in the course of establishing Moghul rule in the sub-continent. The Moghul suzerainty over India lasted about two centuries. Its hold on the north-west was weakened by the invasion of Nadir Shah in 1738. By 1818, it was a Sikh area. The British annexed the N.W.F.P. in 1849, holding it with difficulty until the province became part of Pakistan in 1947.

PEOPLE

N.W.F.P. in 1972 had a population of 8.4 million, which is 12.9 per cent of the population of Pakistan. The population density in the fertile districts of Peshawar and Mardan, namely in the Vale of Peshawar, is high: 700 persons or more, per sq. mile. At the other extreme is D. I. Khan, with a density of about 80 persons per sq. mile. Only one-tenth of the total population is urban living in centres of more than 5,000.

The province is inhabited by a number of tribes and sub-tribes or clans, known locally as *khels*. The major tribes are the Yusafzai, Mohmand, Afridis, Utman Khel, Waziris, and Orakzais, known collectively as Pathans. Administratively, the province is divided into settled districts, like those of the other provinces, and tribal territory. In the tribal areas, tribal law prevails and the *jirga* (Council of Elders) exercises the judiciary function and manages relationships with other tribes.

ECONOMY

The nature of the terrain and the limited irrigation facilities vitiate agrarian prosperity. Agriculture, directly and indirectly, supports about 80 per cent of the population, and contributes about 40 per cent of the gross provincial product. The area tilled is 4 million acres, of which close to 40 per cent is irrigated. Wheat is by far the most important food crop, with a cultivated area of 1.7 million acres and a production of 600,000 tons in 1972/3. It is followed by maize, gram, rice, barley, and millets (*bajra* and *jowar*). In cash crops, N.W.F.P. ranks first among the provinces in the production

of tobacco, and second only to Punjab in the production of sugar-cane. Substantial quantities of rape seeds and mustard are also grown. Except for tobacco and sugar-cane, yields per acre are low, but may improve when use of chemical fertilizers is increased to the level of Punjab and Sind.

There is little manufacturing industry. In 1967/8, the province had 101 factories, employing 27,000 workers. The comparatively important industries within the province are sugar refining, fruit canning and preservation, and tobacco curing. One item for which the province is well-known is the manufacture of hand-made guns. Other industries are cotton textiles, edible oil, cement, and grain milling.

The mineral potential of the province is believed to be comparatively good, but it awaits proper exploration and development. Lack of roads in the northern part of the province is a severe handicap. Coal, limestone, and marble are mined, and emeralds are found in Swat. Iron ore deposits have been located near Drosh in Chitral. Hydro-electricity is produced at Malakand, Dargai and Warsak, and Tarbela Dam, when completed, will produce power in massive amounts.

22. THE PUNJAB

The word 'Punjab' means 'five waters', signifying the five rivers (Indus, Jhelum, Chenab, Ravi, and Sutlej) which are the life-blood of this area. Before the advent of perennial canal irrigation at the turn of the present century, much of the Punjab was no better than a desert or semi-desert. The river waters were then used to convert the barren desert to agricultural fields. The Punjab is the most populous of all the provinces of Pakistan, with 37,374,000 people, or 57.6 per cent of the entire population in 1972.

PHYSICAL GEOGRAPHY

Punjab province lies between latitudes 27° 42′ and 34° 2′ N., and longitudes 69° 18′ and 75° 23′ E, and covers an area of 79,542 sq. miles (fig. 64). Most of this area comprises a level plain formed by the Indus system of rivers and is divided by these rivers into several *doabs* (interfluves). The general slope of the land is from north-east to south-west, the direction of the axes of the doabs, with an average gradient of one foot per mile. However, within each doab, the land slopes downward from the axis to the bounding rivers. The north-west part of the Punjab is hilly, rising to 5,000 feet and higher. The Potwar Plateau lies between these foothills and the Salt Range. Its average elevation is only 1,000–2,000 feet but it is highly dissected. To the south and west, bordering Baluchistan, lies the Sulaiman range, with a maximum height of about 11,000 feet. The agricultural heart of the province lies in the doabs and, to a lesser extent, the Potwar Plateau.

The climate is continental, signifying aridity and marked ranges of temperature, both seasonal and daily. Summers are hot and winters cold; the mean annual range of temperature at Lahore is 28.2°F. In the northern sub-montane strip, annual rainfall is over 20″, which decreases southward to about 5″.

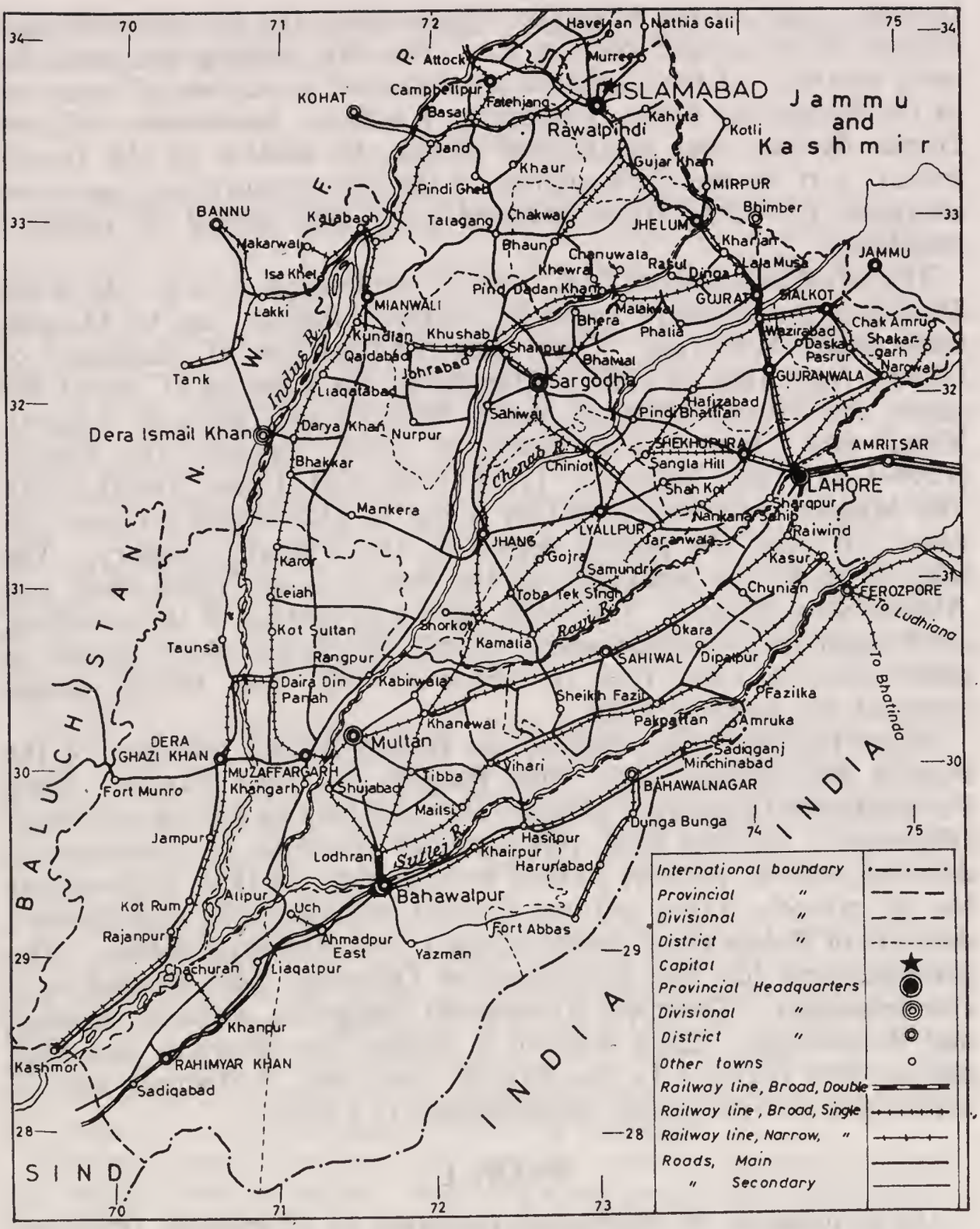


Fig. 64 Punjab Province

HISTORY

The history of the Punjab goes back to great antiquity. It formed a part of the Indus Civilization which lasted from about 2,500 to about 1,500 B.C. Throughout the long span of recorded history, the Punjab area lay on the pathway of invasions of the sub-continent from outside. It remained under Persian occupation from 518 to 359 B.C. Alexander established Greek rule over the area in 326 B.C., which lasted for about nine years. The Punjab

formed a part of the Mauryan empire from 317 B.C. upto the last decade of the second century B.C. The first century B.C. and the early centuries of the Christian era witnessed a number of invasions of the Punjab by Sakas, Parthians, Kushans, Sassanians, till the Gupta dynasty was established about the middle of the fourth century A.D. In the third quarter of the fifth century A.D. came the invasions of White Huns followed by a long period of political instability.

The Muslim influence first came to the Punjab, in A.D. 712 when Sind and the adjacent parts of southern Punjab, up to Multan, came under Arab rule. Then came the invasions of Mahmood of Ghazni from 1001 to 1027. Afterwards, for a period of about 500 years, the Punjab changed hands between the rulers of Ghazni, Kabul and Delhi. The rulers of Delhi included the Khaljis (1296–1321), the Tughluks (1321–1398) and Lodis (1450–1526). The Moghul rule established by Babur in 1526 lasted for over 200 years. It was the golden period of the Punjab's history. The Moghul hold was weakened by the invasions of Nadir Shah and Ahmad Shah Abdali. The Sikhs, taking advantage of the situation, established their confederacies. Ranjit Singh, the chief of one of these confederacies, rose to power in 1792. The British forces defeated the Sikhs in 1849.

When Pakistan was created, the British Indian province of the Punjab was divided into West Punjab and East Punjab. West Punjab formed a part of Pakistan, and later became known as Punjab (Pakistan). At that time, this province consisted of administered districts, and the princely state of Bahawalpur. In 1955, Bahawalpur lost its princely status and was divided into the three administered districts of Bahawalpur, Bahawalnagar, and Rahimyar Khan. The province now has five administrative Divisions, each headed by a Commissioner. These are Rawalpindi, Sargodha, Lahore, Multan, and Bahawalpur. Each division is divided into districts, and each district into *tehsils*. In the Punjab, there are 19 districts and 73 *tehsils* and the provincial headquarters is Lahore.

PEOPLE

The population of the Punjab increased by 12 million, or 46 per cent, between the census of 1961 and that of 1972. In 1972 it was 37.4 million, which formed 57.6 per cent of the total population of Pakistan. The old settled districts of Sialkot, Lahore, Gujranwala, Gujrat, and Rawalpindi, and the canal colony districts of Lyallpur and Sahiwal, all had a population density of over 500 persons per sq. mile in 1961. From this block of high-density districts, there is a general decrease towards the south-west. In 1961, over 20 per cent of the population was urban. When the 1972 figures are released, this percentage will undoubtedly be higher.

The ethnic groups of the Punjab include the Jats, Rajputs, Arains, Gujjars, and Awans. With the growing political and social

equality of the people of the Punjab, these groups are now fast losing their distinctive aspects.

ECONOMY

The Punjab is economically the most advanced province in Pakistan. Gross Fixed Capital Formation in 1971/2 was Rs. 2,895.9 million compared with Rs. 1,982.2 million for Sind, Rs. 1,488.4 million for N.W.F.P. and Rs. 220.1 million for Baluchistan. In 1967/8, 38 per cent of the gross product for the province was obtained from agriculture, and 17 per cent from manufacturing.

The area cultivated was reported in 1971/2 as 27 million acres, of which about 3 million acres were fallow. Nine per cent of the cultivated acres were sown more than once. This percentage can be improved if the irrigation season is extended by better water supplies. Moreover, another 6.6 million acres of land, potentially arable but not now cultivated for lack of water, may be brought under the plough. Of the 27 million acres presently cultivated, 22 million are irrigated. Of these about 70 per cent are served by canals and the remainder by other means, including tube-wells, small dams, and lakes.

Wheat is the principal crop. The Punjab produces four-fifths of the wheat grown in Pakistan. In 1971/2, the area planted was 10 million acres and the harvest, 5 million tons. The Punjab also produces three-quarters of Pakistan's cotton, three-quarters of its sugarcane, and three-fifths of its rice. Other important crops are gram, millets, and fodder crops.

Although agriculture is the most important sector of the Punjab economy, the number of industrial units has been slowly increasing and the province is one of the more industrialized parts of Pakistan. Factories in 1970/71 numbered close to 2,000, employing over 2 lakh persons and producing goods worth over Rs. 600 crore. This was 47 per cent of industrial employment and 43 per cent of the value of manufacturing production for all of Pakistan.

The most important industry both in terms of number of units and employment is textiles. Half the total industrial employment is in textiles, principally cotton textiles. Other important industries are cotton ginning and pressing, dyeing, carpets and rugs, machinery, electrical appliances, surgical instruments, bicycles, and hosiery. Food industries, including dairy products, edible oils, sugar and flour milling, form another major industrial group. Lesser industries include wood products, leather-tanning, chemicals, cement, pottery, and metal works.

Along with economic progress there has been a commensurate improvement in communication and transport in the province. Of the total passenger and freight transport of the Pakistan Railways about half is contributed by the Punjab. There has been a marked increase both in the road mileage and the volume of vehicular traffic.

At the time of Independence the mileage of metalled and black-topped roads in the Punjab was 1,500 miles. By 1970 it increased to as much as 5,700 miles. The increase in vehicular traffic during the Third Plan has been about 34 per cent. A similar increase has been recorded in passenger and freight traffic.

23. SIND

PHYSICAL GEOGRAPHY

The province of Sind extends from latitude 23° 35′ to 28° 30′ N. and longitude 66° 42′ to 71° 10′E. (fig. 65). It has an area of 58,741 sq. miles and a population of 13.97 million (1972 census). Most of Sind is a level flood plain formed by the Indus, and known as the Lower Indus Plain. Unlike the arrangement of the doabs in the Punjab, the Lower Indus Plain has a Nilotic character. That is to say, it is dominated by a single river. The general slope of the Lower Indus Plain towards the sea is even more gentle than that of the Punjab. The river is very sluggish, and has been depositing alluvium for centuries, so that its bed and banks are now above the general level of the plain. The slope of the land is therefore away from the river and when it overflows extensive areas are flooded. To arrest this damage, bunds have been built for long distances. The river also has changed its course, sometimes shifting considerable distances, as at Hyderabad in the 19th century. Remnants of old courses can be seen as slight elevations on the present plain. On the basis of evidence at Moenjodaro, it is estimated that the general level of the plain has been raised at the rate of seven inches a century, and that the delta has extended seaward about 50 miles over the past 2,000 years.[1] Occasional low limestone hills rise about 200 feet above the plain, as in the Makli Hills at Thatta, the Rohri hills and the Ganjo Takkar hills at Hyderabad.

Climatically, upper and middle Sind have conditions quite similar to those of the Punjab. However, the extremes of temperature here are comparatively less pronounced. The mean annual range of temperature at Sukkur is 26.0°F. Summers are hot but winters milder than in the Upper Indus Plain. In the southern coastal belt, marine influences have a moderating effect; the mean annual range of temperature is only 12.5°F. at Karachi. Rainfall in the coastal belt is less scanty.

1 *Lower Indus Report*, West Pakistan WAPDA, Part 1, 1966, p. 16.

Fig. 65 Sind Province

HISTORY

As with the Punjab, the history of Sind goes back to great antiquity. Archaeological excavations indicate that Sind was the site of one of the earliest civilizations of the world. The Indus civilization, which flourished here from 2,500–1,500 B.C., was not a

purely agrarian village society like the ancient culture of Baluchistan. Moenjodaro was a large, well-planned city, with a circumference of three miles. The Indus Civilization is thought to have been overrun by Aryan incursions.

The written history of Sind starts with the invasion of Alexander the Great in 325 B.C. After Alexander's death in 323 B.C., it came under Seleucus Nicator. Chandragupta Maurya extended his rule from the north to the Sind region in 305 B.C. The rule of this dynasty was followed by the Sudra dynasty, which established itself from the sea north to the Salt Range, with its capital at Alor. Brahmin rule was established in the seventh century A.D.

The successful invasion of Mohammad bin Qasim came in A.D. 771 and the Arab rule he established lasted for about three centuries. Next came Mahmood of Ghazni who conquered Sind as a part of his invasions into India. During the period between Mahmood's invasions and the establishment of Moghul rule, the region was mostly governed by local dynasties. There were two important local dynasties, the Sumras and the Sammas. The Sammas, with their capital at Thatta, were over-powered by the Arghuns of Persia, and they in turn were overthrown by the Turkhan dynasty.

Sind was annexed to the Moghul Empire during the reign of Akbar. As the Moghul rule weakened after the death of Aurangzeb, the local dynasty of the Kalhoras was established, to be succeeded by the Talpurs, who remained in power until the British occupation in 1892.

Under the British, Sind was attached to the Bombay Presidency until 1937, when it became an autonomous province. It remained so until 1955, when all the provinces of West Pakistan were integrated into One Unit, a single province of West Pakistan. The One Unit was dismembered in 1970 and all the four povincial governments re-established.

PEOPLE

In 1972, Sind had a population of 14.0 million which formed 21.5 per cent of the total population of Pakistan. The increase from the 1961 census figure was 67 per cent. Because of the presence of the large city of Karachi in this province, 38 per cent of the population was classified as urban. In 1961, population density varied from 1,506 in Karachi to 52 per sq. mile in Thatta.

ECONOMY

Sind is one of the two economically advanced provinces of Pakistan, the other province being the Punjab. Like that of the Punjab, the economy of Sind is agricultural-cum-industrial.

Agriculture is the major source of employment. The area reported as cultivated was 13.75 million acres in 1971/2 but of this 6.38 million acres was fallow that year. This is a much higher pro-

portion of fallow than in either the Punjab or N.W.F.P. The reason lies in the water supply. About 54 per cent of the cultivated area has perennial irrigation. The balance is dependent on flooding during the summer when the river overflows. These waters are controlled as far as possible for a *Kharif* crop, especially of rice.

For the province as a whole, wheat, rice, and cotton are the principal crops, but sugar-cane, gram, millets, rapeseeds, and mustard are also widely grown. East of Karachi there is a truck-farming belt to supply vegetables to the city. The average yields of wheat, rice, and cotton are higher than in the Punjab because the use of high-yielding varieties and chemical fertilizers is more widespread.

Livestock products supply about one-quarter of the value of agricultural products in this province. Karachi constitutes a large market for poultry, eggs, and meat. Fishing is likewise an important industry, both for Pakistan and foreign markets.

In terms of the number of factories, value of production, and value added in processing, Sind is the leading industrial province. In 1967/8, Sind had 1,600 factories, employing 181,400 persons, and producing goods worth Rs. 4,488 million. Cotton ginning and pressing, dyeing, spinning, and weaving form the most important single group of industries. The number of spindles and looms in the cotton textile mills of Sind respectively form 58 per cent and 48 per cent of the total for Pakistan. Other important industries include iron and metal working, machinery, drugs and pharmaceuticals, rubber goods and tyres, printing and publishing, rice-milling, and processing of edible oils. Sind's pre-eminence in non agro-based industry arises from the Karachi's position as the nation's only port city. It is in this city that most of the industries are located.

TABLES

TABLE I

Mean Maximum and mean Minimum Temperatures, Precipitation and number of Rainy Days

M = Mean maximum Temperature °F. N = Mean minimum Temperature °F
P = Precipitation in inches R = No. of rainy days

Station		*Jan.*	*Feb.*	*Mar.*	*Apr*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Annual*
Bahawalpur	M	69.9	76.0	86.0	97.8	106.8	108.5	103.4	100.4	99.7	95.5	85.4	74.5	92.0
	N	42.0	47.5	56.5	68.6	76.7	84.1	84.0	82.0	76.9	64.0	51.8	44.4	64.7
	P	0.2	0.2	0.4	0.2	0.1	0.2	1.9	1.5	0.3	0.1	0.0	0.1	5.5
	R	0.7	0.8	0.9	0.5	0.4	0.5	2.6	2.1	0.5	0.2	0.0	0.4	9.6
Bannu	M	65.5	69.3	77.4	88.6	100.5	105.5	101.8	99.2	97.6	90.3	79.9	69.8	87.1
	N	41.1	46.7	55.1	64.4	74.1	80.7	82.3	80.9	75.3	63.6	51.1	43.2	63.2
	P	0.8	1.2	1.8	1.2	0.5	0.8	2.7	2.2	0.7	0.1	0.1	0.4	12.8
	R	2.1	2.9	4.0	2.7	1.8	1.2	3.7	3.4	1.1	0.3	0.4	1.2	24.6
Campbellpur	M	61.5	67.6	74.5	85.1	97.3	105.3	100.0	97.6	95.5	88.6	75.4	64.7	80.2
	N	35.9	41.3	51.2	59.4	69.5	77.4	79.9	78.5	72.9	57.7	45.1	37.9	58.8
	P	2.1	1.3	2.2	1.9	1.1	0.7	5.0	4.1	1.9	0.7	0.5	2.2	24.1
	R	3.4	2.8	5.3	4.2	2.4	1.5	5.7	6.4	2.8	1.3	1.3	2.3	39.4
Chitral	M	47.7	51.1	60.9	71.0	81.1	94.7	98.0	96.3	89.0	76.4	64.2	52.7	72.7
	N	29.7	32.6	41.1	47.1	55.0	65.7	69.3	68.5	56.4	46.7	38.2	32.1	48.7
	P	1.2	2.9	6.0	6.1	1.8	0.2	0.3	0.3	0.6	0.7	0.6	1.9	23.1
	R	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
D. I. Khan	M	67.3	72.8	81.4	93.6	104.0	108.2	102.8	100.8	99.9	93.6	82.7	72.0	89.9
	N	40.2	45.4	55.4	65.2	75.0	81.0	82.1	80.7	75.6	62.6	49.4	41.7	62.9
	P	0.5	0.7	1.0	0.7	0.3	0.3	2.5	1.4	0.5	0.1	0.1	0.2	8.7
	R	1.4	1.7	2.8	1.8	1.0	0.9	2.8	2.0	1.0	0.2	0.2	0.7	16.5

Table I—Contd.

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Drosh	M	44.8	50.4	59.1	70.3	82.5	92.8	96.8	95.2	89.8	78.1	64.1	51.9	73.0
	N	32.3	34.5	40.9	49.6	59.5	68.5	73.7	72.8	65.4	53.5	43.6	36.4	52.6
	P	3.4	2.9	5.3	4.3	2.4	0.8	0.8	0.9	1.0	1.3	0.8	1.5	25.9
	R	6.0	5.9	9.5	8.2	6.1	2.3	2.0	1.8	2.4	3.5	2.2	3.2	53.1
Fort Sandeman	M	54.6	62.0	69.5	79.6	88.6	98.0	96.4	96.1	91.9	82.5	69.9	59.9	79.1
	N	32.7	37.4	46.4	54.3	62.3	71.9	73.9	73.2	66.6	51.9	41.4	35.4	53.9
	P	1.4	1.0	2.4	1.4	1.2	0.3	2.5	2.0	0.2	0.2	0.7	1.1	15.0
	R	3.7	2.7	5.9	3.9	2.9	1.3	5.9	4.3	1.3	0.6	1.3	2.4	36.2
Haripur	M	61.4	66.9	76.0	84.5	96.3	105.2	98.9	94.2	93.3	87.3	76.9	67.7	84.1
	N	39.0	43.5	50.7	58.9	67.0	76.5	77.0	75.2	71.1	60.5	49.0	42.5	59.2
	P	2.5	1.5	2.5	1.6	0.9	0.2	6.4	7.3	4.1	0.9	0.6	1.3	30.3
	R	4.0	3.1	5.7	3.6	1.1	0.6	6.7	8.3	3.5	1.3	0.9	2.4	41.0
Hyderabad	M	75.6	83.1	93.5	103.0	108.1	105.0	99.5	97.0	98.3	98.7	90.0	79.5	94.3
	N	50.1	55.1	63.9	71.9	78.7	82.3	81.5	79.7	77.2	70.7	61.1	53.2	68.8
	P	0.1	0.2	0.0	0.0	0.1	0.2	2.6	1.7	0.5	0.1	0.0	0.1	6.0
	R	0.5	0.4	0.2	0.2	0.4	0.4	3.5	2.2	1.0	0.2	0.1	0.2	9.3
Jacobabad	M	72.3	79.2	89.4	100.9	110.4	111.8	106.0	102.1	101.3	97.8	87.7	76.8	94.6
	N	44.7	50.7	60.9	70.8	79.6	84.7	85.0	82.9	78.8	67.3	55.5	47.1	67.3
	P	0.3	0.3	0.3	0.1	0.1	0.2	0.2	0.8	0.0	0.0	0.0	0.1	3.4
	R	0.6	0.9	0.8	0.3	0.3	0.3	2.1	1.1	0.0	0.0	0.1	0.3	6.8
Kakul	M	53.6	59.5	65.9	75.0	84.8	93.0	87.0	83.7	83.3	76.9	67.8	59.8	74.2
	N	37.0	41.3	47.7	56.7	63.2	70.6	70.1	68.9	65.6	56.8	47.9	42.3	55.5
	P	3.1	2.6	4.9	3.6	2.4	1.3	10.9	9.3	3.6	2.0	1.3	2.2	47.3
	R	5.6	4.5	1.4	6.7	5.6	3.6	11.7	13.0	6.1	3.0	2.2	3.7	67.1
Karachi	M	75.6	78.2	82.4	86.2	89.2	90.7	88.3	86.3	86.0	87.5	85.8	79.9	84.7
	N	57.1	61.9	69.0	74.9	79.8	82.7	80.9	79.0	77.4	74.1	67.9	60.8	72.1
	P	0.3	0.4	0.2	0.9	0.0	0.3	3.8	1.9	0.5	0.1	0.1	0.2	8.9
	R	0.9	0.8	0.3	0.2	0.1	0.4	3.2	1.8	0.5	0.1	0.2	0.5	9.0

Lahore	M	66.8	72.4	82.1	94.7	104.4	106.0	98.7	96.5	96.7	92.6	82.2	71.4	88.7
	N	41.2	46.5	55.6	65.1	74.7	80.3	80.9	79.8	75.3	63.1	49.2	42.2	62.8
	P	1.2	0.9	0.9	0.6	0.3	1.5	4.8	4.8	3.1	0.4	0.1	0.4	19.3
	R	2.3	2.0	2.6	1.8	1.2	2.6	6.3	6.0	2.8	0.6	0.2	0.9	28.8
Lasbela	M	78.9	84.2	93.1	101.7	101.5	107.5	101.8	100.1	100.3	100.2	93.0	83.8	96.0
	N	46.8	50.8	58.7	66.0	74.7	81.1	81.1	79.2	75.8	66.8	54.7	51.7	65.6
	P	0.3	0.6	0.6	0.3	0.6	0.5	2.4	1.2	0.5	0.1	0.0	0.3	7.6
	R	1.0	1.3	1.0	0.7	1.4	1.0	3.5	2.3	1.0	0.1	0.1	0.5	13.9
Lyallpur	M	66.9	72.5	81.3	93.5	103.5	105.8	99.9	97.7	97.8	93.1	82.7	71.7	88.9
	N	40.6	45.7	54.6	64.9	75.3	81.7	82.3	80.9	76.1	63.9	50.7	42.9	63.3
	P	0.6	0.7	0.9	0.5	0.3	1.1	3.8	3.8	1.1	2.2	0.1	0.3	13.6
	R	1.5	1.8	1.9	1.4	1.1	2.1	4.5	4.6	1.5	0.3	0.2	0.5	21.4
Miranshah	M	58.3	62.1	69.7	81.0	93.4	99.1	96.2	93.4	91.8	84.0	73.2	63.7	80.5
	N	37.4	40.9	50.8	58.6	69.4	76.6	78.1	76.5	71.4	59.0	46.3	38.3	58.6
	P	0.7	1.4	2.3	1.9	0.9	0.9	2.5	1.4	0.5	0.2	0.2	0.8	14.0
	R	2.5	3.7	5.4	3.9	2.3	1.6	3.9	2.6	1.2	0.4	0.4	1.7	29.6
Multan	M	68.0	79.3	84.1	96.5	105.3	109.5	103.1	101.1	99.6	93.7	82.0	71.7	90.8
	N	40.4	45.7	57.4	66.3	74.7	84.2	83.9	82.8	78.2	64.3	50.6	42.8	64.3
	P	0.4	0.3	0.8	0.4	0.5	0.2	1.3	1.2	0.9	0.0	0.1	0.5	6.3
	R	1.3	0.7	1.6	1.0	0.9	0.4	1.7	2.0	1.1	0.1	0.6	1.1	12.5
Murree	M	43.4	46.5	53.5	64.3	4.0	78.9	74.3	71.9	71.3	66.2	58.5	49.5	62.7
	N	31.1	33.2	39.7	48.2	56.3	61.2	60.8	59.5	55.8	49.0	41.9	35.4	47.7
	P	4.7	4.4	6.1	4.0	2.4	4.2	14.2	14.1	5.3	2.1	0.8	2.1	64.5
	R	7.2	6.7	9.1	6.8	5.5	6.5	15.0	16.1	7.5	3.0	1.7	4.2	89.3
Nawabshah	M	73.8	82.0	92.4	102.0	109.7	110.0	103.7	101.2	99.7	97.4	87.8	76.7	94.7
	N	44.0	47.0	58.4	66.9	75.6	82.2	87.8	81.2	76.4	65.7	53.8	47.3	65.0
	P	0.1	0.1	0.1	0.1	0.0	0.2	3.2	2.0	1.4	0.1	0.0	0.0	7.8
	R	0.4	0.4	0.3	0.4	0.1	0.6	3.4	1.3	1.4	0.3	0.3	0.4	9.3

Table I—Contd.

Station		*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Annual*
Nushki	M	60.8	67.3	76.3	88.7	98.2	104.8	106.8	103.9	97.2	86.5	74.0	63.3	85.7
	N	42.2	45.6	53.6	63.7	71.9	78.7	82.3	79.7	70.7	61.5	50.7	42.7	61.9
	P	1.5	1.1	0.9	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.6	5.0
	R	3.4	2.7	2.4	0.7	0.3	0.0	0.5	0.2	0.1	0.0	0.3	1.6	12.2
Parachinar	M	50.1	53.5	60.9	70.7	80.8	88.0	86.9	84.5	82.4	75.3	65.7	56.3	71.3
	N	28.8	32.6	39.4	48.5	57.1	64.7	66.8	65.4	59.7	40.7	40.2	33.4	48.9
	P	3.2	3.0	5.3	4.0	2.5	1.8	4.8	4.4	2.1	0.6	0.5	1.2	33.7
	R	4.8	5.8	8.3	7.4	6.4	4.3	8.5	8.0	4.6	1.8	1.1	2.5	63.5
Peshawar	M	63.1	67.5	74.8	85.7	97.6	104.4	101.0	96.9	95.3	87.9	77.9	68.1	85.0
	N	39.3	43.9	51.8	60.7	71.2	78.2	80.4	78.6	72.9	61.2	48.8	41.0	60.7
	P	1.5	1.8	2.5	1.6	0.5	0.2	1.3	1.6	0.5	0.3	0.3	0.6	13.0
	R	3.5	3.6	5.4	3.5	1.6	0.7	2.3	2.3	1.2	0.9	0.7	1.5	27.0
Quetta	M	51.4	56.1	65.1	76.4	86.7	93.5	95.7	93.8	88.1	77.1	65.0	55.8	75.4
	N	27.0	29.9	37.6	45.1	51.4	57.6	66.0	61.6	49.7	37.7	28.8	25.4	43.1
	P	1.4	1.7	1.6	0.4	0.2	0.0	0.7	0.2	0.0	0.0	0.2	0.2	7.7
	R	3.9	4.1	4.7	1.3	0.8	0.2	1.5	0.6	0.1	0.2	0.7	2.1	20.2
Rawalpindi	M	62.2	67.0	75.4	87.2	98.7	103.7	97.3	93.3	94.0	88.8	78.4	67.5	84.5
	N	37.2	42.1	50.3	59.6	70.0	76.3	76.8	74.8	70.4	58.2	44.7	37.8	58.2
	P	2.5	2.5	3.2	1.6	0.9	2.1	9.1	10.1	3.3	0.8	0.4	0.8	37.8
	R	4.1	4.3	5.3	3.2	2.3	2.9	9.8	10.2	4.3	1.8	0.8	1.7	50.7
Sargodha	M	67.6	72.5	81.1	89.9	99.6	107.2	100.2	97.3	97.1	91.6	80.6	70.8	87.8
	N	37.7	45.3	54.6	62.9	70.3	80.2	81.5	79.8	74.6	61.8	48.5	34.6	61.0
	P	0.8	0.6	1.0	0.9	0.9	0.7	4.1	3.3	0.9	0.3	0.2	0.7	15.1
	R	1.2	2.3	3.1	3.2	2.4	1.5	4.7	2.9	1.5	0.6	0.3	1.0	24.7
Sialkot	M	65.1	70.5	80.2	93.0	103.1	105.4	96.2	93.0	94.4	90.9	80.2	68.7	86.7
	N	42.1	47.1	55.6	66.1	76.3	80.8	79.6	78.0	75.1	62.8	49.7	43.6	63.1
	P	1.8	1.6	1.6	0.8	0.5	2.2	10.5	9.7	3.8	0.8	0.3	0.8	34.7
	R	3.2	3.2	3.3	1.9	1.8	3.3	10.4	10.7	4.6	1.2	0.4	1.2	45.2

Sukkur	M	72.3	78.6	88.4	99.2	107.4	108.6	104.3	101.5	100.4	96.2	86.0	76.4	93.3
	N	46.0	51.5	60.7	70.8	79.3	83.3	82.9	81.0	78.3	69.8	58.4	49.4	67.6
	P	0.2	0.2	0.2	0.0	0.0	0.1	1.3	0.9	0.1	0.0	0.0	0.0	3.5
	R	0.5	0.7	0.8	0.3	0.2	0.4	1.7	1.0	0.3	0.1	0.2	0.3	6.5
Turbat	M	76.4	82.2	92.7	101.9	110.7	112.6	105.2	104.7	104.0	100.3	91.1	81.1	96.9
	N	52.9	54.9	62.3	70.0	78.6	82.5	81.7	79.5	75.5	69.3	61.2	54.1	68.5
	P	1.6	0.8	0.6	0.2	0.4	0.2	0.9	0.3	0.0	0.0	0.6	0.5	6.1
	R	2.5	1.2	0.9	0.6	0.7	0.6	1.7	0.3	0.2	0.1	0.2	0.9	9.9
Wana	M	53.4	59.0	68.7	78.3	89.8	95.4	92.5	91.7	89.5	80.9	70.8	60.4	77.5
	N	27.4	32.6	41.5	50.1	60.0	67.7	71.4	69.9	61.9	47.8	36.2	29.9	49.7
	P	1.7	1.6	2.0	1.4	0.9	0.5	2.1	1.2	0.3	0.1	0.2	0.9	13.3
	R	3.5	4.0	4.7	3.9	2.4	1.4	4.3	3.1	1.1	0.3	0.4	2.0	31.1

Source: Unpublished data obtained from Regional Meteorological Office, Lahore.

TABLE II

Gross National Product at Constant Factor Cost, 1959/60

(*crore Rs.*)

Sector	*1964/5*	*1968/9*	*1969/70*	*1970/1*	*1971/2*	*1972/3*
Agriculture	927.6	1,147.8	1,257.4	1,218.8	1,261.1	1,300.2
Major Crops	488.8	640.8	755.3	704.5	733.6	760.0
Minor Crops	113.0	151.6	136.3	141.8	150.7	156.2
Livestock	312.1	337.3	344.0	350.9	357.9	365.1
Fishing	9.1	12.1	17.0	15.5	12.5	12.5
Forestry	4.6	6.0	4.8	6.1	6.4	6.4
Mining and quarrying	12.2	14.1	15.7	15.6	15.9	16.7
Manufacturing	350.1	463.4	515.6	523.4	498.8	526.0
Large Scale	252.3	354.8	404.2	409.0	381.3	405.3
Small Scale	97.8	108.6	111.4	114.4	117.5	120.7
Construction	102.9	131.7	135.7	139.0	116.3	132.0
Electricity, gas, water and sanitary services	17.2	25.1	63.9	64.1	78.0	83.5
Transportation, storage and communications	149.0	182.3	201.6	197.0	201.1	216.4
Wholesale and retail trade	316.6	402.0	445.7	445.3	441.4	479.7
Banking and Insurance	—	—	57.9	63.5	64.0	66.3
Ownership of Dwellings	97.6	109.9	111.2	114.9	118.8	122.8
Public Administration and Defence	54.3	78.2	208.6	213.7	228.2	257.3
Services	173.2	203.1	216.9	227.6	239.1	251.6
Gross National Product	2,200.7	2,757.6	3,230.2	3,232.9	3,262.7	3,452.5
Population (lakhs)	511.9	569.5	584.9	600.7	616.9	633.6
Per Capita Gross Income (Rs.)	430.0	484.0	552.0	537.0	530.0	550.0

Note : The series from 1969/70 to 1971/72 have been revised on the basis of firm data on output and input and income in the agricultural sector. Income was not previously allocated to sectors like Transport and Communications, Banking and Insurance, Public Administration and Defence, and P.I.A. Consequently the figures prior to 1969/70 are not comparable.

Source: *Pakistan Economic Survey*, 1972/3, Govt. of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad.

TABLE III

Population by Provinces and Administrative Units, 1972

(*Thousands*)

Provinces and Administrative Units	*Population 1961*	*Population 1972*			*Variation 1961–72*		*Proportion of Total Population, 1972*
		Total	*Male*	*Female*	*Number*	*per cent*	
PAKISTAN	42,880	64,892	34,417	30,475	22,012	51.3	100.0
N. W. F. P.	5,731	8,402	4,376	4,026	2,671	46.8	12.9
Centrally Administrated Tribal Areas	1,847	2,507	1,291	1,216	660	35.7	3.9
Federal Capital: Islamabad	94	235	130	105	141	150.0	0.4
Punjab Province	25,488	37,374	19,871	17,503	11,886	46.6	57.6
Sind Province	8,367	13,965	7,474	6,491	5,598	66.9	21.5
Baluchistan Province	1,353	2,409	1,275	1,134	1,056	78.0	3.7

Source: Provisional figures, *Census of Pakistan*, 1972.

TABLE IV

Population by Districts, 1961 and 1972

(*Thousands*)

Locality	*Population 1961*	*Population 1972*			*Variation 1961–72*	
		Total	*Male*	*Female*	*Number*	*Per cent*
PAKISTAN	42,880	64,892	34,417	30,475	22,012	51.5
N.W.F.P.	5,731	8,402	4,376	4,026	2,671	46.6
Peshawar Division:	3,747	5,547	2,888	2,659	1,800	48.0
Hazara District	1,385	2,025	1,045	980	640	46.2
Mardan District	814	1,222	634	588	408	
Peshawar District	1,170	1,711	901	810	541	46.2
Kohat District	378	589	308	281	211	55.8
D. I. Khan Division:	728	1,043	550	493	315	43.3
D. I. Khan District	352	475	253	222	123	34.3
Bannu District	376	568	297	271	192	51.5
Malakand Division:	1,256	1,812	938	874	556	44.3
Dir District	385	535	274	261	150	39.0
Chitral District	113	159	82	77	46	40.7
Swat District	625	936	488	448	311	49.8
Malakand Agency (Swat Rainizai and Sam Rainizai)	133	182	94	88	49	36.8
CENTRALLY ADMINISTRATED TRIBAL AREAS	1,847	2,507	1,291	1,216	660	35.7

Tribal area under D.C., Peshawar	43	60	32	28	17	39.5
Tribal area under D.C., Kohat	250	328	177	151	78	31.2
Tribal area under D.C., D. I. Khan	31	90	45	45	59	190.3
Tribal area under D.C., Bannu	53	64	33	31	11	20.8
Bajaur (Malakand Agency)	280	364	180	184	84	30.0
Mohmand Agency	294	383	201	182	89	30.3
Khyber Agency	301	377	194	183	76	25.2
Kurram Agency	201	281	140	141	80	39.8
North Waziristan	159	252	124	128	93	58.5
South Waziristan	235	308	165	143	73	31.1
Federal Capital: Islamabad	94	235	130	105	141	150.0
PUNJAB PROVINCE	25,488	37,374	19,871	17,503	11,886	46.6
Rawalpindi Division:	3,885	5,689	3,016	2,673	1,804	46.4
Campbellpur District	689	984	511	473	295	42.8
Rawalpindi District	1,121	1,751	941	810	630	56.2
Jhelum District	749	1,052	553	499	303	40.4
Gujrat District	1,326	1,902	1,011	891	576	43.4
Sargodha Division:	5,978	8,987	4,787	4,200	3,009	50.3
Sargodha District	1,468	2,105	1,118	987	637	43.4
Mianwali District	747	1,095	576	519	348	46.6
Lyallpur District	2,684	4,233	2,267	1,966	1,549	57.7
Jhang District	1,079	1,554	826	728	475	44.0
Lahore Division:	6,448	9,672	5,166	4,506	3,224	50.0
Lahore District	2,480	3,762	2,019	1,743	1,282	51.7
Gujranwala District	1,292	2,058	1,098	960	766	59.3

Table IV—Contd.

Locality	*Population 1961*	*Population 1972*			*Variation 1961–72*	
		Total	*Male*	*Female*	*Number*	*Per cent*
Sheikhupura District	1,080	1,562	836	726	482	44.5
Sialkot District	1,596	2,290	1,213	1,077	694	43.5
Multan Division:	6,603	9,495	5,018	4,477	2,892	43.8
D. G. Khan District	777	1,128	598	530	351	45.2
Muzaffargarh District	990	1,548	825	723	558	56.4
Multan District	2,702	4,010	2,137	1,873	1,308	48.4
Sahiwal District	2,134	2,809	1,558	1,351	675	31.6
Bahawalpur Division:	2,574	3,531	1,884	1,647	957	37.2
Bahawalpur District	735	1,053	563	490	318	43.3
Bahawalnagar District	823	1,077	571	506	254	30.9
Rahimyar Khan District	1,016	1,401	750	651	385	73.9
SIND PROVINCE	8,367	13,965	7,474	6,491	5,598	66.9
Jacobabad District	427	694	368	326	267	62.6
Sukkur District	828	1,364	724	640	536	64.7
Larkana District	604	921	487	434	317	52.4
Nawabshah District	692	1,345	701	644	653	94.4
Khairpur District	481	715	383	332	234	48.4
Hyderabad District	1,286	2,195	1,154	1,041	909	70.7
Dadu District	485	796	425	371	319	65.8
Tharparker District	728	1,001	533	468	273	37.5
Sanghar District	430	679	364	315	249	57.9

Thatta District	362	687	306	327	325	89.8
Karachi District	2,044	3,560	1,975	1,585	1,516	74.2
BALUCHISTAN PROVINCE	1,353	2,409	1,275	1,134	1,056	78.0
Quetta Division:	732	1,307	682	625	575	78.6
Quetta-Pishin District	267	495	261	234	228	85.4
Sibi District	225	402	208	194	177	78.7
Loralai District	111	185	98	87	74	66.7
Zhob District	88	160	82	78	72	81.8
Chagai District	41	65	33	32	24	58.5
Kalat Division :	621	1,102	593	509	481	77.5
Kalat District	156	320	176	144	164	105.1
Kachhi District	185	270	145	125	85	45.5
Kharan District	39	75	40	35	36	92.3
Makran District	150	302	161	141	152	100 0
Lasbela District	91	135	71	64	44	48.4

Note. In the above data non-Pakistanis are excluded

Source: Provisional figures, *Census of Pakistan*, 1972

TABLE V

Population of Cities and Metropolitan Areas, 1972

(*Thousands*)

Cities/Metropolitan Areas	*Population 1961*	*Population 1972*			*Variation 1961–72*	
		Total	*Male*	*Female*	*Number*	*Percentage*
Islamabad	—	77	46	31	—	—
Peshawar	219	273	148	125	54	24.7
Mardan	78	109	57	52	31	39.7
Wah Cantt.	37	109	61	48	72	194.6
Rawalpindi	340	615	343	272	275	80.9
Gujrat	60	100	54	46	40	66.7
Sargodha	129	203	110	93	74	57.4
Lyallpur	425	820	446	374	395	92.7
Jhang	95	136	72	64	41	43.2
Lahore	1,296	2,148	1,179	969	852	65.7
Kasur	75	103	55	48	28	37.3
Gujranwala	196	366	196	170	170	86.7
Sialkot	164	212	112	100	45	26.9
Multan	358	544	295	249	186	52.0
Sahiwal	75	115	62	53	40	53.3
Bahawalpur	84	134	72	62	50	59.5
Sukkur	103	159	86	73	56	54.4
Hyderabad	435	624	333	291	186	43.4
Karachi	1,913	3,469	1,917	1,552	1,556	81.3
Quetta	107	156	85	71	49	45.8

Source: Provisional Figures, *Census of Pakistan*, 1972.

TABLE VI

Land Utilizatien, by Province, 1971/2

(*Million acres*)

Unit	*Geogra-phical Area*	*Total area reported*	*Forest Area*	*Not available for culti-vation*	*Unculti-vated land*	*Culti-vated area*	*Current Fallow*	*Net area sown*	*Area sown more than once*	*Total cropped area*
PAKISTAN	196.70	132.29	6.41	50.30	27.64	47.94	11.76	36.18	6.28	42.46
Punjab	50.95	41.88	1.05	7.00	6.56	27.27	2.76	24.51	3.99	28.50
Sind	34.82	30.99	1.22	11.43	4.59	13.75	6.38	7.37	1.48	8.85
N. W. F. P.	25.14	12.37	1.49	4.28	2.60	4.00	0.68	3.32	0.77	4.09
Baluchistan	85.79	47.05	2.65	27.59	13.89	2.92	1.94	0.98	0.04	1.02

Source: *Yearbook of Agricultural Statistics* (*Supplement*), 1972/73, Govt. of Pakistan, Ministry of Food and Agriculture, Islamabad.

TABLE VII

Acreage of Principal Crops (*Thousand acres*)

Crop	*1960/61*	*1968/69*	*1969/70*	*1970/1*	*1971/2*	*1972/3*
Wheat	12,316	15,221	15,393	14,771	14,325	14,710
Rice	3,075	3,842	4,008	3,715	3,599	3,664
Bajra	2,017	1,819	1,560	1,853	1,876	1,607
Jowar	1,249	1,170	1,212	1,378	1,253	1,244
Maize	1,185	1,523	1,600	1,581	1,563	1,495
Barley	460	385	399	347	387	396
Total Food Grains	20,302	23,960	24,172	23,645	23,003	23,116
Gram	2,893	2,369	2,293	2,559	2,383	2,472
Total Food Crops	23,195	26,329	26,465	26,204	25,386	25,588
Sugar-cane	1,158	1,336	1,532	1,572	1,365	1,423
Rape and mustard	1,189	1,093	1,184	1,260	1,389	1,363
Sesamum	194	68	56	76	103	103
Cotton	3,359	4,313	4,338	4,284	4,837	4,968
Tobacco	111	160	149	150	125	125
Total Cash Crops	5,999	6,970	7,259	7,342	7,819	7,982
Total Principal Crops	29,199	33,299	33,724	33,546	33,205	33,750

Source: *Pakistan Economic Survey*, 1972/3.

TABLE VIII

Acreage of Important Crops by Province 1972/3

(*Thousand acres*)

Crop	*Punjab*	*Sind*	*N.W.F.P.*	*Baluchistan*	*Total*
RABI	10,790	1,905	1,690	369	14,754
Wheat	245	30	120	11	406
Barley	1,807	474	223	11	2,515
Gram	737	360	164	58	1,319
Rape and Mustard	—	1	49	5	—
Tobacco					
KHARIF	1,697	1,735	129	101	3,662
Rice	1,086	336	85	5	1,512
Bajra	559	398	73	205	1,235
Jowar	689	50	844	11	1,594
Maize	3,901	1,060	7	—	4,968
Cotton	41	20	6	6	73
Sesamum	908	195	215	—	1,318
Sugar-cane					

Source : *Yearbook of Agricultural Statistics* (*Supplement*), 1972/3.

TABLE IX

Production of Principal Crops (*Thousand tons*)

Crop	*1960/1-64/5*	*1968/9*	*1969/70*	*1970/1*	*1971/2*	*1972/3*
Wheat	4,087	6,513	7,179	6,374	6,782	7,400
Rice	1,141	2,000	2,346	2,165	2,226	2,202
Bajra	375	325	297	355	354	295
Jowar	246	258	279	324	307	297
Maize	486	616	657	706	694	648
Barley	116	95	107	90	101	101
Total Food Grains	6,451	9,807	10,865	10,014	10,464	10,943
Gram	629	520	503	481	502	502
Total Food Crops	7,080	10,327	11,368	10,495	10,966	11,445
Sugar-cane	15,599	21,624	25,952	22,801	19,648	21,070
Rape and mustard	217	219	246	265	296	296
Sesamum	9	8	6	10	13	13
Cotton	352	518	529	518	696	690
Tobacco	71	123	120	111	86	86
Total Cash Crops	16,248	22,492	26,853	23,705	20,739	22,155
Total Principal Crops	23,328	32,882	38,221	34,200	31,703	33,600

Source: *Pakistan Economic Survey*, 1972/3.

TABLE X

Production of Principal Crops by Province 1972/3 (*Thousand tons*)

Crop	*Punjab*	*Sind*	*N.W.F.P.*	*Baluchistan*	*Total*
RABI					
Wheat	5,604	1,078	575	68	7,325
Barley	64	6	34	3	107
Gram	390	123	30	2	545
Rape and Mustard	158	80	37	7	282
Tobacco		1	30	5	
KHARIF					
Rice	985	1,203	65	35	2,288
Bajra	224	63	11	1	299
Jowar	124	108	15	50	297
Maize	324	11	358	2	695
Cotton (Lint) (Ml. bales)	2,826	1,118	3	—	3,947
Sesamum	5	3	1	1	10
Sugar-cane	13,510	2,869	3,252	1	19,632

Source: *Yearbook of Agricultural Statistics (Supplement)*, 1972/3.

TABLE XI

Yield Per Acre of Principal Crops (*Maunds per acre*)

Crop	*1960/1–64/5*	*1968/9*	*1969/70*	*1970/1*	*1971/2*	*1972/3*
Wheat	9.0	11.6	12.6	11.7	12.9	13.7
Rice	10.1	14.2	16.5	15.9	16.8	16.4
Bajra	5.0	4.9	5.2	5.1	5.1	5.0
Jowar	5.4	6.0	6.3	6.4	6.7	6.5
Maize	11.1	11.0	11.1	12.2	12.1	11.8
Barley	6.8	6.9	7.3	7.1	7.1	6 1
Gram	5.9	6.0	5.9	5.9	5.7	5.5
Sugar-cane	364.1	440.6	461.1	394.9	391.9	403.1
Rape and Mustard	4.9	5.6	5.8	5.7	5.3	5.9
Sesamum	2.9	3.2	3.7	3.7	3.5	3.5
Cotton	2.7	3.3	3.3	3.4	3.9	3.8
Tobacco	19.8	20.5	20.9	20.2	18.6	18.6

Source: *Pakistan Economic Survey*, 1972/3.

TABLE XII

Yield per acre of Principal Crops by Province, 1972/3 (*Maunds per acre*)

Crop	*Punjab*	*Sind*	*N.W.F.P.*	*Baluchistan*
RABI				
Wheat	14.1	15.4	9.3	5.0
Mexi	18.8	18.4	12.0	15.4
Others	8.0	9.1	7.0	3.3
Barley	7.1	8.0	7.8	6.8
Gram	5.8	7.0	3.6	6.2
Rape and Mustard	5.8	6.0	6.1	3.3
Tobacco	N.A.	13.8	16.7	22.9
KHARIF				
Rice	15.8	18.9	13.7	9.6
Irri	21.9	21.0	24.0	12.6
Others	14.4	13.7	13.0	6.6
Bajra	5.6	5.1	3.6	5.4
Jowar	6.0	7.4	5.6	6.6
Maize	12.8	6.3	11.5	4.4
Cotton (Lint)	3.5	5.0	2.1	3.7
Sesamum	3.3	3.7	3.7	7.2
Sugar-cane	405.0	400.3	411.5	204.2

Source : *Yearbook of Agricultural Statistics*, 1972/3.

TABLE XIII

Per Capita Availability of Food Grains

Year	*Domestic production (lakh tons)*	*Allowance for seed, animal feed, wastage etc.@ 10%(lakh tons)*	*Import (lakh tons)*	*Export (lakh tons)*	*Available for consumption (lakh tons) (Cols. (2—3+4—5)*	*Population (in lakh)*	*Per capita availability (ounces per day)*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1950/1	59.2	5.92	—	—	53.28	362.1	14.10
1954/5	50.6	5.06	—	1.37	44.17	397.0	10.80
1959/60	59.9	5.99	8.04	0.56	61.39	450.3	13.90
1964/5	72.1	7.21	14.92	1.81	78.00	511.9	15.00
1967/8	93.7	9.37	14.19	1.16	97.36	554.5	17.80
1968/9	98.1	9.81	0.16	1.25	87.20	569.5	15.90
1969/70	108.8	10.88	2.27	0.87	99.32	584.9	17.02
1970/1	100.1	10.01	2.90	1.77	91.22	600.7	15.02
1971/2	104.3	10.43	6.94	1.96	98.85	619.9	16.09

Source: *Pakistan Economic Survey*, 1972/3.

TABLE XIV

Consumption of Fertilizers

(*Thousand tons*)

Year	*Nitrogen*	*Phosphate*	*Potash*	*Total*
1960/1	31.0	0.4	—	31.4
1961/2	37.0	0.5	—	37.5
1962/3	40.0	0.2	—	40.2
1963/4	68.0	0.7	—	68.7
1964/5	85.0	2.2	—	187.2
1965/6	69.8	1.2	—	71.0
1966/7	112.3	3.9	—	116.2
1967/8	177.7	11.3	0.2	189.2
1968/9	197.0	38.9	3.0	238.9
1969/70	273.5	35.5	1.4	310.4
1970/1	257.1	30.7	1.3	289.1
1971/2	336.4	36.4	0.7	373.5
1972/3	386.4	48.7	1.4	436.5

Source : *Yearbook of Agricultural Statistics*, 1972/3.

TABLE XV

Sources of Irrigation Water By Province, 1970/1

(*Thousand acres*)

Unit	*Total Cultivated*	*Total Irrigated*	*Canals*		*Tubewells*	*Wells*	*Tanks*	*Others*
			Government	*Private*				
PAKISTAN	47,770	32,020	22,370	850	5,620	1,710	20	1,450
Punjab	27,160	21,860	14,620	20	5,440	1,560	20	200
Sind	13,750	7,410	6,690	—	60	70	—	590
N.W.F.P.	3,950	1,510	580	690	80	70	—	90
Baluchistan	2,910	1,240	480	140	40	10	—	570

Source: *Yearbook of Agricultural Statistics* (*Supplement*), 1972/3.

TABLE XVI

Production of Selected Manufacturing Industries

Item	*Unit*	*1964/5*	*1967/8*	*1968/9*	*1969/70*	*1970/1*	*1971/2*
Food Manufactures:							
Sugar	000 tons	156.0	248.0	401.0	600.0	500.0	370.0
Hydrogenated vegetable oil	000 tons	90.0	92.4	97.6	122.0	133.0	160.2
Sea salt	000 tons	218.0	211.0	319.0	248.0	220.0	236.0
Cigarettes	crore nos.	1,430.0	2,002.0	2,064.0	2,237.0	2,417.0	2,177.0
Textile Manufactures:							
Cotton yarn	crore lbs.	45.4	49.5	52.7	60.2	67.0	74.0
Cotton cloth	crore yds.	71.5	71.5	71.0	72.5	78.7	75.1
Art Silk and Rayon cloth	lakh sq. yds.	321.0	719.7	875 0	786.0	676.6	100.7
Rubber tyres and tubes	lakh nos.	68.9	58.7	66.2	65.0	66.3	45.5
Safety matches	lakh gross boxes	11.7	11.4	12.7	12.0	11.7	16.3
Cement	lakh tons	16.3	21.3	25.1	26.1	26.6	25.6
Chemicals and Fertilizers:							
Superphosphate	000 tons	8.0	15.8	14.2	22.9	25.0	27.0
Ammonium sulphate	000 tons	34.9	46.1	41.9	57.4	58.7	65.7
Urea	000 tons	44.0	43.0	104.8	203.1	201.5	388.5
Soda ash	000 tons	33.8	57.3	61.8	66.7	76.8	75.6
Sulphuric acid	000 tons	18.9	24.8	23.7	31.0	30.2	31.2
Bicycles	000 nos.	98.0	155.4	169.8	161.3	59.7	112.1
Electric Fans	000 nos.	N.A.	210.2	166.3	161.9	215.7	201.2
Paper Manufactures	000 tons	24.4	24.6	34.3	34.3	39.6	33.8
Paints and Varnishes	000 galls.	1,133.1	1,329.4	1,434.9	1,489.4	1,646.5	1,315.6
Mild Steel Products	000 tons	226.4	176.0	224.1	177.2	193.0	163.5

Source: *Pakistan Economic Survey*, 1972/3.

TABLE XVII

Production of Minerals

Item	*Unit*	*1964/5*	*1966/7*	*1967/8*	*1968/9*	*1969/70*	*1970/1*
Antimony	tons	265	914	758	148	172	181
Aragonite/Marble	tons	9	10	10	17	18	23
Celestite	000 tons	463	524	480	580	507	250
Chromite	000 tons	16	38	23	26	25	27
Coal	000 tons	1,237	1,323	1,200	1,373	1,249	1,241
Dolomite	tons	484	547	8,563	5,058	—	1,503
Fireclay	000 tons	17	20	19	19	28	28
Fuller's earth	000 tons	9	18	14	7	3	13
Gypsum	000 tons	183	122	60	234	204	163
Limestone	000 tons	1,994	2,170	1,568	2,173	2,872	2,707
Magnesite	tons	622	824	1,231	1,304	514	288
Rock salt	000 tons	247	231	270	365	305	344
Silica sand	000 tons	28	78	86	76	43	30
Soapstone	tons	3,354	2,870	2,081	2,931	2,931	4,049
Barytes	tons	11,223	6,228	8,608	11,183	1,296	3,148
Crude oil	million I. G.	138	126	128	137	136	120
Natural gas	000 million cu. ft.	63	80	85	100	128	118

Source: *Pakistan Economic Survey*, 1972/3.

TABLE XVIII

Movement of Passengers and Freight by Rail

Year	*Number of passengers carried (thousands)*	*Passenger-miles (millions)*	*Freight carried (thousand tons)*	*Freight ton-miles (millions)*
1949/50	67,791	3,685	7,176	1,807
1954/5	86,311	4,410	10,288	2,855
1959/60	121,119	5,590	13,229	3,814
1964/5	131,606	6,257	14,713	4,949
1968/9	134,776	6,482	14,540	4,761
1969/70	128,676	5,967	12,329	4,675
1970/1	126,037	5,823	12,341	4,581
1971/2	124,207	5,914	12,599	4,722
1972/3	135,200	6,824	12,300	5,096

Source: Statistical Branch, Pakistan Railway, Lahore.

TABLE XIX

Road Mileage

Year	*Total*	*High Type*	*Low Type*
1949/50	15,726	5,624	10,102
1954/5	19,102	7,980	11,122
1959/60	19,176	8,772	10,404
1964/5	21,758	9,971	11,787
1967/8	19,678	10,704	8,974
1968/9	19,003	10,926	8,077
1969/70	19,109	10,593	8,516
1970 1	20,732	11,725	9,007
1971 2	21,468	11,853	9,615

Source : Ministry of Communications, Statistical Division.

TABLE XX

Foreign Trade

(*million Rs.*)

	1968/9	*1969/70*	*1970/1*	*1971/2*	*1972/3*
Imports	3,047.0	3,285.0	3,602.0	3,495.0	8,398.0
Exports	1,699.9	1,608.6	1,998.2	3,372.0	8,552.0
Re-exports	62.8	58.4	112.4	51.8	72.0
Balance of Trade	−1,284.0	−1,618.0	−1,492.0	−72.0	+225.0

Source : *Statistical Bulletin*, Ministry of Finance, Planning & Development, Vol. 21, Dec. 1973.

TABLE XXI

Imports by Commodity Group (*million Rs.*)

Commodity Group	*1964/5*	*1968/9*	*1969/70*	*1970/1*	*1971/2*	*1972/3*
TOTAL IMPORTS	3,814	3,046	3,285	3,602	3,495	8,398
Food	721	158	145	181	572	2,048
Beverages and Tobacco	25	12	13	12	9	14
Crude Materials, except fuels	121	155	189	205	205	636
Minerals Fuels	221	253	220	280	295	683
Animal and Vegetable Oils	132	79	109	182	131	330
Chemicals	332	435	599	452	389	1,204
Parts of Manufactured Goods	226	159	159	166	196	448
Parts of Investment Goods	671	492	479	604	548	1,108
Machinery and Transport Equipment	1,250	1,184	1,268	1,418	1,049	1,680

Source: *Development Statistics of the Punjab*, Bureau of Statistics, Govt. of the Punjab, Lahore, 1973

TABLE XXII

Exports, by Commodity Group

(*million Rs.*)

Commodity Group	*1964/5*	*1968/9*	*1969/70*	*1970/1*	*1971/2*	*1972/3*
TOTAL EXPORTS	1,140	1,763	1,667	2,111	3,423	8,615
Primary Commodities	683	795	653	823	1,670	3,461
Raw and waste cotton	316	364	224	285	982	1,200
Raw wool and other animal hair	70	48	33	24	25	83
Rice	119	155	94	173	274	1,136
Fish fresh, dried and processed	41	61	83	61	111	234
Other primary goods	137	167	219	280	277	808
Manufactured Commodities	457	968	1,013	1,288	1,754	5,154
Cotton yarn and textiles	271	465	535	700	1,041	3,361
Other textiles	34	154	131	162	204	531
Tanned leather and leather goods	73	153	137	141	219	644
Metal goods.	28	86	93	157	101	173
Cement and cement products	—	13	19	22	45	102
Other manufactured goods	51	97	98	106	143	343

Source: *Development Statistics of the Punjab.*

TABLE XXIII

Cargo Handled at Karachi (*Thousand tons*)

Year	*Import*	*Export*	*Total*
1950/1	2,302	1,172	3,474
1954/5	2,147	892	3,039
1959/60	3,424	1,078	4,502
1964/5	6,273	1,533	7,806
1967/8	6,405	2,258	8,663
1968/9	5,515	2,788	8,303
1969/70	5,929	3,372	9,301
1970/1	6,279	3,157	9,436
1971/2	6,296	3,010	9,306

Source: *Pakistan Economic Survey* 1972-73.

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The many changes brought about by the secession of East Pakistan in 1971 necessitated a comprehensive re-appraisal of the situation. This the author has undertaken and, with the aid of the most up-to-date statistics available, here presents an accurate and detailed geographical picture of the Pakistan of the 1970s.

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