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Pakistan Geographical Review

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ALLUVIAL MORPHOLOGY OF THE LOWER INDUS PLAIN AND ITS RELATION TO LAND USE

M. M. MEMON

THE ORIGIN OF THE PLAIN

FOR an elaborate study of the morphological features of the Lower Indus Plain it is necessary to know about the nature of its origin and the processes involved in its development. In the sub-continent of Pakistan and India, a vast geosyncline or trough lies between the mighty Himalayas in the north and the plateau of Peninsular India in the south. The origin of this depression is intimately connected with that of the bordering ranges. Eduard Suess believes that it is a "fore-deep" in front of the high crust-waves of the Himalayas as they were checked in their southward advance by the Archean land-mass of Peninsular India. Based on this view the depression is synclinal in nature. According to Sir. S. Burrard it occupies a deep "rift valley", a portion of the earth's surface sunk in a huge crack or fissure in the sub-crust, between parallel dislocations or faults on its two sides. The formation of the great crack 15,000 miles long and several thousand feet deep was according to his view associated with the rise of the Himalayas.

D. N. Wadia¹ and other geologists picture the conversion of the depression to almost level plains by a simple process of alluviation in which the deposition kept pace with subsidence. According to Wadia underlying the Pleistocene and sub-Recent alluvial deposits of the mighty rivers of the Indo-Gangetic system are unconsolidated Siwalik and older Tertiary sediments of the Himalayan piedmont and below these are more consolidated older formations, such as the Gondwanas and Cretaceous, the presence of which is indicated by good reflections of the seismic wave as well as by borings¹. Gravity, magnetic and seismic explorations, that have been made so far reveal that the depth of alluvium is variable, from less than 1,000 to over 2,000 metres².

¹D.N. Wadia : *Geology of India* (London : 1909), p. 284.

²*Ibid.* p. 389.

* MR. MEMON is Professor and Head of the Department of Geography, University of Sind, Hyderabad.

It will not be out of place to mention here the views of Al-Beruni the "Master Aliboron" of the medieval west, which he expressed with regard to the origin of the plain as early as 1030 A. D. He states, "But if you have seen the soil of India with your own eyes and meditate on its nature, if you consider the rounded stones found in the earth however deeply you dig, stones that are huge near the mountains and where the rivers have a violent current, stones that are of smaller size at great distance from the mountains, and where the streams flow more slowly, stones that are pulverised in the shape of sand and where the streams begin to stagnate their mouths and near the sea—if you consider all this, you could scarcely help thinking that India has once been a sea which by degrees has been filled up by the alluvium of the streams³."

The western section of this extensive plain is called the Indus Plain, and has for its base the old peninsular pre-cambrian mass which extends across it into Kashmir. On it lie the great thickness of sediments, deposited by the rivers. Underneath these alluvium deposits a sub-terranean ridge, known as Delhi Shahpur ridge is traceable from Delhi northwestwards to the Salt Range which divides the plain into two sub-terranean basins. The existence of this ridge has been supported by geodetic evidence or gravity anomalies.

The trough of the Indus Plain is regarded to be of a fairly great depth. Its archaic floor is covered by about 15,000 feet of sub-recent alluvium overlying a shelving bank of older fluvial sediments of the Siwalik and Murree epoch (Miocene). On the basis of geodetic data, Oldham in 1917, postulated the maximum thickness of the alluvium from 15,000 to 20,000 feet⁴. However, gravity surveys conducted recently have led E.A. Glennie to suggest a much lesser depth aggregating only 6,500 feet⁵. The whole thickness of the alluvial depths constitutes one continuous conformable series whose accumulation is still in progress.

The geophysical work carried out very recently in the Lahore Basin by the Burmah Oil Company gives a depth to the basement of about 22,000 feet in the region of about 29° 3'N, 70° 8'E, while the torsion balance survey in the Indus Basin reveals depths exceeding 2,000 feet close to the Delhi-Shahpur ridge. The alluvium is regarded as thin in the Sind area, except for the basin lying west of Jacobabad 28° 3'N, 68° 4'E⁶.

³E.C. Sachau : *Al-Beruni's India* (Lahore : 1914) Popular Edition, Vol. I, p. 198.

⁴R.D. Oldham : *Memoirs of Geological Survey of India*, Vol. 92, p. 119.

⁵E.A. Glennie : Gravity anomalies of the structure of the earth, *Survey of India Professional paper* No. 27, (1932).

⁶E. A. Glennie, "Gravity Data and Crustal Warping in North West Pakistan and adjacent parts of India," (1955).

Whatever the nature of the depression, it was subjected to rigorous sedimentation during the greater part of the Tertiary era and is believed to have proceeded parri-passu with the slow sinking of the basin. Outcrops of marine Kirthar limestones near Sukkur and Hyderabad as well as the presence of Siwalik like fluvatile sediments at a depth of only about 535 feet near Lyallpur, suggest the possibility that in this region the earlier sediments deposited on the pre-Cambrian basement were marine. With the gradual withdrawal of the sea during the later part of the Tertiary era, shallow-water and possibly deltaic deposits were laid down, finally culminating in the restoration of terrestrial conditions and deposition of fluvatile material with the advent of the Siwalik period. Since then, it has remained a vast floodplain on which the sediments of numerous streams have accumulated in enormous thickness.

The whole of the Indus Plain from the Himalayas to the Salt range in the north to the Arabian Sea in the south, is one of the most homogeneous physiographic regions of the earth, with only the Kirana hills in the upper part and the limestone ridges at Sukkur and Hyderabad in the southern part to interrupt the flow of its rivers. The plain has a very fertile soil and abundant water supply, making it one of the most prosperous agricultural regions of the sub-continent. The southern section of this plain is termed the Lower Indus Plain (Fig.-1). Here all the alluvial deposits are the work of one river, the Indus which carries the combined waters of all its tributaries. The deposits consist of old and recent alluvium, cut by river channels, some of which are leveed. The gradient from Kashmor to the Arabian Sea on the average is less than one foot a mile.

THE LOWER INDUS, ITS ALIGNMENT AND GENERAL TRENDS

A study of the contour map of the region (Fig.-2) reveals that the river Indus is aligned along a ridge throughout its entire course from the Gudu Barrage to the sea. This feature is very well marked in the north where contours on the right bank from Kashmor to below Larkana run from south to north, until they meet a distinct hollow or trough that extends from near Jacobabad to Manchar Lake. The hills have forced the river to follow a south westerly course in a narrow belt between Shikarpur and Larkana in the west and the desert in the east. The river has well developed natural levees. When the river overflows them at the time of floods, the water finds its way through a net work of distributaries which slope away from the main water course. The general slope of the land away from the river also helps the right bank flood water to be drained into the Manchar Lake. During the floods the lake swells into 100 sq. miles. When it recedes after the floods it leaves behind vast alluvial deposits.

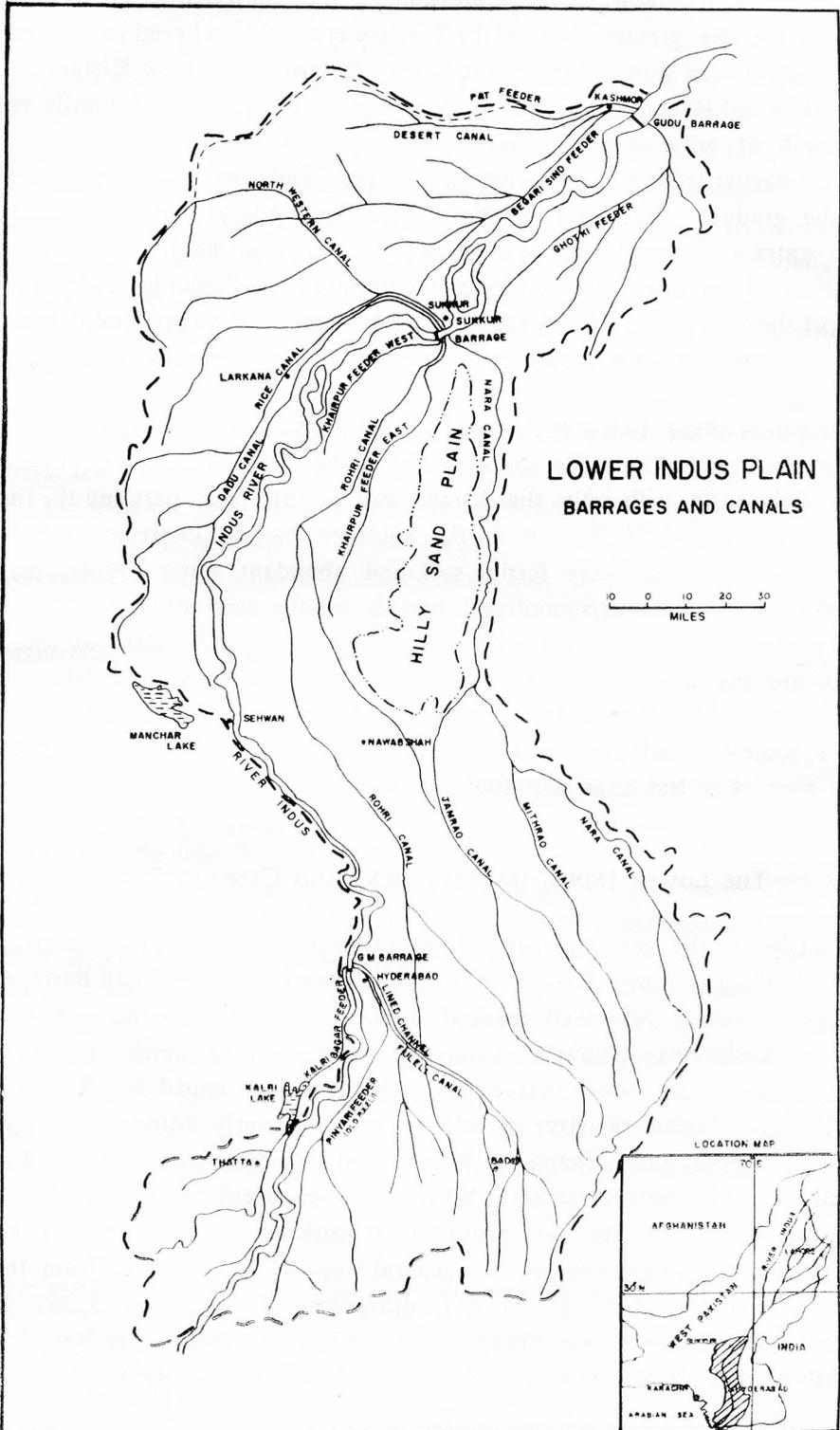


FIGURE 1

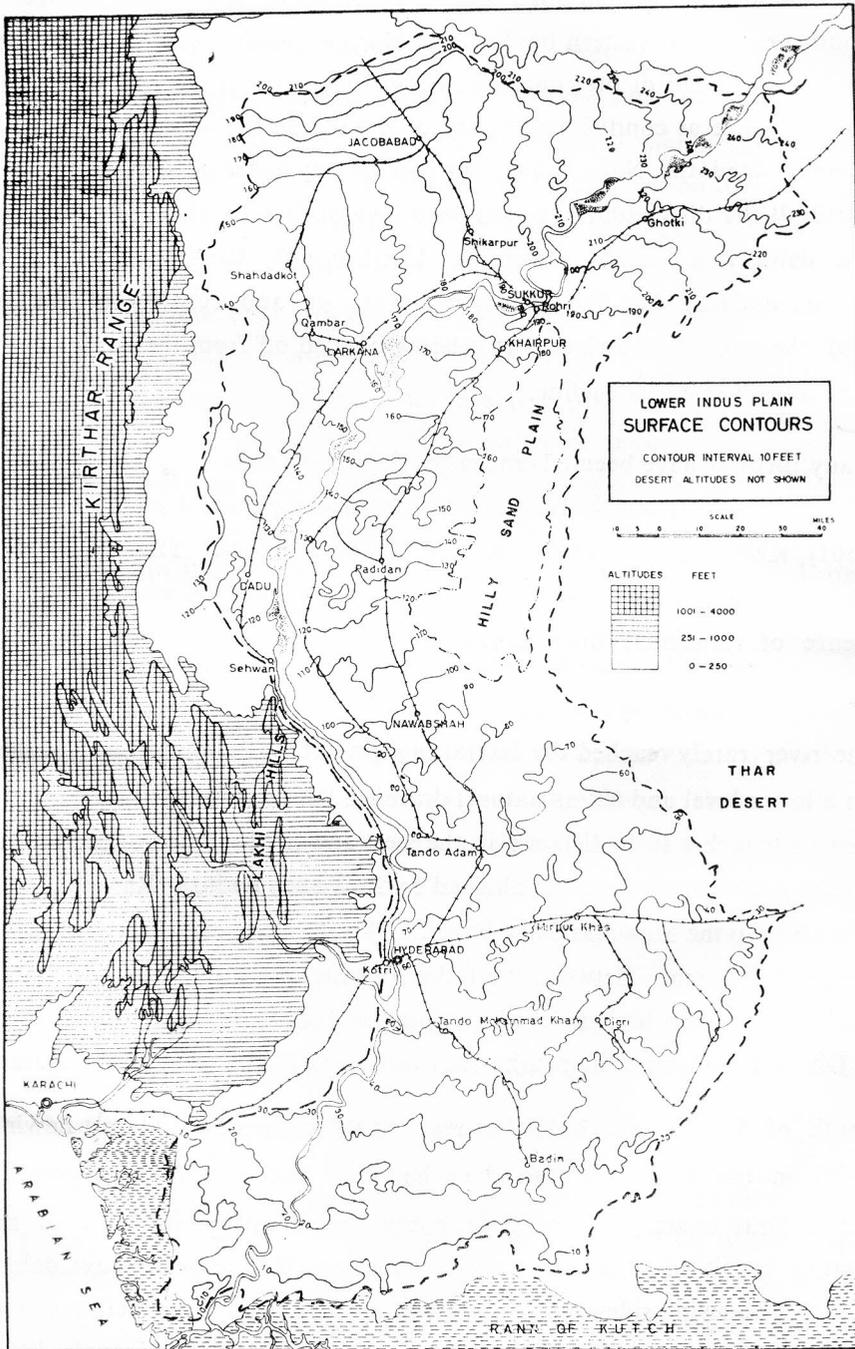


FIGURE 2

From south of Nawab Shah almost upto Badin the contours run from north-east to south-west on the eastern bank. The Nara occupies a distinct trough for most of its length. The shape of the contours further suggests that the Indus has followed a south easterly course as conditioned by the hills lying on the west. Some of the early distributaries joined the Nara valley, but successively lower down it with the passage of time until all the distributaries found their own outlets to the sea, spreading out across the delta in a westerly direction. Until recently the Ochito and the Haidari were the chief outlets. The Ochito is now drying up and consists of the remnant channel of the once Ochito river. It is being banded off from the main river, which will all the more hasten its decline.

Many theories have been advanced to explain the westering tendency of rivers with a dominant north-south trend. Most commonly quoted are those of William Ferrel (1861), Karl von Baer (1866) and G.K. Gilbert (1884). The westward swinging of the Indus *i.e.*, towards its right, under "Ferrel's law" is most probably due to the influence of rotational forces as it happens to be situated in the Northern Hemisphere.

The river rarely reached the lateral margins of its floodplain which, therefore, remain at a lower level and act as natural drainage lines. The Kirthar Range borders the hollow or trough a little distance in the west and the high bed of the Indus in the east, while its outlet in the south is blocked by Bhit and Badhra Ranges and Lakhi Hills, giving rise to the Manchar Lake basin. The drainage line along the Nara has a natural outlet to the sea. Between the Indus and the Nara, a drainage system has developed between the higher levels of the old Indus courses, the most prominent one is of Dhoro Puran, running south south-east from Mirpurkhas to the Nara.

South of Sehwan the Indus has reached its western limit almost flowing close to the hills in the west. If the river had not been tamed and permitted to follow its natural course, it would probably have built-up its level to such an extent that a break to a more easterly course would have been unavoidable. The river's tendency to swing sideways has now been controlled by the erection of bunds or embankments. The construction of barrages and introduction of canals have now resulted in virtually putting an end to the natural flooding activity, the canals replacing the flood channels and field irrigation replacing the natural covering activity.

THE CHANGING COURSES OF THE INDUS

For a correct appraisal of the alluvial morphology of the Lower Indus Plain, it is necessary to have a precise knowledge of the different courses of the Indus during recorded history. Such an information is of vital significance in interpreting the geomorphology and in understanding the distribution of soil texture in the region. Apart from the abundance of information available in different languages regarding the river and its wanderings, remnants of abandoned river channels amply testify to the oscillations of the river in the floodplain formed by the deposition of its own sediments. It is, unfortunate, that historical evidences in this regard are, however confusing and most unsystematic. They are thus practically of no help in arriving at a correct and detailed reconstruction of the sequence of events.

However, the dawn of aerial photography has opened up the scope of interpreting the earlier courses with accuracy. The aerial photographs now available for the Lower Indus Region have made the task of correlating the traced courses with the historical records comparatively easier.

It is hard to visualise the fury and uncontrolled force of the mighty river prior to the construction of flood protective bunds, and barrages taming it, by confining it to its present channel. Only a few parts of the floodplain situated at a higher level escaped being submerged when the river was swollen in flood. Occasionally the river breached its raised course formed by the aggradation of its own sediments and gradually adopted an entirely new course. Consequently human habitations and standing crops alike were swept away by the surging waters bringing misery and destruction in trail.

Not much is known about the course followed by the Indus in pre-historic times. The earliest evidence of settlements and agriculture in the floodplain is provided by the un-earthed ruins of the ancient city of Moen-jo Daro and a number of contemporary village sites. The civilization named after this town persisted over a remarkable length of time, suggesting that the river was then comparatively stable. It may be assumed that the river at that time lay not far to the east of this city and its decline may be attributed to the shifting of the river course eastwards.

When Alexander the Great sailed down the Indus in 326-325 B.C. the river used to flow northwest of Sukkur close to Gauspur, north of Shikarpur and down south to Ruk. It then crossed the present river course and running parallel to it for some distance in the east reached Patala, a city somewhere in the area of Brah-

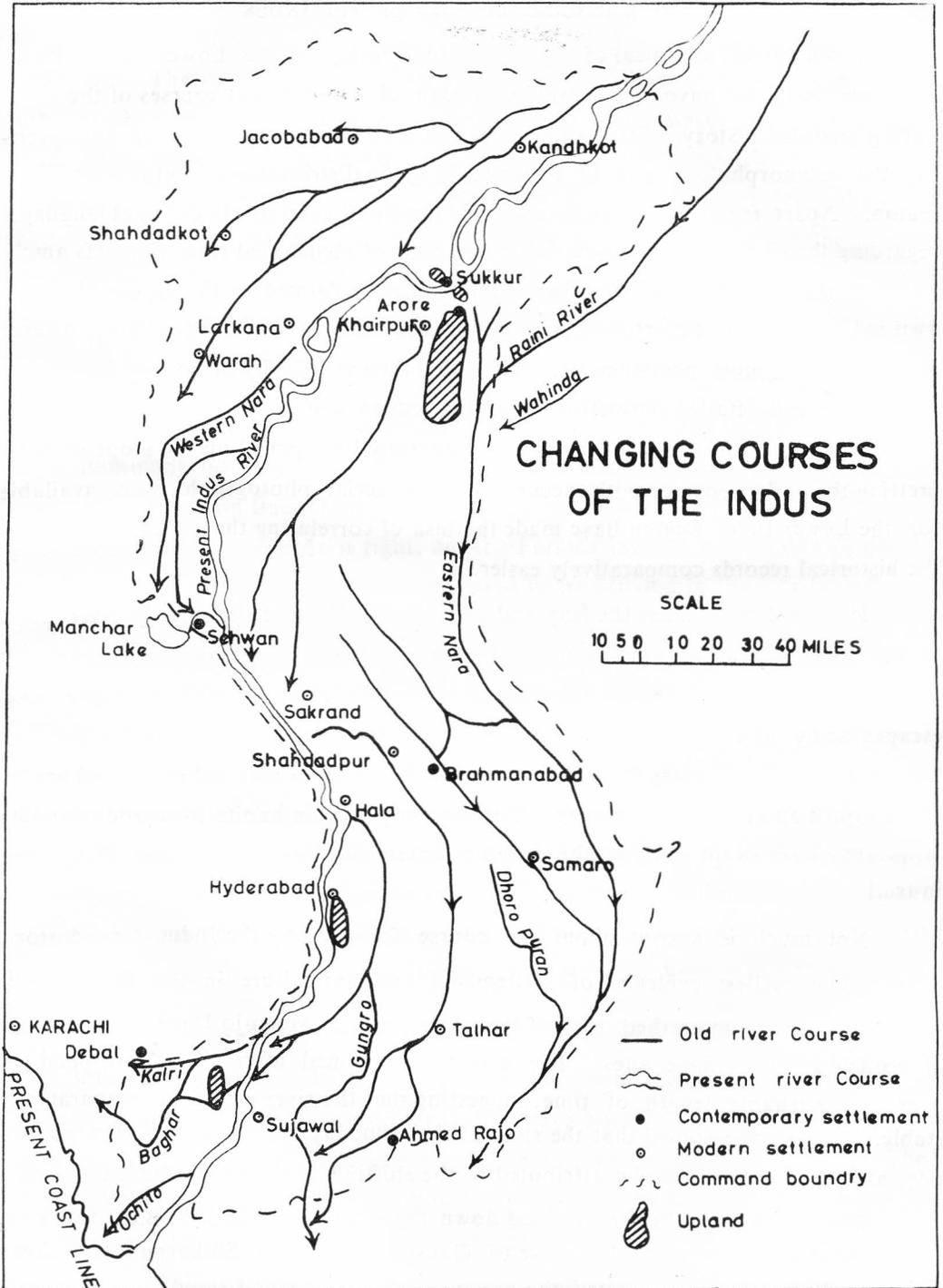


FIGURE 3

manabad. From Patala, which was situated at the delta head,⁷ two distributaries proceeded to the sea. The eastern one running through Samaro, draining into the Eastern Nara whilst the western distributary has long since become obscured. The latter is supposed to have reached the sea somewhere in the area of Mirpur Bathoro. The coastline at that time probably lay close to the Makli Hills.

During the succeeding centuries the Indus had one distributary on the left bank, and two on the right bank. The one on the right bank probably flowed past Aror, situated on the Rohri Hills overlooking the Nara gap and coursing down the Eastern Nara. Figure 3 shows several courses in the Gudu and Sukkur Right Bank Commands. The course through Jacobabad or the one through Shahdaddkot, is probably that of one of the two supposed right bank distributaries, and an early counterpart of the Western Nara may be taken to be the second. Both of these might have been draining into the Manchar Lake and later issuing out of it as the Aral joined the main stream then following a more easterly course midway between Sehwan and Patala.

When the Arabs conquered Sind in the eighth century A. D., it appears that the river flowed down the course passing near Kandhkot. It then crossed the present river course which runs southwest of Sukkur to continue down the course in the east of Khairpur Command which is cut by the Indus presently near Sakrand. The Western Nara—Aral channel configuration may have been in existence in form as that of to-day. Sehwan was then about ten miles west of the river. A number of distributaries have been mentioned in historical literature further south, but the Mehran appears to be the westernmost one. It appears that the Mehran lay to the west of Brahmanabad, about sixteen miles east of Nerunkot⁸, a city which once stood at the present site of Hyderabad. It then reached the sea somewhere south of Sujawal. The port of Debal lay on a smaller western branch. Aror, a city sited on Rohri Hills beside the Nara gap and commanding a strip of fertile land in the northeast was still the capital city in the north, while the capital city of the south was Brahmanabad. According to the Arab writings the main stream of the Indus flowed through Aror by about 950 A. D.,⁹ but all other evidences lead to the conclusion that the Nara

⁷H. T. Lambrick : *Sind, A General Introduction* (Hyderabad : 1964), p. 110.

⁸Sir A. Cunningham : *The Ancient Geography of India* (London: 1871), p. 279.

⁹Mirza Kalich Beg : *A History of Sind* (Chachnamah) (Karachi : 1900), Vol.I, p. 11.

gap carried a branch of the river and certainly not the full volume of the waters of the Indus.

It was probably between the 10th and thirteenth centuries and certainly not later than 1333 A. D.¹⁰ that the river broke through the Sukkur gap, perhaps due mainly to an increase in volume, on account of the joining of the two major branches—the one through Warah, and the other through Kandhkot and east of Khairpur Command. This incident inevitably resulted in the desertion of the Kandhkot and East Khairpur courses. Consequently the settlement of Aror declined and the fertile country to the northeast was laid waste. In the south, the flourishing southeastern corner of Sind also shared a similar fate on account of the drying up of a major distributary passing near Shahdadpur and Talhar as shown in the map. As this region declined, the Gungro course region extending from Tando Muhammad Khan out to the sea via Sir Creek rose to prominence.

After making a passage through the Sukkur gap the river started cutting its former floodplain in Gudu Left Bank and Khairpur Commands, later to shift gradually northwestwards to its present position. Further south it flowed a little west of its present course north of Sehwan, where the two courses can be traced as shown in the map. This resulted in the increased fertility and prosperity of the Larkana-Dadu area. From Sehwan the river flowed southeast becoming traceable again from south of Hala, east of Hyderabad, to Tando Muhammad Khan where it turned southwest. This course must have been contemporaneous with the Gungro, but soon superseded it, since the Kalri and Baghar distributaries existed by 1340 A. D. The Kalri which served a major outlet to the sea in 1519, declined some time in the middle of the eighteenth century, whilst the Baghar continuing to be the main outlet of the river silted up soon after 1817.

Some time during 1758—79 another major hydrographic change occurred which caused the Indus to adopt approximately its present course in the north leaving the Dadu area. In the south the present course west of Hyderabad was formed which passes through another gap in the limestone outlier.¹¹ In the south the new course rejoined the former channel, and Baghar served as its main outlet.¹² In 1819 the Indus began to follow a new course, at first along the Sattah but later turning southwest flowing through the Ochito, then named "Hajamro". During the middle of the

¹⁰Lambrick : *Op. cit.*, footnote 8, p. 182 and 183.

¹¹M. R. Haig : *The Indus Delta Country* (London : 1894), p. 118.

¹²Lambrick : *Op. cit.*, footnote 8, p. 193.

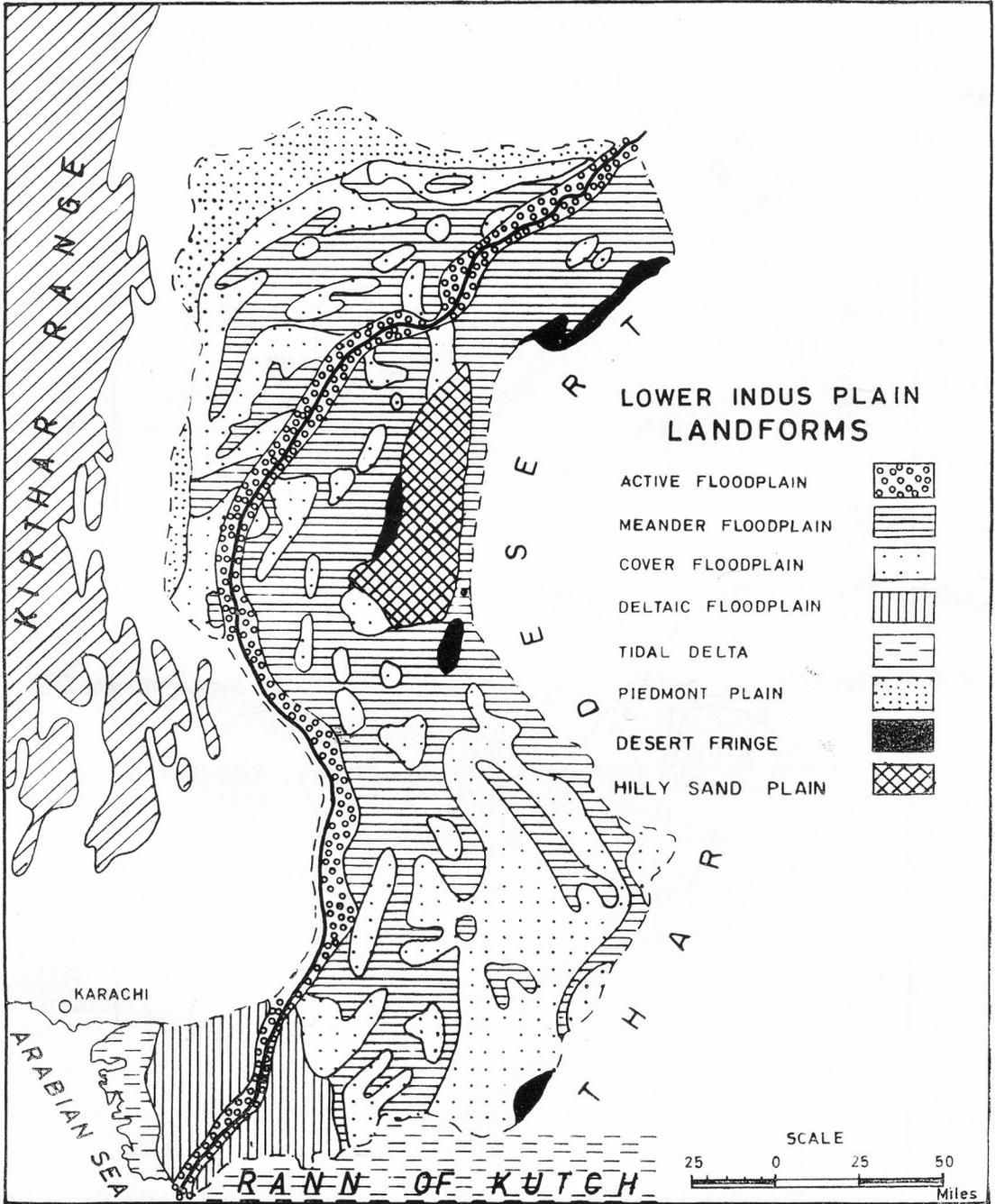


FIGURE 4

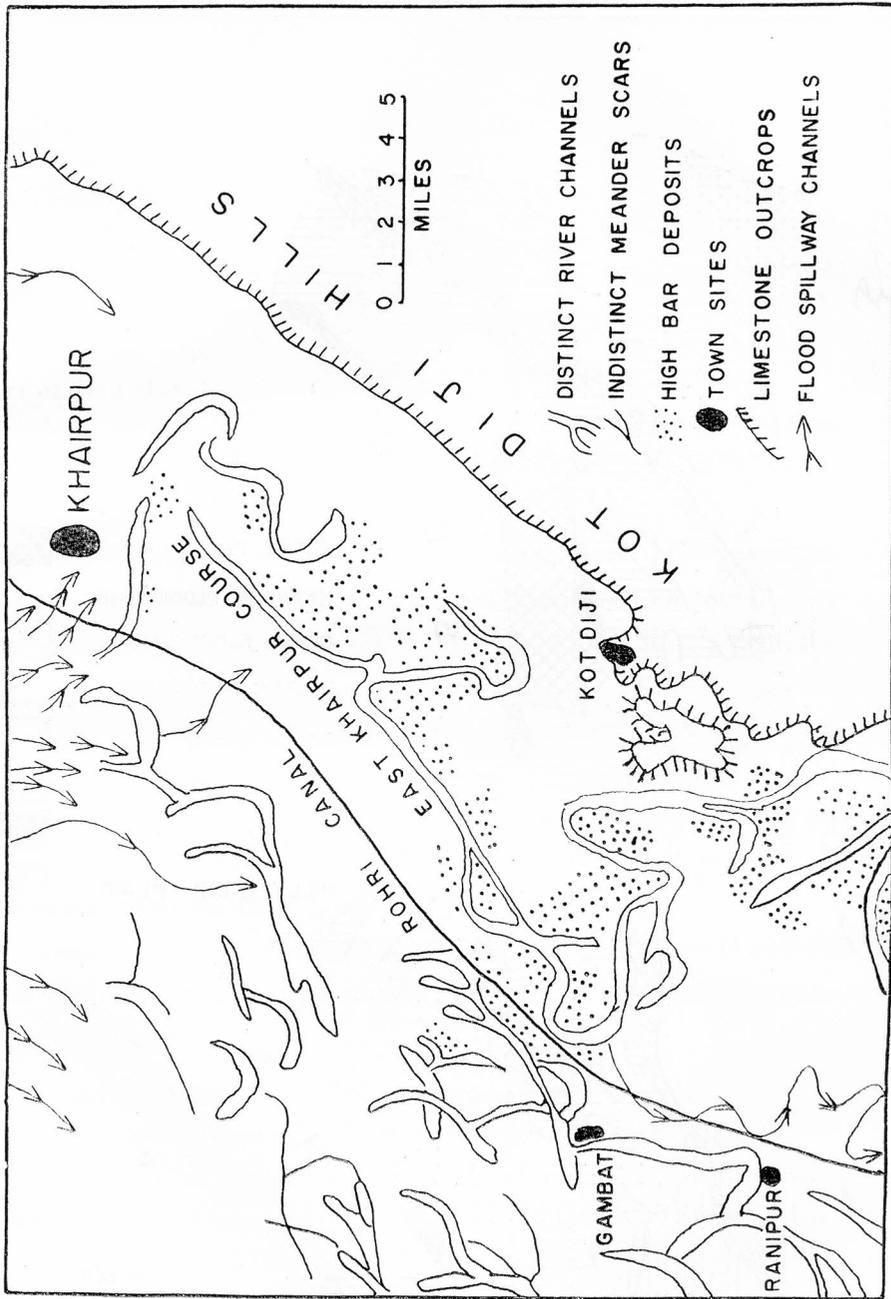


FIGURE 5—Meander floodplain South-West of Khairpur showing distinct topographical features.

last century it breached the Ochito and followed a more easterly outlet, the Haidari. Finally in the last decade, bunds were extended southwards to cut off the Ochito, while the main river had itself found yet another principal outlet to the east of Haidari.

It is only in the north, near Ghotki and west of Khairpur that the river shifted slowly and steadily westward during the past one thousand years. The delta of the Indus has also grown and is advancing south-westward due to constant deposition of younger sediments. The courses running across Rohri and Nara Commands were narrow deltaic distributaries nearly two thousand years ago, so also was the course passing near Shahdadpur about a thousand years back. Man's control over the river developed very gradually and suffered many a set-back. It was not until the construction of bunds that the floods could be controlled, and settlements could become more permanent. The construction of barrages and the assured water supply that resulted was the final logical step in man's control over the river.

It may be concluded that broadly speaking the Indus may be said to have shifted its course steadily westward, although individual courses may have remained fairly stable for quite a few centuries until sudden breaks resulted in the formation of new courses.

LANDFORMS

The Lower Indus Plain which apparently looks to be perfectly flat to the untrained eye, is not so in reality. The contours and aerial photographs reveal minor variations in relief and pattern of alluvial deposits, suggesting that the different parts of the plain were deposited at different periods and in different ways. This feature divides the plain into units called landforms which differ from one another both in their origin and morphology.

The landforms encountered in the region mark different phases in alluvial sedimentation. A feature of the alluvial sediments is that they have well sorted textures and reveal an intricate stratification, with rapid lateral and vertical changes. The most recent sediments are fine sandy loam to silty clays, while those deposited a little earlier than these are much coarser and at places almost sandy. The various types of landforms found in the region can easily be distinguished in that they differ from one another in their geomorphic associations—elevation, topography and soil structure. Fig. 4 shows landforms which are of considerable areal extent while those of smaller order of size, on account of limitations of scale have been shown in Fig. 5.

Meander floodplains

These are the abandoned river courses which may lie either adjacent to the present active floodplain or may follow entirely different courses. When in the past these courses were active, coarser sediments were deposited during floods until the level of the meander belt was raised to an extent which forced the river to adopt a new course. In the old course the sediments became stabilized, and as the new

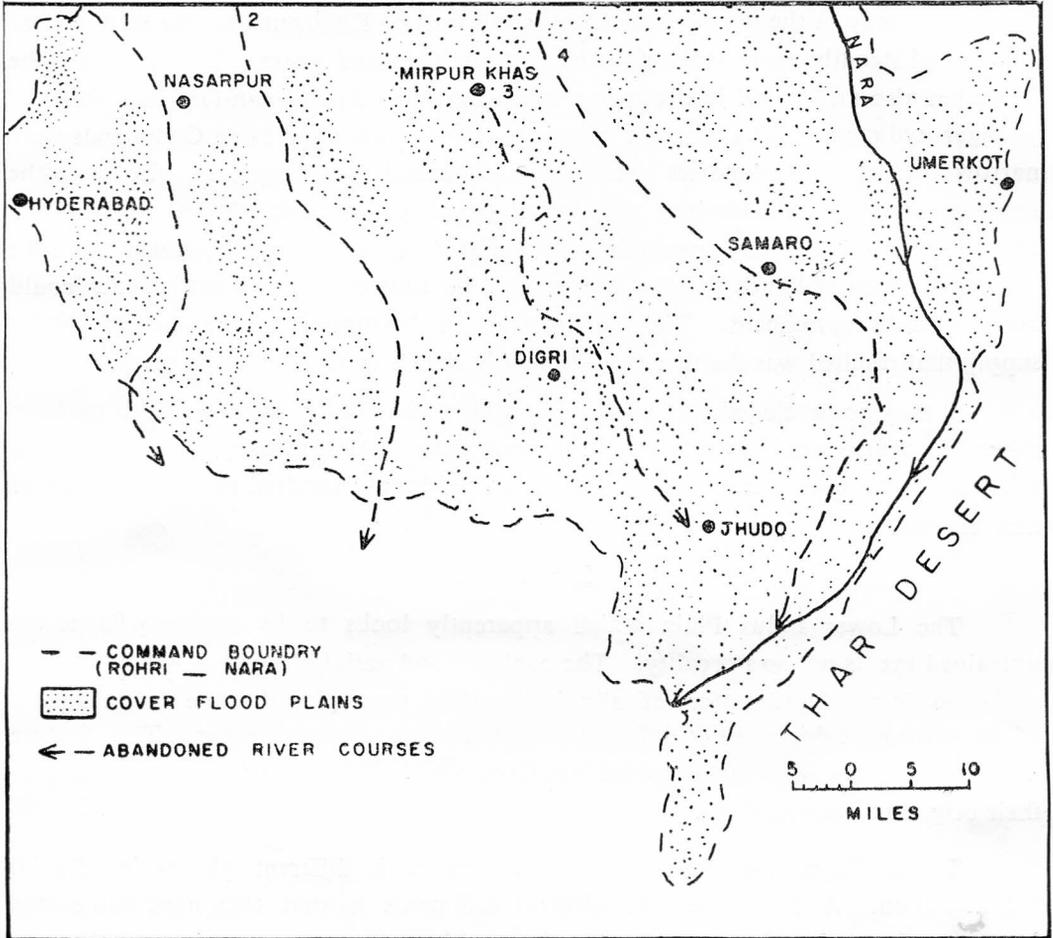


FIGURE 6—Showing cover floodplain in the Southern Section of Rohri and Nara Commands (1) Nasarpur course ; (2) Shahdadpur course ; (3) Dhoro Puran and (4) Samaro course.

course built up a still higher level, they got covered up. The intervening low lying areas between the river courses, the cover floodplains, received a veneer of fine sediments every time the flood water escaped from the river courses. The meander floodplains are much wider in the north but gradually get narrower (the intervening cover floodplains wider) as they enter the delta until the “bank-topping” floods are dominant in the deltaic distributaries giving rise to extensive cover floodplains. An example of the distinct topographical features of the meander floodplains is to be found south-west of Khairpur (Fig. 5).

Bar deposits

These are of two types depending on their relative height and relief. This distinction is perhaps due to the amount and proportion of coarse material carried

by the river. Of the two types, low-bar deposits are more common. Their relief is comparatively more even, soil texture is mostly coarse-medium with coarse horizons and of fine medium with thin horizons especially at the surface. High bar deposits (Fig. 5) have a comparatively higher relief and are normally out of command; their topography is rough and soil texture is predominantly coarse *i.e.*, sandy.

Channel Deposits.

These are very important landforms of common occurrence in the region. Sometimes they subdue other types of meander floodplain deposition by their coarse textured material which may at times be of fairly good thickness. Three types of levees have been distinguished (a) bank levee, it is most common in the delta region, (b) spillway levee, it is of very wide occurrence. Spillway levees vary in size and extent, they are smaller than the bank levees because they have been formed by spillways and (c) sheet levee, it occurs when the river suddenly overflows its banks over a wide front, inundating large areas, and depositing layers of coarser sediments usually of shallow depth.

Cover floodplains.

This is the most extensive landform in the region. The intervening areas between the river courses, which are at a lower level are periodically inundated at the time of floods. By the time the slow moving flood water reaches there it has already dropped its load of coarser material and only the finer material is deposited here vertically covering former topographic features, leading to the formation of cover floodplains (Fig 6). The cover floodplains fall into three types, depending in some measure on their relative age a) *shallow cover-plain*, it is slightly depressed land with smooth topography, textures fine-medium to varying depth overlying coarse-medium or coarse, b) *deep cover-plain*, it is also slightly depressed land with very smooth topography, textures are mostly fine-medium and c) *very fine cover plain*, slightly depressed land with very smooth topography, textures fine and fine-medium to varying depth.

Active floodplain.

The present day active river channel is the active floodplain. It is an artificial landform since it is bunded over most of its length. The bunds create artificial cover floodplain conditions and so the sediments deposited away from the active channels may be quite thick. The bunds also restrain the river so that it may not materially change its course. Under such conditions natural deposition of sediments over the floodplain is now no longer possible.

Delta zone

The distributaries of the river Indus, near Tatta begin to spread out across the delta on their way to the Arabian sea. The two landforms, deltaic floodplain and

tidal delta, cover the greater part of the Indus delta. The deltaic floodplain covers about 25 per cent of the region. It lies above the high tide and is that part of the delta most recently abandoned by the sea. The tidal delta comprises almost 60 per cent of the region. The soil profiles of the deltaic floodplain are very changeable from place to place and most of them show thin stratification. The soil textures range from moderately coarse to moderately fine and are generally finer than those found in most other plains of river laid alluvium. Coarser materials are found on the active floodplains and along the banks of some of the distributaries.

The extreme western portion of the Indus delta which faces the Arabian sea and the extreme southern portion which faces the Rann of Kutch consist of tidal mudflats and constitute the tidal delta or tidal cover-plain. All the lands under the tidal delta are inundated at the time of high tides and lie exposed at low tides. The width of the tidal delta varies between five and twenty-five miles. There are only a few small parts that are high enough not to be overrun by the tides. This division corresponds to the cover floodplains found inland but with the difference that its sediments are comparatively finer and of no immediate agricultural value.

Desert fringe

The name is given to the floodplains and desert border north of Sanghar district. Here isolated sand-dunes are encountered rising over the alluvial plain. The texture of the intervening alluvium is similar to that of the type of associated floodplain. At places the surface has become sandy on account of man's intervention by levelling the sand-dune margins.

Piedmont zone

The main Piedmont plain is the Kachhi Plain, which extends from Kashmor to Jhatpat, north to Sibi, and south to Manchar Lake. The Piedmont material in this area is mostly of a fine texture, and alluvial in origin as it has been brought down by streams descending from the adjacent hills. It is also as well sorted as the Indus alluvium. Elsewhere, adjacent to the Lower Indus plain, Piedmont zones occur along the foot of the Rohri Hills and along the Kohistan area and its outliers in Ghulam Muhammed Barrage Command. They mostly consist of coarse fan material, but limited Piedmont cover floodplains occur west of Tatta.

Soils.

Pedologists in an attempt to describe and classify soils on a world-wide basis, have set up as their primary units the three soil orders, zonal, intrazonal and azonal. The second level of classification divides the zonal order into great soil groups, each of which has a distinctive horizon development and has evolved under a distinctive climatic regime. In the world map showing the principal zonal soil groups, soils of

the Lower Indus Plain together with those of the Thar desert have been included in the category of desert soils or Sierozems¹³. The zonal soils are not the only soils in the zones or regions, but each region has also its intrazonal and azonal soils which exist in association with each of the classes made. Azonal soils are generally found in areas of extremely youthful and undeveloped regolith, such as newly deposited alluvium. They do not show any distinctive physical characteristics, such as horizons, because they are immature on account of not getting enough time to develop. The soils of the Lower Indus Plain mostly consist of river laid alluvium which is of recent origin; they either show very little or no profile development and so no horizons. The layering that they exhibit is related to the deposition of alluvium and the characteristics inherited from the parent material. It is, therefore, advisable to include these soils in the category of Regosols belonging to the azonal soil order.

Texture is the only reasonably stable characteristic of the soils and is also readily recognisable; the other morphological features viz., colour, consistence and structure, are not well developed and so they cannot be adopted as a criterion to differentiate between soils. For purposes of soil mapping on detailed scales, texture can be employed as a basis but on regional scales the stratification becomes too complex. Soil textures are very closely related to depositional conditions, and each landform has a defined range of textural profiles together with characteristics of elevation and topography. It is, therefore, that modes of deposition have been found to be the most suitable basis of soil classification in the region and the mapping units finally adopted are geomorphic units or landforms.

It is on account of arid climate that virgin soils show a high content of the salts of sodium, potassium, magnesium and calcium. A zone of accumulation of these salts is usually found at a depth corresponding to the penetration of rain or flood water. It is affected by drainage in different areas and only shows where the water-table is deep, so that no salts from the ground water reach the surface of the soil. Calcium carbonate present in these soils works as a cementing material and its proportion is about ten per cent of the soil by weight. Its concretions, however, are not widespread. Most of this salt was deposited here as sediments which the river brought with it from the Himalayas, but certainly some of it has precipitated from the irrigation water as well. An analysis of soils indicate that they are low in organic matter and available nitrogen and phosphate, but are very productive when irrigated¹⁴. The deficiency of organic matter in soils is due to high temperatures experienced in the region which rapidly oxidize the organic matter and do not let it accumulate in soils. The organic matter is the chief source of food and energy for

¹³A. N. Strahler : *The Earth Sciences*, New York, 1963, p. 621.

¹⁴F. O. Young : *Report to the Government of Pakistan on Soils and Agriculture* (Rome : 1953), p. 10.

TEXTURE DISTRIBUTION IN THE LOWER INDUS PLAIN

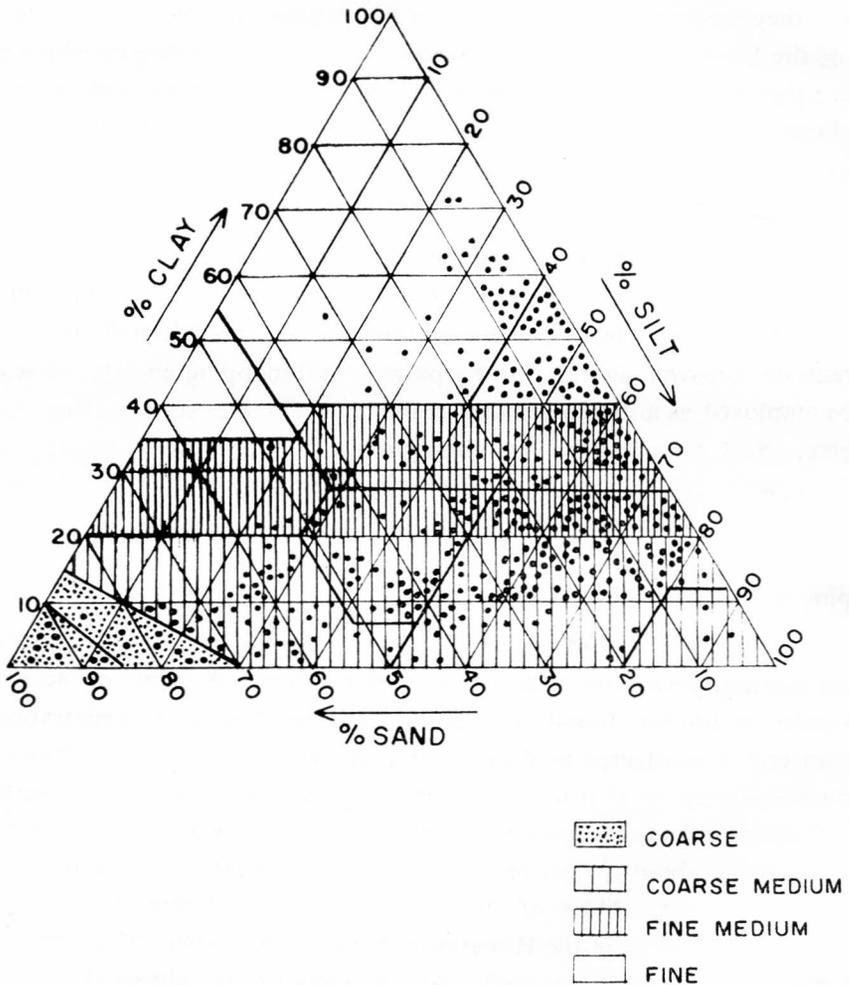


FIGURE 7

micro-organisms and some of these in their own turn are so very useful for providing plant food on account of their nitrogen fixation quality.

The Bureau of soils of the United States Department of Agriculture has adopted the following sizes or diameters of particles to differentiate between different

types of soil as to their physical composition : coarse sand is taken as 1.00-0.50 millimeter, medium sand 0.50-0.25 millimeter, fine sand 0.25-0.10 millimeter, very fine sand 0.10-0.05 millimeter, silt 0.05-0.002 millimeter and clay below 0.002 millimeter in diameter.¹⁵ Various textures are produced by combinations of sand, silt and clay in certain proportions. The scale employed in this connection is also the same as adopted by the Bureau of Soils of the United States Department of Agriculture : sand—eighty per cent or more of sand and twenty per cent or less of silt or clay, sandy loam—twenty to fifty per cent of silt and clay and the remainder sand, loam—twenty per cent or less of clay and thirty to fifty per cent of sand (if silt predominates then it is silty loam, if clay then clay loam), clay—thirty per cent of clay and less than seventy per cent of larger sizes¹⁶.

The United States Department of Agriculture texture triangle¹⁷ has been adopted to convert mechanical analysis into textural classes. The mechanical analyses have been done by Hunting Technical Services* on samples over the range of textures encountered in the Lower Indus Plain and their distribution is shown in Fig. 7.¹⁸ This figure suggests that the majority of textures belong to silty loam and silty clay loam classes. True clays and medium or coarse sands are rare particularly in the upper alluvial layers. Soil textures having eighty-five per cent of sand are not widespread but are limited to high-bar deposits and certain parts of the meander floodplains.

The meander floodplains have comparatively rough topography and generally coarse soils, while the cover floodplains have smooth topography and fine soils. The levees have coarse-medium or coarse soils, overlying fine-medium or fine soils. In the north-west of the region, there is a strip of alluvium, the piedmont, that has been deposited by streams from the adjacent hills. It is generally of a fine texture and possesses different physical properties from the Indus alluvium.

RISING WATER-TABLE AND ASSOCIATED PROBLEMS

A study of the water-table and its fluctuations is of vital significance to any kind of agricultural development in the region. Such a study can very greatly help in determining the types of crop which can be grown successfully, methods of cultivation and irrigation to be employed, and other agricultural practices to be followed.

¹⁵C. E. Miller and L. M. Turk : "*Fundamentals of Soil Science.*" (New York : 1956), p. 45.

¹⁶Strahler, *op cit*, footnote 14, p. 612.

¹⁷Miller and Turk, *op. cit.*, footnote 16, p. 52.

¹⁸*Lower Indus Report, Physical Resources, West Pakistan WAPDA, Vol. 2, p. 161.*

*Authors of the "Lower Indus Report—Physical Resources." 1965.

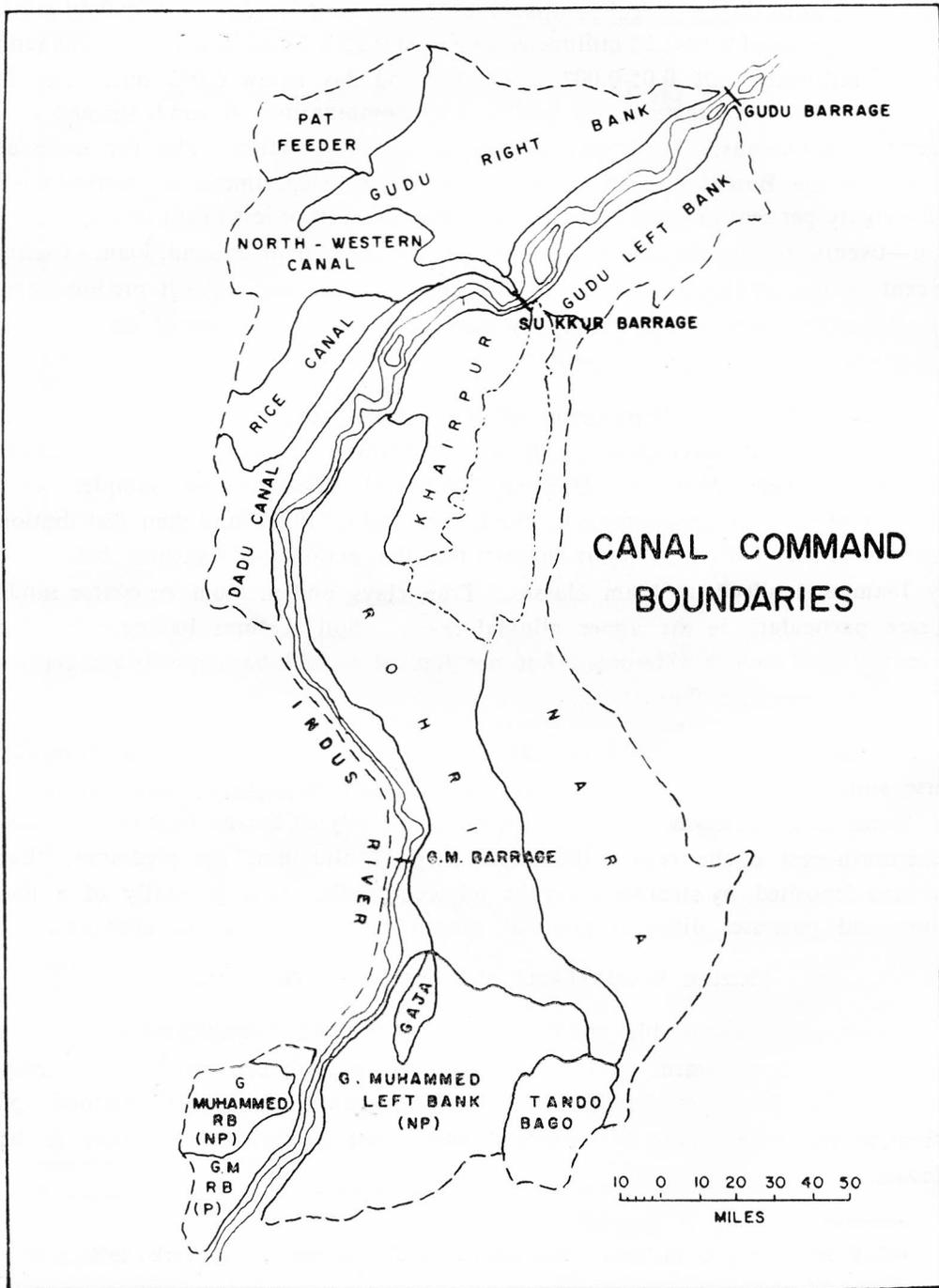


FIGURE 8

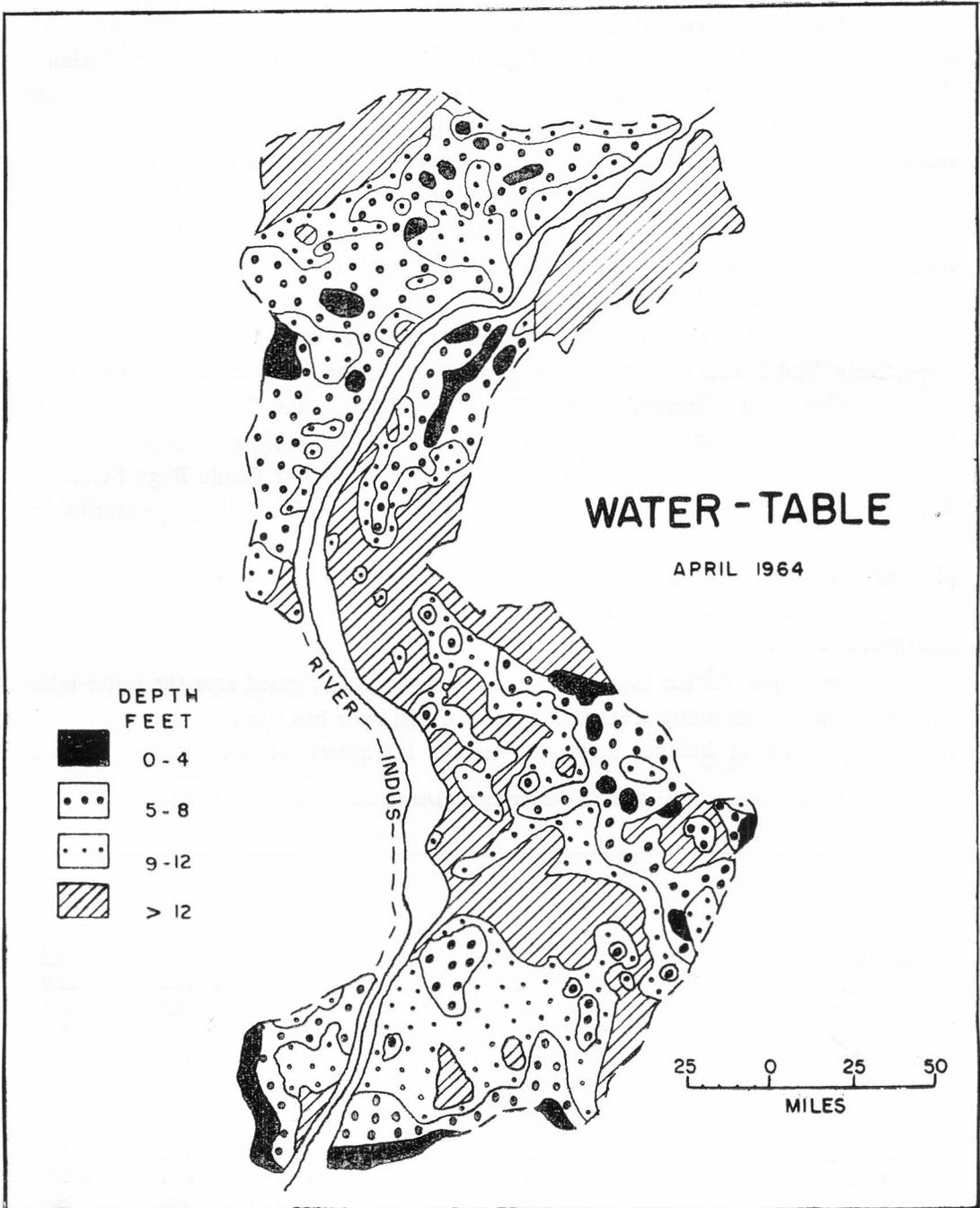


FIGURE 9

In the last century the water-table was very close to the stabilized natural water-table established by natural forces, but the construction of barrages with a network of canals in the present century (Fig. 1) have considerably disturbed the balance that existed previously between the natural recharge of the aquifer through river and rain and the discharge of its water to the sea. In consequence, surface infiltration of water by rainfall, floods, field irrigation, seepage from river, canals, spills, hill torrents, and sub-soil flow of water towards the valley from adjacent higher areas now exceeds the down-valley outflow of water, loss of water due to evaporation from shallow water-table, transpiration by plants and removal of water by drains resulting in the rising of the water-table, which fluctuates from season to season.

Figures 8 and 9 show the canal command boundaries and depth to water-table respectively and Tables 1 and 2 show percentage of the area in each water-table depth class by canal commands for the months of April and October 1964 respectively. These tables indicate that the areas of low water-table are: Gudu Barrage Command Right and Left Banks, Rohri Canal Command and Tando Bago Perennial Area (eastern side only). All the rest of the commands have a high water-table. The commands that have the greatest percentage of their area under water-table of four feet and less both in April and October are: Ghulam Muhammad Barrage Right Bank and Left Bank (non-perennial), Rice Canal, Gudu Right Bank and Nara Canal.

These tables further indicate that throughout the irrigated area the water-table is generally high. In many areas it is either still rising or has risen to the extent as to reach a state of balance under the present intensities of cultivation. Table 3

TABLE 1—PERCENTAGE OF AREA IN EACH WATER-TABLE DEPTH CLASS BY CANAL COMMANDS, APRIL, 1964.

Command	0-4 ft.	4-8 ft.	8-12 ft.	12-16 ft.	Below 16 ft.
Gudu Left Bank	Nil	0.8	0.5	6.4	92.3
Gudu Right Bank	2.2	56.7	39.2	0.7	1.2
Pat Feeder Area	Nil	3.1	3.7	12.2	81.0
N.W. Canal	9.5	68.0	21.5	0.7	0.3
Rice Canal	0.8	67.3	31.1	0.8	Nil
Dadu Canal	Nil	56.0	28.8	14.4	0.8
Khairpur	11.8	46.4	10.5	5.5	25.8
Rohri Canal	1.2	7.3	24.5	29.0	38.0
Nara Canal	7.0	42.2	36.4	7.8	6.6
Tando Bago	2.2	22.7	49.5	18.2	7.4
G.M. Left Bank (N.P.)	5.3	23.9	49.0	19.1	2.7
Gaja	Nil	97.0	3.0	Nil	Nil
G.M. Right Bank (P)	Nil	27.4	31.6	20.2	20.8
G.M. Right Bank (N.P.)	5.1	42.1	50.0	2.8	Nil

TABLE 2—PERCENTAGE OF AREA IN EACH WATER-TABLE DEPTH CLASS BY CANAL COMMANDS, OCTOBER, 1964.

Command	0-4 ft.	4-8 ft.	8-12 ft.	12-16 ft.	Below 16 ft.
Gudu Left Bank	Nil	0.9	13.1	16.5	69.5
Gudu Right Bank	64.5	34.9	0.6	Nil	Nil
Pat Feeder Area	Nil	7.7	2.5	10.2	79.6
N.W. Canal	46.0	35.0	11.3	5.8	1.9
Rice Canal	84.5	15.5	Nil	Nil	Nil
Dadu Canal	13.1	37.9	40.8	8.2	Nil
Khairpur	14.9	48.2	9.9	3.4	23.6
Rohri Canal	1.4	12.3	21.6	33.1	31.6
Nara Canal	60.3	21.9	13.1	1.6	3.1
Tando Bago	5.2	37.8	41.4	12.3	3.3
G.M. Left Bank (N.P.)	68.1	30.4	0.8	0.7	Nil
Gaja	40.0	55.0	5.0	Nil	Nil
G.M. Right Bank (P)	42.1	10.1	24.5	22.4	0.9
G.M. Right Bank (N.P.)	73.2	22.5	4.3	Nil	Nil

SOURCE : "LOWER INDUS REPORT, PHYSICAL RESOURCES," WAPDA, 1965, VOL. 2, P. 457.

shows the percentage of cultivable commanded area in each water-table depth class for the region as a whole. It reveals that over sixty per cent of the commanded area has water-table of twelve feet and less from the surface in the month of April, while sixty per cent of the area has eight feet and less in the month of October.

TABLE 3—PERCENTAGE OF CULTIVABLE COMMANDED AREA IN EACH WATER-TABLE DEPTH CLASS.

Area	0-4 ft.	4-8 ft.	8-12 ft.	12-16 ft.	Below 16 ft.
April 1964 Perennial	2.8	20.3	16.8	9.2	10.9
April 1964 Seasonal	1.0	12.8	13.0	3.5	9.7
April 1964 Total	3.8	33.1	29.8	12.7	20.6
October 1964 Perennial	16.9	14.5	11.6	8.8	8.2
October 1964 Seasonal	20.5	9.0	1.1	1.6	7.8
October 1964 Total	37.4	23.5	12.7	10.4	16.0

SOURCE : "LOWER INDUS REPORT, PHYSICAL RESOURCES," WAPDA, 1965, VOL. 2, P. 499.

Waterlogging

In the area where water-table is about ten feet or more from the surface soils are free from waterlogging but where it reaches to, or comes near the surface, soils and sub-soils get saturated with water giving rise to waterlogging of lands. Mehta¹⁹ is of the opinion that in regions where water-table reaches to six feet from the ground surface, soils are bound to show signs of waterlogging. But Dr. Vlugter,²⁰ an expert of the Netherlands Bureau of International Technical Assistance on Drainage and Reclamation has suggested that, if ground water-table is fixed at three to four feet below the surface then there will be no stagnant water and no waterlogging. The evaporation from such a water-table will be somewhat greater than in the case of a ten feet deep one, but it will not exceed one tenth of a free water surface.

The cultivable commanded area having water-table of four feet and less from the surface is 3.8 per cent in the month of April and 37.4 per cent in the month of October. It is unfortunate that more than thirty-seven per cent of the cultivable commanded area of the region as a whole suffers from waterlogging to a varying degree. Extensive tracts of once productive land particularly in the Ghulam Muhammad Barrage Command Right and Left Banks (non-perennial), Rice Canal Command, Gudu Barrage Right Bank Command and Nara Canal Command have gone out of production and still larger areas have been adversely affected by waterlogging. The waterlogged areas can be reclaimed and the menace can be prevented by canal lining, pumping of water by tube-wells, open drains, canal closure at intervals etc.

Salinity

Of the twin soil problems of waterlogging and salinity, the menace of waterlogging is comparatively less severe. But waterlogging has contributed greatly in the extension of area under salinity by preventing effective drainage thereby retarding process of leaching of salts below the Zone of plant roots. Salinity is in fact due to rise of saline water from the high water-table (within eight to ten feet of the ground surface)²¹ resulting in the deposition of salts in the region of about one foot or 30 centimeters from the surface when the water evaporates.

¹⁹Mehta : "The Formation and the Reclamation of Thur Lands in the Punjab." (1940) Paper No. 235, Vol. 28, *Proc. Engg. Cong.*, p. 123.

²⁰H. Vlugter : "Some Aspects of Water Control in West Pakistan," *Pakistan Geographical Review, Lahore*, Vol. 25, No. 2 (1960), p. 3.

²¹K. S. Ahmad "Reclamation of Waterlogged and Saline Lands in West Pakistan," *Pakistan Geographical Review*, Vol. 26, No. 1 (1961), p. 3.

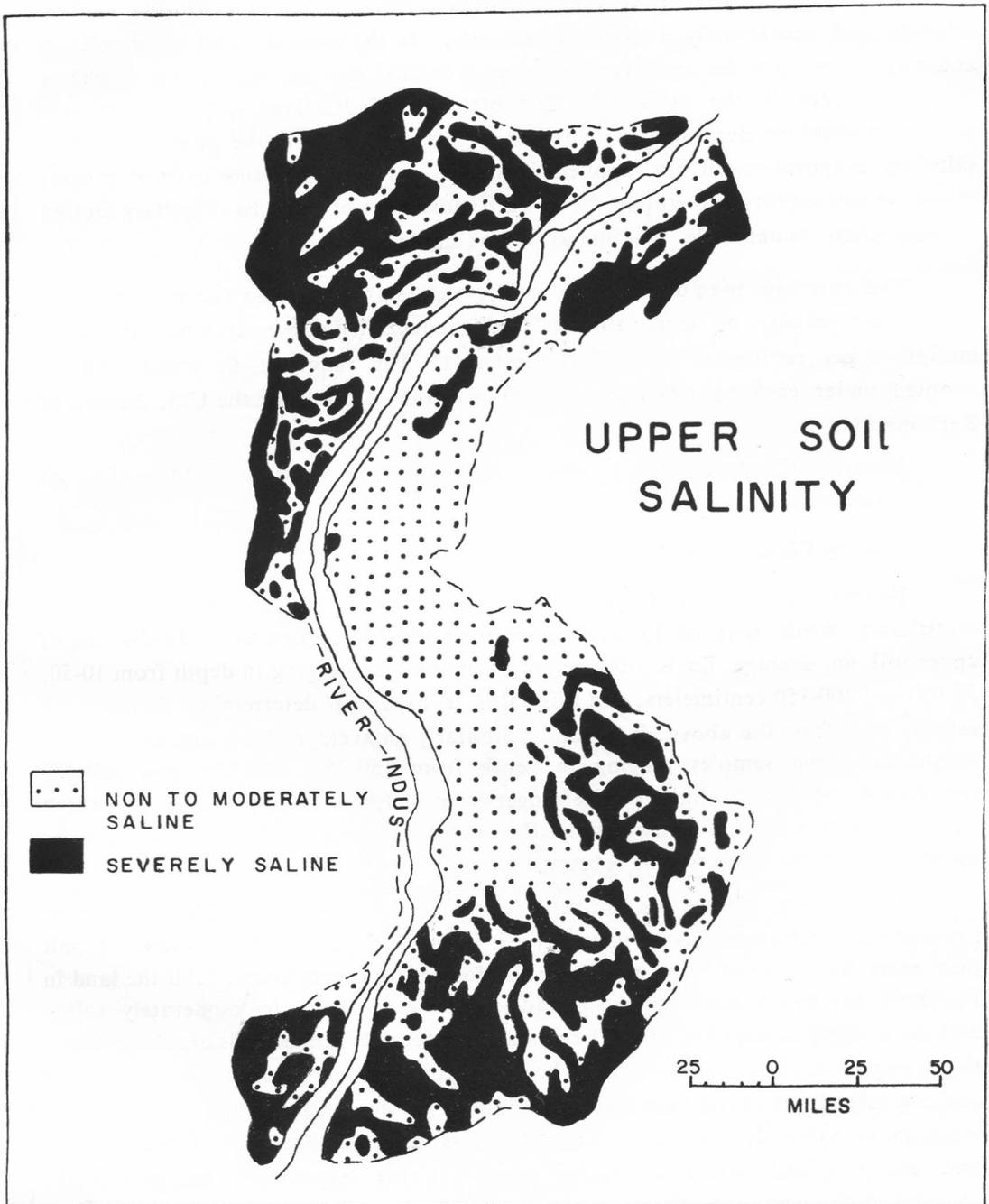


FIGURE 10

A greater proportion of salts deposited consist of sodium chloride, sodium sulphate and occasionally sodium bicarbonate. In the worst affected areas calcium and magnesium chlorides are sometimes present but calcium and magnesium sulphates may also occur in the top-soil²². The presence of dissolved salts in soils may be due to solutions deposited at an earlier stage as well as from the concentration of salts by evaporation of the applied irrigation water. But the most dominant factor for soil salinity is certainly the upward movement of salts by capillary action in areas where water-table is saline as well as shallow.

The soils have been divided into different classes by Hunting Technical Services as to their salinity by using the electrical conductivity of the saturation extract in millimhos per centimeter at 25°C (Ec extract). The range of Ec extract values adopted under each salinity class is the same as that adopted by the U.S. Bureau of Reclamation.

Electrical Conductivity (saturation Extract)	0-4	4-8	8-16	16-40	More than 40
Salinity Class	1	2	3	4	5

For purposes of determining salinity, upper soil limit is taken from 0-150 centimeters, while that of the substratum from 150-450 centimeters. In the case of upper soil an average Ec is obtained of three samples ranging in depth from 10-50, 50-100 and 100-150 centimeters, and this value is used for determining directly the salinity class from the above given data. Similarly an average Ec is obtained for the substratum from samples ranging in depth from 150-250, 250-350 and 350-450 centimeters. The soil salinity profile ranges from 0-450 centimeters and is written in two numbers each of which denotes the salinity class *e.g.*, 3/1, the former for the upper soil and the latter for the substratum.

The salinity classes are directly related to the average Ec of both the upper soil and the substratum and the values give a fairly good idea of the amount of salt that must be removed from the upper soil for getting better crops. All the land in the region can be divided into two broad categories (*a*) non to moderately saline and (*b*) severely saline (Fig. 10). The non and moderately saline lands are those where the average electrical conductivity of the saturation extract in both the upper soil and the substratum is less than sixteen millimhos per centimeter, while in the severely saline lands it exceeds this figure. Table-4 shows the percentages of class three salinity and less (non and moderately saline soils). It also very clearly brings out the regional differences. In Gudu Barrage Left Bank and Rohri Canal C mands a greater proportion of the abandoned land is of low salinity as also in K hairpur

²²Lower Indus Report, Physical Resources, West Pakistan WAPDA, Vol. 2, p. 259.

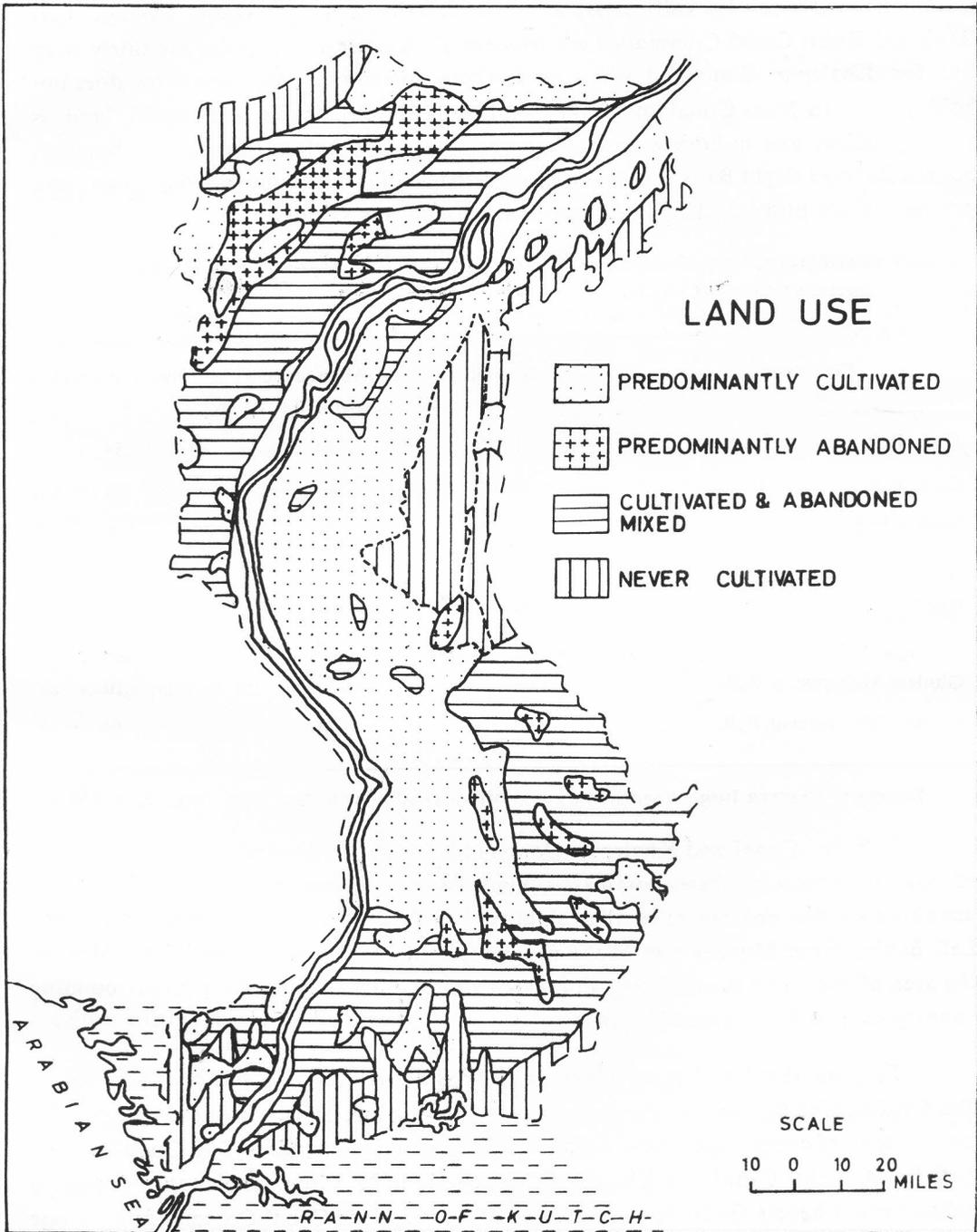


FIGURE 11

Command. One can logically arrive at this conclusion as far as Gudu Barrage Left Bank and Rohri Canal Commands are concerned because water-tables are fairly deep but for Khairpur Command where water-table is shallower, this reasoning does not hold good. In Nara Canal and Gaja Commands about half the abandoned land is severely saline, and in both water-table is shallow. In Ghulam Muhammad Barrage, Sukkur Barrage Right Bank and Gudu Barrage Right Bank Commands only twenty-five per cent of the bores drilled for the purpose showed low salinity.

TABLE 4—DISTRIBUTION OF MODERATELY SALINE LANDS IN EACH COMMAND BY PERCENTAGE UNDER DIFFERENT LAND USE HEADS.

Command	Cultivated	Abandoned	Never cultivated
Gudu R.B.	81	24	54
Gudu L.B.	96	90	47
Sukkur R.B.	70	24	28
Khairpur	91	84	73
Rohri	94	74	78
Nara	81	42	30
Ghulam Muhammad R.B.	66	26	10
Ghulam Muhammad R.B.	68	21	19

SOURCE: "LOWER INDUS REPORT, PHYSICAL RESOURCES", WAPDA, 1965, VOL. 2, P. 336.

In Rohri Canal and Khairpur Commands never cultivated lands are mostly of low salinity. In these commands abandoned and never cultivated lands are uncultivated for reasons other than salinity. In Gudu Barrage Command Right and Left Banks about fifty per cent of the never cultivated land is of low salinity. Most of the area of these commands being situated at a level a little higher than the surrounding country cannot be irrigated by canals.

To show the distribution of soil salinity, salinity class 3/3 has been adopted as the dividing line between moderately and severely saline soils. Table 5 shows the percentages of areas under these soils in the different commands. The Gudu Barrage Left Bank, Rohri Canal and Khairpur Commands have a low percentage of severely saline soils, whereas Gudu Barrage Right Bank and Nara Canal Commands have one third of their area under this salinity class. The Sukkur Barrage Command Right Bank has almost half, while Ghulam Muhammad Barrage Command Right and Left Banks taken together have two thirds of their area as severely saline.

TABLE 5—DISTRIBUTION OF SALINITY IN THE REGION (PERCENTAGES OF AREAS UNDER COMMANDS).

C o m m a n d	Moderately Saline	Severely Saline
Rohri	90	10
Khairpur	86	14
Gudu L.B.	81	19
Nara	63	37
Gudu R.B.	63	37
Sukkur R.B.	52	48
Ghulam Muhammad L.B.	34	56
Ghulam Muhammad R.B.	33	67

SOURCE : "LOWER INDUS REPORT, "PHYSICAL RESOURCES", WAPDA, 1965, VOL. 2, P.361.

Since all classes of upper soil salinity are found associated with all depths of water-table, therefore, no definite relationship can be established between water-table depth and upper soil salinity. Relationship between geomorphic features and salinity is also not very distinct, since in almost all the landforms, there are equal number of sites of class four and five salinity. The levees are in fact the most saline of all the geomorphic units. Salinity in them varies considerably and it is very difficult to find out whether it is due to landform or land use, because the saline part of the cover floodplain in proximity with the levee deposit is never cultivated.

LAND USE

A study of land use map of the Lower Indus Plain (Fig. 11) reveals the following three outstanding features : *a*) almost contiguous tracts of abandoned land in the right bank commands, *b*) extensive tracts of cultivated land situated on the left bank in the Rohri Canal Command and *c*) patches of abandoned and never cultivated land in the Gudu Barrage and Ghulam Muhammad Barrage Commands. The abandoned land constitutes approximately sixteen per cent of the regions cultivable commanded area ²³. This can be explained to be mainly due to : *a*) failure of development efforts in never cultivated saline lands, *b*) deficiency of water or its absence particularly in lands in proximity to canal extremities due to maldistribution of water and improper canal maintenance and *c*) harmful effects of waterlogging and salinity. The two soil evils of waterlogging and salinity are rampant in areas where there has been appreciable rise in water-table due to seepage from canals running in close proximity. The process of salinisation of soil commences no sooner irrigating of land ceases.

23. *Ibid*, Vol. 7, p. 42.

Table 6 indicates that the three major commands viz, Gudu, Sukkur and Ghulam Mohammad have a gross area of approximately fifteen million acres of which 1.7 million acres are uncultivable. The balance of more than thirteen million acres is either at present used for irrigated agriculture or is potentially irrigable. Apart from the above mentioned fifteen million acres, the area between the river bunds excluding the main channel consists of 1.6 million acres of which 418,000 acres are cultivated and 387,000 acres are under forest (Table 7). The remaining 834,000 acres consist of non-cultivable and unproductive land.

TABLE 6—LAND USE SUMMARY (1,000 ACRES).

Barrage Command	Cultivable land		Total c. c. A	Non-culti- vated land	Gross area
	Productive	Unproductive			
Gudu	1,436	1,366	2,802	298	3,100
Sukkur	5,691	1,779	7,470	1,031	8,501
Ghulam Muhammad	1,279	1,645	2,924	392	3,316
Total :-	8,406	4,790	13,196	1,721	14,917

SOURCE: "LOWER INDUS REPORT, PHYSICAL RESOURCES", WAPDA, 1965, VOL. 7, P. 41.

TABLE 7—LAND USE IN RIVERAIN AREA (1,000 ACRES).

River tract	Cultivated	Forest	Non-cultivable and unproduc- tive land	Gross area
Gudu to Sukkur	188	94	213	495*
Sukkur to Sehwan	119	107	358	584*
Sehwan to G. M. B.	58	111	114	283*
G. M. B. to Sea	53	75	149	277*
Total :-	418	387	834	1,639

*Excludes main channel.

SOURCE: "LOWER INDUS REPORT, PHYSICAL RESOURCES", WAPDA, 1965, VOL. 7, P. 42.

The unproductive land comprises thirty-six per cent of the total cultivable commanded area of the three major commands. In individual commands the percentage of unproductive land to its cultivable commanded area is the highest, fifty-six

per cent in the still developing Ghulam Mohammad Barrage Command, forty-nine per cent in the Gudu Barrage Command and the lowest twenty-four per cent in the Sukkur Barrage Command. The non-cultivable land in these commands accounts for 11.5 per cent of their gross area. The non-cultivated land within these commands is such which can be developed by canal irrigation provided efforts are made. In the rest of the commands the never cultivated land represents the transition between sand-hills and sand dunes on the one side and the already cultivated area on the other.

Lakes, permanent and seasonal swamps occupy 584,000 acres. Of this figure eight per cent is in the Rice Canal Command, seventy four per cent within the Ghulam Mohammad Barrage Command, and the remaining eighteen per cent is largely accounted for by the broad reaches of the Nara Canal which have been included within this category of land use. In the Rice Canal Command, lakes and permanent swamps occupy 19,000 acres and seasonal swamps 29,000 acres. They are mostly concentrated in the south-west corner of the command. This concentration accounts for fifty and thirty three per cent of the area under lakes and permanent swamps and seasonal swamps of the command respectively. In the Ghulam Mohammad Barrage Command lakes and permanent swamps occupy 185,000 acres, representing forty-seven per cent of the uncultivable area. The seasonal swamps account for 246,000 acres, or eight per cent of the cultivable commanded area. These two categories totalling 431,000 acres or about 13 per cent of the gross area of the command, reduce to a very considerable degree the area of land available for development.

LANDFORMS AND LAND USE.

A comparative study of landform and land use maps Figs. 4 and 10 not only gives a clear understanding of the physical environment and human reactions to it but also reveals both adjustments and maladjustments in land use.

On the basis of field studies, interpretation of aerial photographs and large scale maps, it appears that the cover flood plains consist of mixed cultivated and abandoned lands. In the middle section of the Lower Indus Plain particularly in Rohri Canal Command cultivated area is generally devoid of abandoned land as it is almost free from natural shortcomings. However, in the northern section of the plain in all the right bank Commands and in the southern section on the left bank of the river south of Hyderabad—Tando Muhammad Khan, patches of predominantly abandoned and never cultivated land are widespread. The meander floodplains are predominantly cultivated excluding the bar and levee deposits which are mostly saline and out of command. The deltaic floodplains in the delta zone mostly consist of mixed cultivated and abandoned lands due to the twin menace of waterlogging and salinity.

The tidal delta is not cultivated, since it is rendered unfit for agriculture on account of constant onrush of sea water at the time of high tide.

The active floodplain is bounded by embankments along most of its length. Riverain forests are found in the area between the river *bunds* excluding the main channel. On either side of the main channel of the lower Indus from Hyderabad to Goth Mira (about eight miles south of Sehwan) in the north and Chuhar Jamali in the south, the forests generally run in a continuous stretch. There are no forests to be found in a 10 miles strip south of Hyderabad due to the narrowness of the river channel. Northward of Goth Mira almost upto Kashmir forests wherever encountered are generally in patches or in strips of various sizes. Of the total area between the river bunds, excluding the main channel less than twenty-five per cent is forested, about twenty-five per cent is cultivated and more than fifty per cent is non-cultivable and unproductive land.

CONCLUSION

All the alluvial deposits of the Lower Indus Plain are obviously the work of one river, the Indus, which have completely buried the original land surface of the plain together with its earlier marine deposits to a depth of some thousand feet. The plain may be regarded as a fairly homogeneous aquifer likened to a huge sponge, capable of absorbing runoff from adjacent foothills as well as rainfall and seepage from the river and canals that traverse it, and of transmitting this subterranean flow downslope to the Arabian Sea.

Human control by erecting bunds has virtually confined the river to its own channel. It can now no longer swing sideways, but the natural tendency of a break through to a more easterly course still persists on account of its building up of its channel. Under such conditions the natural deposition of alluvium over the floodplains is now restricted. It, therefore, becomes necessary that the fertility of soils should be maintained by adding such soil constituents of which they are depleted on account of their supporting crops through the ages.

The soils of the region are of recent origin and pedologically immature, There is very little or no profile development and so no horizons. The landforms found here mark different phases in alluvial sedimentation. A redeeming feature, however, of these sediments is that they exhibit well sorted textures and reveal intricate stratification with rapid lateral and vertical changes. The most recent sediments are fine sandy loam to silty clay, while those deposited a little earlier are much coarser and at places almost sandy. Soil textures having eighty-five per cent of sand are limited to high bar deposits and certain parts of the meander floodplains. The soils are deficient in organic matter, available nitrogen and phosphate but are

very productive when irrigated. It is hoped that the present situation of low organic content in soils will certainly improve with an increase in cropping intensities, thereby improving the physical characteristics of soils, provided the drainage is good.

Abandoned land in the region constitutes approximately sixteen per cent of the cultivable commanded area, which is mainly due to a failure of development efforts in saline lands in proximity with canal extremities, maldistribution of water and damage done by waterlogging and salinity. Within the three major commands (Gudu, Sukkur and Ghulam Mohammad) non-cultivated lands are those which can be developed by canal irrigation. In the remaining commands the never cultivated land represents the transition between sand-hills and sand-dunes on the one side and the already cultivated area on the other.

About sixty per cent of the region has a high water-table which manifests itself in the form of waterlogging of lands. Under the existing conditions water-table is expected to rise in all the perennial commands. The seasonal rice growing areas evince a typical seasonal rhythm which can be expected to persist without much change even where development provides greater water supplies. In perennial areas where it is envisaged to introduce tube-wells for utilizing ground water, pumping will indirectly control the water-table, but in areas where increased surface supplies are inevitable water-table is bound to rise resulting in waterlogging of lands. Thus provision of a drainage system in such areas is inevitable for bringing down the water-table. It will not be out of place to mention here that the government is alive to the need of providing a drainage system. Many schemes having been formulated for the purpose and are under various stages of execution.

Salinity has now assumed alarming proportion in the region. About thirty-eight per cent of the land is severely salt affected and the remaining sixty-two per cent is moderately saline. This soil defect together with waterlogging is limiting to a very considerable degree the productivity of the cultivated land in the region. There is no definite relationship between water-table depth and upper soil salinity, since all classes of upper soil salinity are found associated with all depths of water-table. Abrupt changes in salinity over short distances are very common. In such places salinity is associated with water-table depth, ground water salinity and land use. These three factors are so closely interrelated that no one factor can be considered independently of the other two. Relationship between landforms and salinity is also not very clear. Since in almost all the landforms there are equal number of sites of class four and five salinity. The levees are certainly the worst affected in this regard and the extent of salinity in them is also variable. It is difficult to make out whether it is due to landform or land use, because the saline part of the cover floodplain along side the levee deposits is never cultivated.

It is, indeed, very fortunate that modern science and technology has enabled man to evolve effective methods to eradicate the harmful effects of the twin soil diseases. It is now left to us to employ these methods to our advantage expeditiously and intelligently. Efforts at first should be directed to check their spreading and then to redeem partially damaged lands as also those permanently lost to agriculture on account of it. Methods employed must correspond to local geological and hydrological conditions as also to requirements of agriculture, for different types of crops are raised in different areas.

In the end it is hoped that, this study may prove to be of some advantage in appreciating the relationship that exists between the geomorphic features, soils and present land use and in indicating the direction in which more detailed studies may be undertaken for a planned and intelligent use of the land.

KARACHI BEFORE BRITISH RULE

ZAFAR AHMAD KHAN

NOTHING definite is known about the early history of Karachi before it became part of British India in 1843. Some writers consider that it is the same 'Alexander's Haven' from which Nearchus sailed with his fleet to explore the coast of Mekran and Persia¹. Others believe that it is the ancient seaport of Debal which was destroyed by the Arab General Muhammad Bin Kasim in his invasion of the Sind in A.D. 711². But Hughes holds that a town never existed on the site of Karachi or anywhere near it until the first quarter of the 18th Century³. Baillie,⁴ Aitkin⁵ and Smyth⁶ also have the same opinion. Their assertion is based on the fact that this part of the coast of Sind lacked all the natural advantages that are conducive to the growth of towns. However, they all agree that before 1725 there did exist on the present site of Karachi a small village which consisted of about twenty-five fishermen's huts and was known as Dirbo.

In 1729, a number of settlers arrived at Dirbo from a nearby port called Kharak Bundar. Kharak Bundar was situated at the mouth of the River Hubb and had a lucrative trade with the countries on the Arabian Sea coast⁷. But around 1725 the harbour became silted up and the merchants were forced to migrate to another place which would afford them better mercantile advantages.

Dirbo was situated at the head of Karachi Bay which was spacious and quite safe for vessels. It was only the sheltered bay on the Sind coast where protection could be obtained from winds and weather⁸. The River Indus was sufficiently near

¹H. Pottinger: *Travels in Beloochistan and Sind* (London: 1816), p. 385. C. Masson: "Lahore via Multan, Ull, Khairpur, Hyderabad and Tatta to Karachi and Ocean" *Proceedings of the Geog. Soc.*, Bombay, Sept. Nov., 1840; Bombay 1941, p. 116. E.B. Eastwick: *Personal Observations in Sind* (London: 1831), p. 120.

²A. Burnes: *Travels in Bokhara, being an account of a journey from India to Kabool Tartary and Persia* (London: 1831), p. 20. Suleman Nadvi: "Early Relations between Arabia and India": *Islamic Culture*, Vol. 11 (Hyderabad Deccan: 1937), p. 18.

³A. W. Hughes: *A Gazetteer of the province of Sind* (Bombay: 1876), p. 414.

⁴A. F. Baillie: *Kurrachee: Past, Present and Future* (Lond: 1890), p. 1.

⁵E. F. Aitkin: *Gazetteer of the Province of Sind*, Vol. 2 (Bombay: 1909), p. 57.

⁶J. W. Smyth: *Gazetteer of the Province of Sind*, Vol. 1, Karachi District (Bombay: 1927), p. 43.

⁷H. E. A. James: A forgotten Chapter of Indian history as described in the Memoirs of Seth Nao Mal Hotchand, *Exeter* (1915), p. 36.

⁸Masson: *Op. cit.*, footnote 1, p. 114.

*DR. KHAN is Professor of Geography, Post-Graduate Section, Government College, Rawalpindi.

to be utilized for commerce with the interior. Plenty of flat land was available all around for expansion. An added attraction was the availability of fresh water.

The water was obtained from a well called 'Kalachi's Kun'—Kun means well and Kalachi was the name of a fisherman. The village of Dirbo thus became known as Kalachi-jo-got (the village of Kalachi) in later years. Karachi seems to be a corrupt version of Kalachi.

For some years Karachi was threatened by pirates from Dwarka and Kutch and Kathiawar ports⁹. Belochi tribes from neighbouring hills and nomadic tribes from the Thar Desert also threatened it¹⁰. This necessitated the building of fortifications which were of mud mixed with straw and a long creeping weed obtained locally in marshes. They encompassed an area of 30-40 acres of land which was roughly square in shape¹¹. Along the sides and at each corner there were a number of round minarets which were mounted with cannons. The fort had two entrances—the one facing the sea and the other facing the River Lyari. The former was called Khara-dar (the gate leading to the salt water) and the latter was called Mithadar (the gate leading to the sweet water). These names are still retained by the localities situated in the vicinity of the gates.

The merchants paid huge amounts of money to the rulers for maintaining an army to protect the town against any attack. It was strongly garrisoned by the Khan of Kalat to whom the town was ceded in the middle of the 18th Century by the Kalhora princes of Sind. Even later on when the Talpurs overthrew the dynasty of Kalhoras and captured Karachi in 1797, they too treated the merchants most considerately. They built a fort at Manora in 1799 to defend the town against attack from the sea and adopted measures to increase its trade¹².

Although the merchants sponsored the army which protected the town, they did not allow the rulers to interfere with its internal affairs. They had spread their wealth throughout many countries and this enabled them to hold out the threat of emigrating to a more friendly states in the case of any interference. This had the effect of keeping their rulers 'within the bounds of moderation'¹³.

In contrast, the commerce of the inland towns of the Sind was being constantly interfered with at this time. The Amirs of Khairpur destroyed Rohri,¹⁴ the Kalhoras

⁹M.B. Pithawalla: *Geology and Geography of Karachi and its Neighbourhood* (Karachi: 1946), p. 42.

¹⁰*Ibid.*

¹¹C.L. Mariwala: Karachi Town, its Trade and Taxation in the first half of the 19th Century: *Journal of Indian History*, Vol. 19, Part 3 (Madras: 1941), p. 336.

¹²Hughes: *Op. cit.*, footnote 3, p. 414.

¹³S. V. W. Hart: "Report on the Town and Port of Kurrachee": *Selections from Record of Bombay Government*, No. 7, Part 1, New Series (Bombay: 1855), p. 215.

¹⁴Pastans Personal Observations on Sindh, Longman, Brown (1843), p. 31.

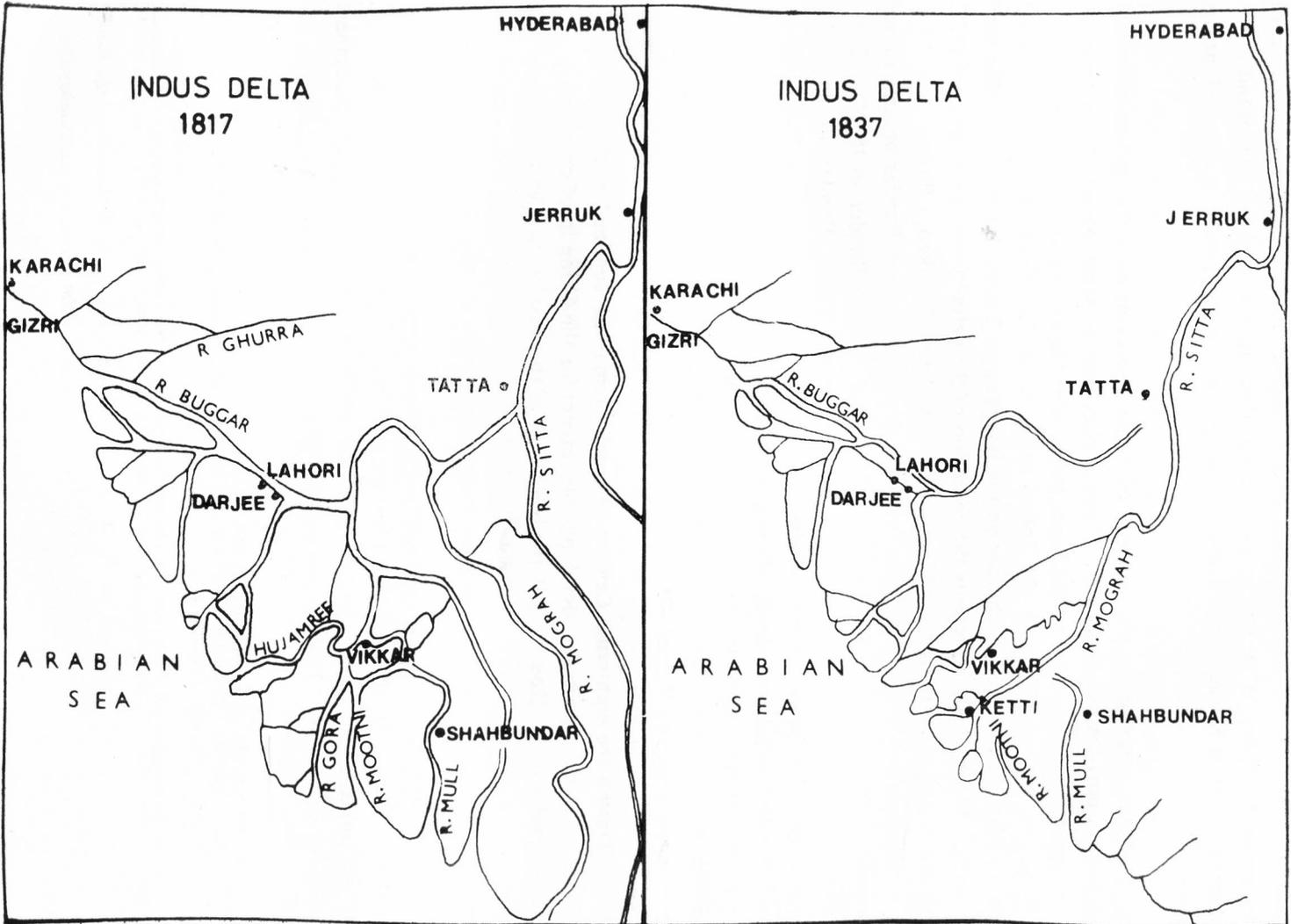


FIGURE 1

Sehwan,¹⁵ and the Talpurs Bukkar and Sukkar¹⁶. Although there is no evidence to prove it, there is a strong probability that as the trade of the inland towns declined, that of Karachi grew stronger and became more firmly established at its expense.

Some impetus to the growth of trade also came from the decline of several important port-towns of the Sind. Their decline was brought about by changes in the courses of the branches of the River Indus after the earthquake of 1819. Figure 4 (A) shows the condition of the Indus delta in 1817. Shah Bundar is situated on the Mul branch, Lohari Bundar on the Buggar and Vikkar Bundar of the Hujamri branch. Figure 4 (B) represents the condition of the delta twenty years later in 1837. All the branches except for the Mograh-Sita have been forsaken. Buggar and Mull are disconnected from the Indus and are drying up. Shah Bundar became ruined around 1820¹⁷, Lohari Bundar in 1828¹⁸, and Vikkar Bunder in 1839¹⁹. These ports had had considerable business as export depots. Vikkar Bundar in particular was a depot for the greater part of the foreign and internal commerce of Indus delta²⁰, and handled nearly two-thirds of the grain export of the Sind²¹. A great part of the trade of the above ports was probably transferred to Karachi. It is certain at least in the case of Shah Bundar that when the harbour was blocked up, many of the merchants moved to Karachi²².

During the eighteenth Century Karachi remained confined within its walls. There were no significant developments except for the filling in of open spaces with houses and shops. However, at the beginning of the nineteenth Century, there had occurred a few breaches in the walls which provided easy contact with outside and gave rise to the development of some straggling suburbs around the fort²³.

In 1839, Karachi was captured by the British army. But with an agreement with the rulers of the Sind the army did not interfere with the affairs of Karachi. It encamped about a mile and a half east of the town where a few permanent barracks were built. This was the birth of Karachi Cantonment.

¹⁵Burnes : *Op. cit.*, footnote 2, p. 251.

¹⁶S.P. Chablani : *Economic Conditions in Sind 1592—1843* (Calcuta, 1951), p. 59.

¹⁷Smyth : *Op. cit.*, footnote 6.

¹⁸*Ibid.*, p. 69.

¹⁹E. Thornton : *A Gazetteer of the countries adjacent to India on the north-west, including Sindh, Afghanistan, Beloochistan, the Punjab and the neighbouring states*, Vol. 2 (London : 1844), p. 419.

²⁰T. G. Carless : *Memoirs on the Delta of Indus : Selections from the Records of the Bombay Government*, No. 17, Part. 2 (Bombay : 1855), p. 429.

²¹J. F. Heddle : *Memoirs on the River Indus, Selections from Records of the Bombay Government*, No. 18, Part. 2 (Bombay : 1855), p. 429.

²²Hughes : *Op. cit.*, footnote 3, p. 414-5.

²³Thornton : *Op. cit.*, footnote 19, p. 419.

The fortifications as found by the British army were too dilapidated to be fit for defence. Most of the towers were mere heaps of earth and there were many breaches in the wall so large that the inhabitants used them as convenient places of 'ingress and egress.'²⁴

Like most of the Indian towns the settlement was very congested and excessively dirty²⁵ (Fig. 5). The streets were crooked and so narrow that two horses could barely pass each other in the principal thoroughfares²⁶. The narrow alleys through which nothing bulkier than a jackass could pass with ease, boasted no common sewer: drainage was managed by evaporation. Every inhabitant threw away in front of his dwellings what he did not want within; while the birds and the dogs were the only scavengers²⁷.

Almost every street was a bazaar. The bazaars contained the shops of wholesalers, retailers, carpenters, goldsmiths, potters, dyers and the offices and stores of importers and exporters²⁸. They were covered with matting overhead which prevented the free circulation of air, there prevailed 'a faint dead smell of drugs and spices as one might suppose to proceed from a newly made mummy'²⁹. It was often increased by the aroma of carrion in such a state that even the kites pronounced it rather too high to be pleasant³⁰.

The houses were built of mud mixed with a large quantity of chopped grass which was plastered over a framework of wood. Some were two or three storeys high but the majority did not exceed one storey. They were all flat roofed and fitted with *badgirs* or wind-catchers³¹.

As to the public buildings, there were none possessing any remarkable features³². Temples numbered thirty-one and the mosques twenty-one. In addition, there were a few schools. All of them were built of mud and were scattered haphazardly in the town.

The suburbs had become quite extensive. They occupied two areas, one on the west and the other on the east. The former was near the sea and was inhabited by fishermen and mariners. The latter was along the River Lyari and was inhabited by coolies and water-carriers³³. Both contained huts and hovels which were built

²⁴J. W. Winchester: "Some notes on Sindh", *Transactions of the Bombay Geographical Society* (September to May, 1844), p. 207.

²⁵J. M. B. Neill: *Recollections of four years of Service in East with the 40th Regiment* (London: 1845), p. 28.

²⁶T. G. Carless: "Memoirs on the Bay, Harbour and Trade of Kurrachee" *Selections from Records of Bombay Government*, No. 17, New Series, Part I (Bombay: 1855), p. 196.

²⁷R. F. Burton: *Sindh: or the Unhappy Valley* (London: 1851), p. 207.

²⁸Hart: *Op. cit.*, footnote 13.

²⁹Burton: *Op. cit.*, footnote 27, p. 30.

³⁰*Ibid.*

³¹Hart: *Op. cit.*, footnote 13, p. 211.

³²Baillie: *Op. cit.*, footnote 4, p. 34.

³³*Ibid.*, p. 212.

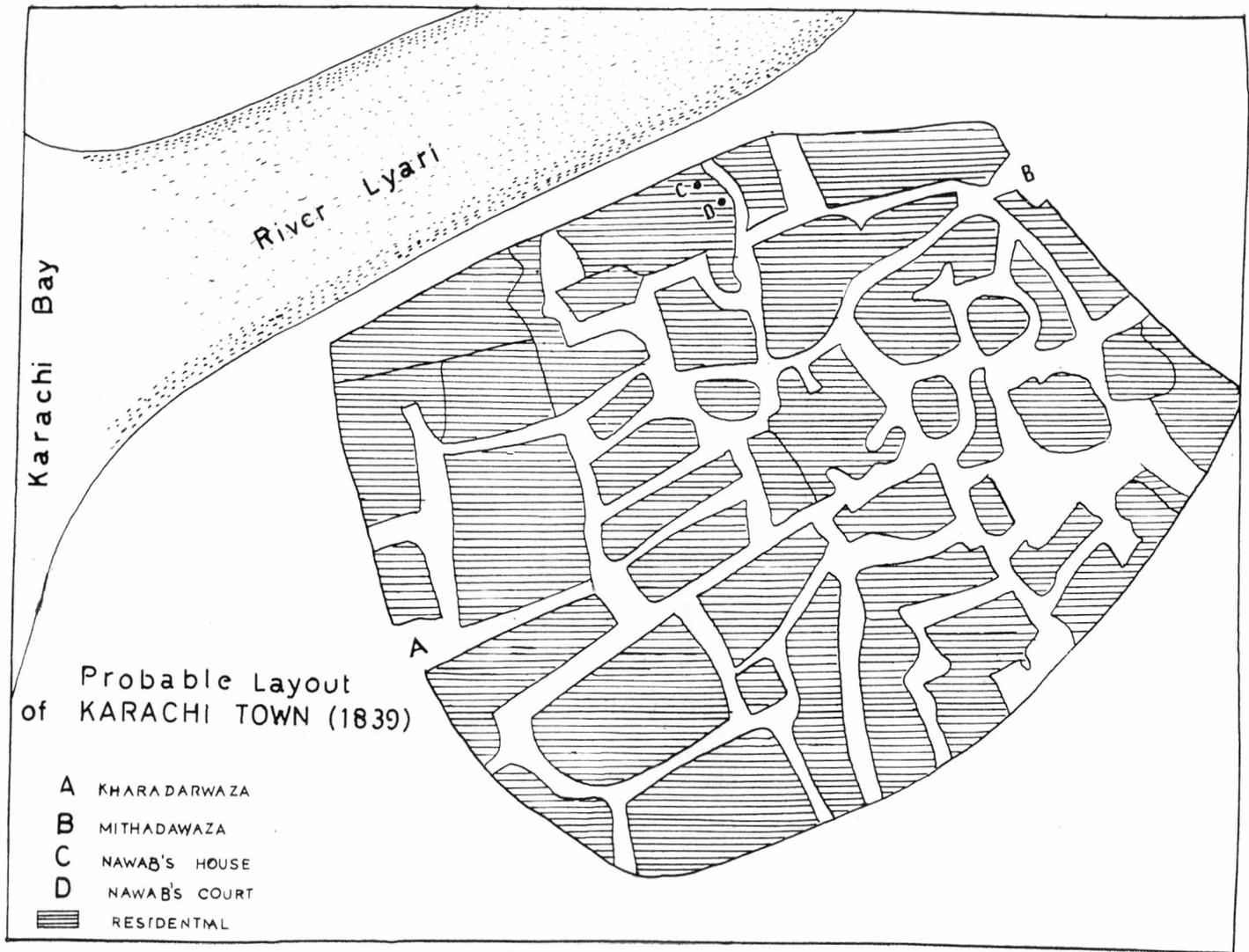


FIGURE 2

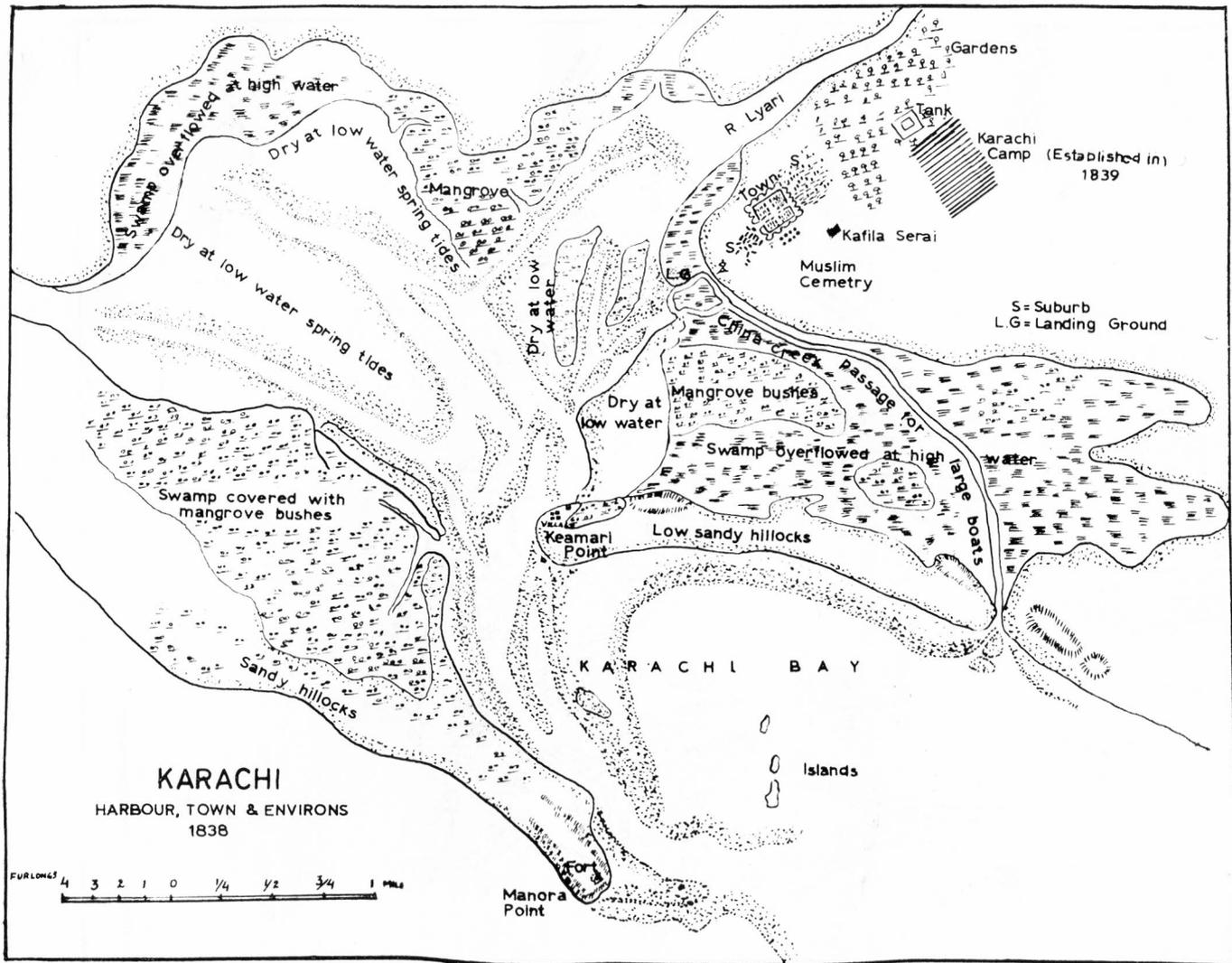


FIGURE 3

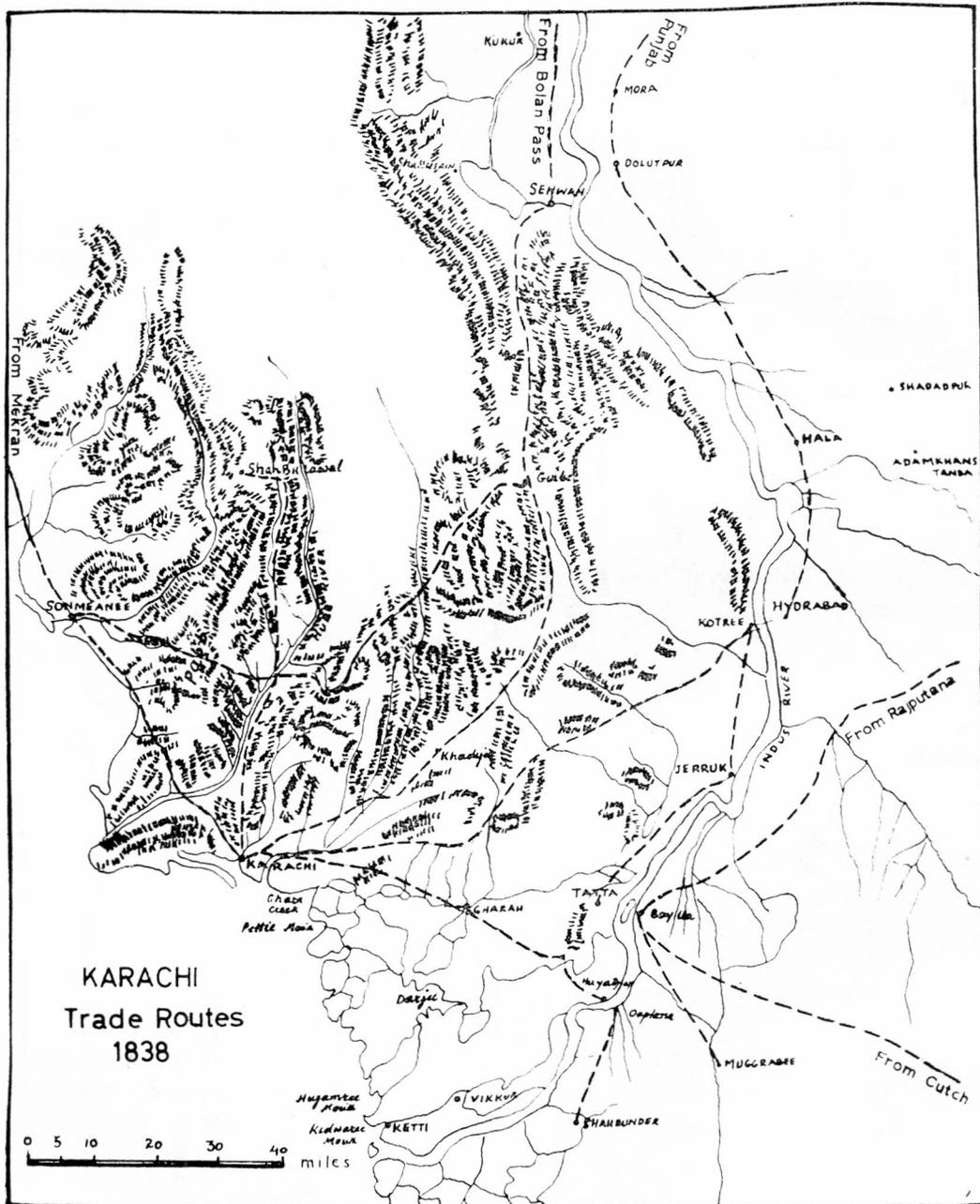


FIGURE 4

of mud and locally available *tarmish* and *thuar* bushes. Of the towns the total population of 14,000 nearly half lived in the suburbs.

To the south of the town where today stands the Sind Madrasah Building was situated a *Kafila Serai* or camping ground for caravans which used to come via the land routes from Sind, Rajputana and Afghanistan. The *Kafila Serai* covered a large open space in the centre of which stood a ramshackle inn. The location of the *Kafila Serai* outside the town was advantageous in two ways. It served as a protection against turbulent Afghans and facilitated the levying of duties on the merchandise which entered or left the town.³⁴

There was a Muslim cemetery by the southern wall and a mud pier in front of the western gate or Kharadar. On the pier stood the *Chabutra* or customs house, a building one storey high and raised upon five arches.

The harbour in front was little more than a safe anchorage for native craft. Boats drawing more than 10 or 12 feet of water could not enter it. There were mangrove swamps and mud flats all around (Fig. 6). There was no broad and deep channel to provide direct and easy approach to the pier. The boats were anchored first at the Keamari Point. Then at high tides the passengers and goods were brought on small *doongis* (boats) through a narrow channel to within three or four hundred yards of the landing place. From there the goods were carried through the mud to the dry land on the heads of coolies; and passengers either walked ashore or were carried pick-a-back, according to their means and social position.³⁵

Inland transport was also undeveloped. There was "not a single mile of bridge or metalled road, not a masonry bridge of any kind, in fact not five miles of any cleared road."³⁶ The *Kucha* (unmetalled road) tracks used by caravans passed through rocky hills and waterless plains (Fig. 7). They crossed over the seasonal streams and could only be used during the dry season. The wheeled carriage was practically unknown³⁷ and camels were used for long distance transport.³⁸

The same was true about inland water transport. The nearest branch of the Indus was several miles away from Karachi. Merchandise was first carried from the harbour by boats via Ghara Creek as far as Gharo from where it was carried on

³⁴Footnote 4.

³⁵*Op. cit.* M. P. Webb : *The Karachi Handbook and Directory for 1927-8* (Karachi : 1927), p 28.

³⁶Aitkin: *Op cit.*, footnote 5, p.38.

³⁷B. P. Delhoste: Report on the country between Kurrachee, Thatta, and, Sehwan, *Selections from the Records of the Bombay Government*, No.7, Part I (Bombay : 1855), p.265.

³⁸W. P Andrew : *The Indus and its Provinces : Their political and commercial importance* (London : 1857), p. 4.

camels to Jerruk on the Indus. There it was again loaded onto boats for various destinations.³⁹ The river currents were so strong that the passage of boats up-stream was incredibly slow and in places navigation was very difficult and dangerous. As a result the natives did not make much use of the Ghara Creek.⁴⁰

The undeveloped state of the transport systems severely limited the commercial activity of Karachi. The reports on the trade in 1838 furnished by Carless and Mart are interesting.⁴¹ The value of the total trade was Rs. 21,46,625. Imports amounted to Rs. 15,99,625 (74.8%) and exports to Rs. 5,47,000 (25.2%). Bombay, Malabar, Bengal, Muscat and the Persian Gulf were the main areas from which the goods were imported. From Bombay were imported china, silk cloth, cotton piece goods, cotton yarns, pepper, copper and ivory. The main items imported from Malabar and Bengal was sugar. From the Persian Gulf and Muscat were imported dates, pearls and slaves. The imported goods were mostly despatched to the Sind, Punjab, Kalat, Khorasan, and Afghanistan by land routes. As regards the exports, the main items were *ghee*, wool, saltpetre, hides, indigo, tobacco, opium and *lungi*, all brought from up-country and sent to Bombay, Muscat and Behrein.

The analysis of merchandise both incoming and outgoing shows : (1) That most of the merchandise passed through the port in transit to and from the interior area. (2) The merchandise consisted mostly of goods of high value and small bulk. (3) There was not a single item which originated in the port. (4) No goods were destined for processing or manufacturing within the town. Thus Karachi had neither any commerce of its own, nor any income producing activity. It only served as a depot for the exchange of merchandise. The town's economy could therefore afford very limited opportunities for development and expansion.

The same conditions prevailed until 1843, when the Sind was incorporated in British India and Karachi became the administrative headquarters of the province.

³⁹Baillie: *Op cit.*, footnote 4, p. 38

⁴⁰E. P. Delhoste: "Report on the routes leading from Kurrachee to Jerruk," *Selections from the Records of the Bombay Government*, No.17, Part 1, New Series (Bombay 1855), p.255.

⁴¹F. G. Carless ; *The Bay, Harbour, Trade of Karachi*, *op cit*, footnote 20, p.196. Hart : *op cit*, footnote 13.

THE PEOPLE OF CHITRAL : A SURVEY OF THEIR ETHNIC DIVERSITY*

ISRAR-UD-DIN

ONE of the interesting features of Chitral State is its ethnic variety. There are a number of ethnic groups, varying in their population size. Each of the ethnic groups has its own specific culture and way of life. They possess different history, speak different languages and practise different customs. It is, therefore, useful to attempt to describe the behavioural pattern of the various people living in Chitral State. Thus the purpose of this paper is to present a coherent description of the main cultural aspects of the people of Chitral.

KHOW : THE PREDOMINANT GROUP

The majority of the people of Chitral are called the Khow, who make a population of 96,118, including 48,641 Males and 47,477 Females.¹ In their customs, culture, language and other ways of life, the Khow are different from their Pathan neighbours on the south. They are, however, more related to the people inhabiting the valleys of Gilgit Agency, Azad Kashmir, because of their long historical contacts with them.

The Khow, to-day, extend as far as Gupis in Gilgit Agency. According to Biddulph, they used to spread over much larger areas than they occupy now. This he has presumed from the appearance of their name in the ancient 'Kophen' (Kabul River), the Choaspes (Kunar River), the Choas (the combined Swat and Panjkora River) etc.²

The language of the Khow is called 'Khowar' which is spoken nowhere else except in Chitral and by the Khow settlers in Gilgit Agency and certain parts of Pakistan. According to Professor Morgenstierne, "Khowar is an Indo-Aryan language of archaic type..... But it contains, apart from more recent borrowings from Persian, Aryan and Hindi, also loan words from the Pamir dialects, as well as a number of words of Middle Iranian origin. Some words are borrowed from, or shared with Burushaski and Shina, and several of the common words are of unknown origin."³

As far as the origin of the Khow is concerned, they can be divided into two groups ;

- 1) The Original Khow, and
- 2) The Later Immigrants who mixed with the Original Khow.

*The paper is a chapter from my M. Sc. Thesis : *A Social Geography of Chitral State* (London University of London, 1965). I am thankful to Professor Emrys Jones, who supervised my thesis.

¹Census of Pakistan, 1961, Census Report of Tribal Areas, Part II, pp.

²John Biddulph ; Tribes of the Hindu Kush ; Calcutta 1880, pp. 160-161.

³G. Morgenstierne ; Names, Languages and Tribes of Chitral, The Encyclopaedia of Islam (New Edition) ; Vol. 2, Fasciculus 23 (London : 1963), p. 31.

*Mr. Israr-ud-Din is Senior Lecturer in Geography, University of Peshawar, Peshawar.

The Original Khow

The Original Khow are of Aryan stock. In the ancient times the region between the Hindu Kush and the Himalayas, was inhabited by a people called 'Pisacha'⁴. They were later exterminated or driven out or absorbed by the invading Aryans who came about three thousand years ago from the northern passes of the Hindu Kush and occupied most of their territory between Nuristan (Former Kafirstan) in Afghanistan and Gilgit and Astor in Azad Kashmir. This area was thus occupied by a homogeneous race. But subsequently, as Biddulph suggests, the area was split into two parts "by a wedge of Khow invasion, representing members of a different, but related tribes coming from the north."⁵ Grierson agrees to the above suggestion and further adds that Khowar represents "the language of a later body of Dardic⁷ invaders, akin to the earlier ones".⁶ We are thus led to the conclusion that the Khow though came and settled in these valleys later than the first wave of Aryans, belonged to the same race. Whatever differences had occurred in them and in their language were because of their long contacts with the Ghalcha speaking people of the north, before crossing over into Chitral.

These people to-day, form the Original Khow of Chitral and consist of small families scattered in various parts of the state. The interesting thing about them is that their population, instead of increasing, is, to a certain extent, static. In none of the villages can more than four houses of the same family be found. The reason for this would be the circumstances in which they were put. They were subdued and subjugated by the different waves of immigrants and invaders, who not only treated them as their slaves but also seized their belongings, leaving them the bare minimum for sustenance. In such a condition, when a family grew in size, other members had to leave in search of a more reasonable livelihood in some other place, abandoning their properties to the ones remaining behind.

⁴Sir George A. Grierson : Linguistic Survey of India, Vol. VIII, Part II ; Calcutta 1919, p. 1.

⁵John Biddulph : Dialects of the Hindu Kush, Journal of R.A.S., London, Vol. XVII, 1885, pp. 133-1334.

⁶*Ibid*, Tribes of the Hindu Kush, pp. 157-61 ; and G.A. Grierson ; *op. cit*, pp. 7-11.

⁷In ancient Sanskrit, Greek and Roman literatures the word 'Dard' has been used for the people inhabiting the whole mountain tract between the Hindu Kush and the frontiers of India. Accordingly, the tract is called 'Dardistan' and the languages spoken in the area are generally grouped under 'Dard Group' of Indo-Aryan languages. The present people are also, sometimes, referred to as 'Dard'. (J. Biddulph ; Tribes of the Hindu Kush, p. 155 ; and G.A. Grierson ; *op. cit*. pp. 1-2).

The Immigrants

These include those who came to Chitral in different decades as refugees from the surrounding countries of Badakhshan, Wakhan, Russian and Chinese Turkistan, Gilgit Agency, Dir and Swat states of Pakistan and parts of Afghanistan. Many also came as invaders or as followers or scions of the ruling class, who were at first "..... adventitious and sporadic squatters but they made themselves at home subduing, dispossessing and oppressing the existing primitive stock"⁸.

These clans and families who came later in spite of their different origins and backgrounds, absorbed themselves into the Original Khow by living in the same villages, intermarriages, adapting Khowar language, Khow customs and other ways of life. The hostile surrounding conditions helped towards this development a great deal by creating a common purpose of defence for these different elements. In later years Islam, which they all had embraced, played an important role as a unifying factor. Thus these people, having ethnologically and historically different backgrounds and consisting of about two hundred different clans and families are one people today and all called the Khow.

Characteristics

The Khow are described as dolicho-cephalic to meso-cephalic, of middle height, fair complexion and well built⁹. The family organization is based on a patrilocal and patrilineal basis. An average family is made up of seven members which include father, mother, sons, their wives and children. In the case of upper class families, the household members reach thirty or more which include father, mother, (or mothers) sons, their wives and children and servants and their families.

The father is the head of the family and the mother plays a role of 'home minister' and is in charge of all the domestic affairs. The division of labour according to sex and age is as follows.

Men are responsible for all agricultural work (except weeding, which is done by women), storing fuel wood, fodder, looking after goats and sheep, marketing, yarning and weaving and other manual work. The women do domestic work such as looking after children, preparing meals, cleaning the house, etc. They also look after the cows and prepare dairy products and help their men in certain agricultural work *e.g.* watering, weeding, harvesting and threshing. They sew and embroider, which count as important qualifications for a woman. They also help in weeding.

⁸R. C. F. Schomberg : *Kafirs Glaciers or Travels in Chitral* (London ; Martin, Hopkinson, 1938), pp. 209-210.

⁹G. Morgenstierne : *Op cit.*, footnote, p. 31.

The children in this and all other small tribes, to be mentioned later, work after the age of seven by helping their parents in the fields by taking meals to them or grazing kids or cattle, scaring away birds, and watering the fields.

The most notable characteristic of the Khow is their cheerfulness, fondness of rejoicing and merry-making. They are also good polo players, and keen sportsmen. Though certain writers have described them as "prone to cold-blooded cruelty,..... traitors",¹⁰ and ".....lazy.....",¹¹ but the conditions prevailing now do not support these accusations. They are, on the other hand, very hard working and peaceful minded people. The Khow women are experts in certain handicrafts such as embroidery works and weaving woollen materials. Unfortunately, due to lack of patronage, these fabrics are not yet presented to the world outside Pakistan and so the Khow women have so far failed to get their due credit.

There are other tribes, though small in number as well.

Considering the population, the number of small tribes in Chitral is very high. They are ten in number and make a population of 16,726, including 8,840 Males and 7,580 Females. These tribes have immigrated from different surrounding countries of Chitral and have settled in various parts of the country. They speak their own languages and, to a certain extent, observe their own customs. Though all of them, except the Kalash, are Muslims and there is a great deal of mixing and intercourse between them and the Khow, still they have preserved their identity. These tribes are :

1. The Kalash, 2. The Bashgali, 3. The Gowari, 4. The Damali, 5. The Dangarike, 6. The Pathans, 7. The Gojar, 8. The Wokhi, 9. The Badakhshi or Madaklashti, and 10. The Mundiji.

THE KALASH

This tribe which comprises of about 2,500 souls, inhabits the three side valleys of south western Chitral, which are called Rumboor, Bumburat and Birir. The Kalash are pagans (in their beliefs), primitive in their ways of life and unique in their customs and traditions. They have, strangely enough, succeeded in maintaining their old beliefs and culture in the face of increasing influence of Islam and centuries of domination by alien races. Not only that, they have also been successful in preserving "... the original characteristics of their race"¹² in pure form.

¹⁰Sir G. Robertson : *Story of a Minor Siege* (London : 1896), pp. 9-10.

¹¹Schomberg : *Op. cit.*, p. 220.

¹²B. S. Guha : "Racial Affinities of the people of India", *Census of India, 1931*, Vol. 1, part 3, p. xxi.

Origin

It has now been confirmed through traditions that the Kalash are immigrants but the actual place of their emigration is in obscurity. They themselves claim to have come from a place called Tsiyam, but it is not certain whether by this they mean the country of Thailand which used to be called by that name, or Syria which is also named Sham. However, in the light of certain Kalash festival songs, which describe places of battles between them and the then inhabitants of Chitral, Siiger has been able to trace their route along the River Chitral down to a place called Waigal which is situated in Afghanistan. But in Prof. Morgenstierne's opinion; Tsiyam is situated still further south, but, he also points out that ".....Kalash only stayed for a few generations in Waigal....."¹³ Beyond this no information could be obtained. Thus so far we are only able to conclude that the habitation of the Kalash was round about the area between the Lower Bashgal valley and Chagan Sarai (in Afghanistan) before their arrival in Chitral.

Emigration

During the eleventh century of the present era, Sabughtagin and his son Mahmed of Gazni, the Kings of Kabul, were waging wars against the infidel tribes in the region of Jalalabad and Lughman¹⁴. Those tribes who are now inhabitants of Nuristan (which was formerly called Kafirstan and the people Red Kafirs) in Afghanistan, could not stand these attacks and so had to retreat, pushing back the tribes inhabiting the upper valleys between Lughman and Lower Bashgal. The Kalash who lived in this area could not face the invading tribes and so in their turn invaded the lower parts of Chitral which they occupied as far as the villages of Baranis or Roshun (about thirty miles above Chitral Town). They remained rulers of this part of Chitral for about three hundred years, when in 1320 A.D. they were defeated and subjugated by the Khow who had by then accepted Islam¹⁵.

With the passage of time, the Kalash who remained in the main valley with the Muslim Khow, were greatly influenced by them and so accepted their religion and adopted their customs and language. On the other hand, the Kalash who lived in these valleys and those who later retreated to these areas, were, to a certain extent due to their seclusion and mainly because of the tolerant character of their neighbours, able to continue their old practices. They enjoyed every freedom under the Muslim rulers and remained totally unmolested in their corners. In their turn, they only paid certain special taxes or performed *corvee* as those in the other tribes who belonged to the lower classes, till the reforms in 1953.

¹³Siiger, H: *Ethnological Research in Chitral, Sikkim and Assam*: 1956, p. 34.

¹⁴Downes, E: *Kafirstan*, Lahore, 1873, p. 6.

¹⁵Murtaza, Mirza Ghulam: *Op. cit*, p. 29.

Characteristics

The Kalash are described as Proto Nordic type¹⁶: "The inter-relationship between the Khow and Kalash race is", according to Guha, "very remote". In complexion they are fair but generally darker than the Khow and the Bashgali tribes¹⁷.

The religion of the Kalash is a mixture of idolatory and ancestor worship. They have numerous gods and goddesses who are worshipped by singing hymns, sacrificing goats according to fixed rituals and by spectacular dances in which both men and women take part. Fairies, demons and ghosts of ancestors are also conciliated in similar manner. They also believe in paradise and hell, and consider charity the best way to happiness.

An average Kalash family is the same as in the case of the Khow. Division of labour according to sex is, however, different from the other tribes. In this case men are responsible for looking after animals, preparing dairy products, farming and other outdoor work such as marketing or manual work. Women's duties are bringing in fire-wood, grinding grain, weaving woollen cloth, certain agricultural work, *i.e.*, weeding and watering, looking after children and other domestic work done by Khow women.

The position of women is definitely low as is obvious in many ways. They are not allowed to visit most of the shrines and sanctuaries. They are also forbidden to go to the goat-houses and cannot milk goats and sheep. Women are not even allowed to put their feet between the hearth and the back wall where domestic utensils are kept. They must wash their hands in running water and then stretch to get what they need. If ever by mistake a woman puts her foot in the enclosure then all the articles must be destroyed. Pure and sacred quality is, according to them, ascribed to these places and to guard them from pollution such precautions are taken.

Moreover, women are segregated during their monthly periods and during child-birth. They retire to a house called 'Bashalani' or women's house during these days and confine themselves for seven days in the first case and for forty days in the latter. They are strictly forbidden to do any work during these days or to come out of these houses. No man can pass by these houses which with their surroundings are thought to be impure, and if someone by mistake passes by, he has to offer a sacrifice to make himself pure.

These women are very industrious. They always seem to be doing some job or other. The Kalash men are thought to be good masons, though unfortunately they do not take much advantage of this, and skilful channel builders. They are also,

¹⁶B. S. Guha : Races of Northern India.

¹⁷Guha: Racial affinities of the people of India, Census of India, 1931, part III, p. xxi.

though uneducated and totally illiterate, a very intelligent folk. They are also well known for their cheerfulness, wit and generosity. They are fond of dancing and merry making and love their old religion and customs very much. As a suppressed people they are humble in their demeanour, but also friendly.

Their dress is also different from the other tribes. Men wear grey woollen trousers and a black-brown poncho called '*bore*' with a small woollen cap. The women wear black gowns called '*sangach*', with a belt at the waist. The most interesting part of the dress is the head-gear, hanging down the back to the waist, decorated with hundreds of shells and petty trinkets and is called '*kopes*'. The language spoken by the Kalash is called '*Kalasha*' or Kalashwar.

THE BASHGALI

The Bashgalis or Shiekhan as they are called by the other Chitrali, live in different parts of Chitral such as: Gabor in the Northern part, Rumboor and Bumborate in North-Western, and Langur-bat in Southern Chitral. Their total number is approximately 2,000.

The Bashgalis are the descendants of those immigrants who were formerly pagans in their beliefs and lived in the Nuristan valleys of Afghanistan. They have been called Red Kafirs by the foreign writers to distinguish them from the Kalash who are also termed Black Kafirs, and the area was named Kafiristan. Their immigration took place in the last decade of the nineteenth century when the forceful conversion of this community was going on under the Amir of Afghanistan. In consequence most of them were converted to Islam but these people took refuge in Chitral and settled in the areas mentioned. They had been practising their old religion until the 1920s after that all of them voluntarily embraced Islam.

The Bashgalis are different from other Chitralis not only in their language, which is called Bashgaliwar, but also in many other respects. An average family is made up of fifteen members which includes father, mother (usually more than one), sons, their wives, children and grand-children. The different generations continue to live together, whereas, in the other tribes the families split up after the death of the father or after the third generation.

Division of labour is quite unique. For example, the duties of women include not only the domestic work but also all the agricultural work. They are practically household slaves and their life is one of incessant labour and trouble. They also do all carrying except such very heaviest which are left for men. Men only plough, in which also a woman's help is needed to steer the ox in ploughing. Men's job is threshing corn, looking after livestock and preparing dairy products.

As is obvious from the above, the women are industrious and work incessantly. That is why the whole economy of the Bashgalis depends on them and those who have much land marry more than one wife. Every wife's share of work and house is separate and the husband stays with them in turn and enjoys their 'hospitality'. The women are wonderfully helpful and kind among themselves and love their husbands devotedly. The men are lazy parasites and pass most of the time chatting. Once they were thought to be the best bowmen in these regions and now that is no more. Their favourite pastime in winter is snow hockey which they play with great zeal and enthusiasm.

THE GOWARI OR ARANDUI

These people, who make a population of about 800, inhabit the southernmost vilage of Chitral called Arandu which is situated, on the border of Afghanistan. They are further divided into three groups according to their place of origin :

- 1) The Suniardari,
- 2) The Sultana, and
- 3) The Afghani or Swati.

The first group, Suniardari, immigrated from the Asmar area of Afghanistan and claims to have settled here more than five hundred years ago. The second group also came to settle here from Jalal Abad in Afghanistan about seven generations back. The third one, according to tradition, emigrated from Dir-Swat area in Pakistan twenty generations ago. Later they split into two branches and one of them went further north to settle in the Damil valley.

According to Prof. Morgenstierne's informant, the third group had "..... immigrated from Gabar in Bajaur (Dir) in the time of Sultan Azdar Ali, sixteen generations ago. His four sons were expelled by the Pathans, and one of them conquered Arandu from the Cafirs and settled there....." Further, Prof. Morgenstierne suggests that..... a Sultan Haider Ali is mentioned by Babur and if we allow thirty years for each generation sixteen generations would carry us back to A.C.1450, about the time of this prince and of the Pathan conquest of Swat and Bajaur (Dir). The tradition does, therefore, contain a nucleus of truth, and it is quite possible that another brother went further north to Damil.....¹⁸

All these three groups are now intermingled and speak the same language called 'Gowar-bati' or 'Arandui-war'.

¹⁸Morgenstierne, G. : Gowaribati Oslo 1950, pp.5-6.

The ways of living of the Gowari are very backward compared with the Khow. Human beings and cattle live under the same roof. They are also unfriendly to each other and the most troublesome people in the whole state. Killing each other and stealing each other's property is their day to day practice, so every one lives in insecurity. That is why every precaution is made to safeguard the houses by building high boundary walls around. The houses also have no windows or ventilators except one small hole of six inches diameter in the roof which serves the purpose of letting in light and letting out smoke.

The causes of all this could be traced as follows :

First of all, the settlements of other tribes such as the Gujars and the Pathans who are recent settlers in this area cannot get along with each other. Also new fugitives from Afghanistan who come frequently, make the situation worse as they have to depend mainly on stealing. Old feuds and enmities continue for the generations and the methods of vengeance used are killing or stealing.

The international border line which separates not only the same village, but also the same families and old enemies, plays an important role in this regard. For example, nothing is easier than to kill one's enemy and slip across the border where he would have no fear of law to condemn him.

An average family includes five members, which is composed of father, mother and children. In division of labour they do the same as the Khow, but the only difference is that they have 'gobana' system to look after the stock. For example, a man is employed by the whole village for this purpose for only two months in a year when other villagers are busy with other agricultural work. In the case of the Khow one member of the family is assigned the duty of looking after the stock.

THE DAMALI

These people make a population of approximately 1,500 and inhabit the valley called Damal which is situated about twenty miles north of Arandu on the left bank of the Chitral river. According to their origin, these people are grouped into :

a) The Shintari, and b) Swatis or Afghanis.

The two groups have by adopting the same language and customs and by intermarriages, become mixed and call themselves Damalis after the valley in which they live.

The Shintari claim to be the original or rather the earlier inhabitants of this area. Though not much anthropological research has so far been done on these people, the linguistic investigations by Prof. Morgenstierne give much food for thought. This shows that "the lexological accordances of Damia (language of the

Damalis) with Khowar (language of the Khow) and Gowar-bati (language of Gowaris) are relatively few, while these connecting it with Kalasha, and other Kafir languages are more numerous. "He further points out the importances of Kafir languages sub-, super-, and adstratum in this language and suggests that "... at least to some extent it (Damia) seems to belong to a form of Kafir" language different from those which exist now. He also puts forward the hypothesis that "this unknown language is the one once spoken by Jashis. At any rate, the morphological structure of Damia shows that it must have existed as a separate language for a considerable period."¹⁹

The Jashis lived in the upper reaches of the Bashgal and in other valleys before the arrival of the present inhabitants of those areas. After the present inhabitants invaded those valleys, as mentioned earlier, in the 11th century A.D., they subdued and enslaved the Jashis. It is tempting to suggest that this group could be fugitives from those people and retired to this secluded valley. The fact that friendly relations between this group and the Kalash, who were also fugitives and occupied most of the part in Southern Chitral, gives support to this idea.

The second group, *i.e.*, the Swatis or Afghanis, are a branch of Gowaris, as mentioned earlier, and had settled in this valley. They have now mixed with the previous group.

These people live in scattered houses and only in summer which they spend in upper pastures with their livestock they live in groups. Thus the opportunities of getting together are very few and only on the occasions such as marriages, births and deaths, or during religious festivals. But their relations with one another are, compared with the Gowaris, very friendly and co-operative. They are very backward in education and take no interest in it. Instead of sending their children to the school they rather prefer them to look after the animals. A family generally consists of four members.

THE DANGARIK

It was about six generations ago that these people came and settled in the Ashrat valley. Later they spread to the surrounding valleys of Beori and today they are a population of about 2,500.

The place from which they emigrated is thought to be Chilas in Azad Kashmir. They still speak same old language, Phalura or Dangarik-war, which is the language in Chilas, though it has now a number of innovations "due to the influence of these surrounding languages."²⁰

¹⁹Morgenstierne : Notes on Damali (Oslo 1940), pp.146-8.

²⁰Morgenstierne : Phalura (Oslo 1941), p.8.

THE PATHAN

The Pathans have immigrated from Dir, Swat (in Pakistan) and other parts of Afghanistan during the last hundred years. They came here as fugitives due to family troubles, or as traders or as state servants, and then settled. Now they inhabit different parts of the country but their main concentration is in Drosh, Chitral and Mustuj. Besides, they are found in Rashun, Petch Ute (Lut Kuh), Arandu and Damal.

They make population of about 3,000 and all speak Pashtu. More than 85 per cent of them are engaged in trade and control eighty per cent of the state's whole trade.

They are very co-operative and helpful towards each other and try best to dominate the rest of the population commercially. Though they live in the same village as the Khow they mainly keep to themselves. They also practise marriages among themselves and mainly avoid having close relations especially with the common Khow.

Their family structure is based on conjugal bases, except those whose mainstay is agriculture and who are consanguine, patrilocal type as other Khow. Thus their family includes four members on average, which consists of father, mother and children.

THE GOJAR

The Gojar are originally from Dir, Swat and Hazara Kohistan in Pakistan and have spread in the different parts of Southern Chitral during the last fifty years. Their main concentration is in the Shishi Kuh valley and they are also found in Damal and Arandu valleys. Main occupation of the Gojar is stock raising. As they do not have their own lands and pastures, so they have to take lands and pastures belonging to others, on lease. Except those who are settled in this way, the rest move with animals in search of pastures from place to place according to the seasons of the year. Due to this nomadic and scattered way of life they have no social organization. Their total population, according to the 1961 census report, is 2,910.

THE WOKHI

These people live in the neighbourhood of glaciers on the north-eastern most part of Chitral, called Baroghil. They make a population of about 450.

The Wokhi are immigrants from Wokhan in Afghanistan but there are also two families who have immigrated from Russian and Chinese Turkistan and called Kirgiz and Sirquli, respectively. These two, though, have their own languages, which are Turkish and Tajik but the common language of all is Wokhi (language of the Wokhis).

Baraghil was used as summer pasture before, but during the last fifty years these people have been able to bring so many acres of land under the plough with their hard work and so have started living permanently. Their main occupation is stock raising.

They live in scattered houses and only in the four months of summer they get the opportunity of getting together in the summer quarters. A family is composed of eight members in average, which include father, mother, brother, sister-in-law and children. The elder brother is head of the family. The Wokhis are pleasant and friendly folk and fond of dancing and singing. According to Schomberg, "They seldom speak the truth, because under the conditions of their lives it does not pay to do so. 'Don't quote me' is as much a Wokhi proverb as a Whitehall one. The Wokhi live in one country and have relations in others, so they have to be circumspect. As they cannot learn to hold their tongues, they protect themselves by telling lies."²¹

BADAKHSHIS OR MADAKLASHTI

These people live in Madaklasht village of Shishi Koh valley. Originally they belonged to Badakhshan in Afghanistan and came to Chitral about two hundred years ago. It is said that they were ironmongers and were invited by the then ruler of Chitral to make guns for his army. Their total population is now about 1,400. There is not much difference between them and the Khow, but their language, which is old Persian. Their favourite sport in winter is skiing.

YADGHA

They inhabit the village called Parabeck in the Lot-Kuh Valley. They are immigrants from Badakhshan in Afghanistan. There is nothing much to say as the Yadgha people have adopted all the ways of life of the Khow. The only thing they have so far preserved is their language. There are about five hundred of them.

RELIGIOUS GROUPS

The above tribes form three religious groups: Sunni Muslims, Ismailia Muslims and 'Kafir' or Pagan. The Kalash are as has been mentioned, a Pagan tribe. The small tribes, except the Madaklashti or Badakhshi, and more than two thirds of the Khow belong to the Sunni sect of Islam, while the remainder are Ismaili. The Ismaili inhabit mainly the valleys of the north-east and north-west, while the Sunni Muslims dominate the north-central valleys and the valleys of the lower parts of Chitral. The Kalash inhabit some of the western valleys.

²¹Schomberg : *Op. cit.*, pp. 257-8.

Islam was first introduced into Chitral through the northern passes of Baroghil and Dorah, by the invaders and other immigrants coming from Badakhshan and Turkistan and other parts. Most of these areas professed, and still profess, the Ismailia sect of Islam. Islam did not, however, enter the Kalash occupied region of the south until the thirteenth century conquest. Thereafter the southern valleys were not only open to settlers from the north but also to immigrants mainly Sunni Muslims, from the south. Later the establishment of the present Sunni ruling family also helped the religion to spread northwards. The Sunni concentration in Mulikhow and Torikhow tehsils is also ascribed to the missionary activities of a famous Afghan divine, Mulla-i-Room, in the sixteen century.

Those of the Kalash who lived in the main valleys of the south have been influenced by their Muslim neighbours and have slowly accepted their religion (Sunnism). On the other hand those who lived in the secluded valleys have been able to continue their old practices without being molested or influenced by the others.

FARM SIZE-CROP RELATIONSHIP IN WEST PAKISTAN

K.U. KURESHY AND M.K. ELAHI

IN this paper an attempt has been made to relate the cropping pattern¹ in West Pakistan with the various farm-size classes.² The data processed for the purpose have been taken entirely from the Agricultural Census of Pakistan, 1960, Vols I-III.

The general farming pattern has been recorded in Fig. 1. For this purpose the cultivated area in each district has been represented in squares, the area of the square being equal to the total cultivated area in each district, adjusted to the scale of the map. The proportion of area in each of the various size classes of farms has been shown in different columns. Auxiliary information relating to the ratio of fragmented, manured and double cropped area in each size class has been shown respectively in Figures 1, 2 and 3.

Distribution of four major crops, wheat, rice, sugarcane and cotton, has been studied for the purpose of establishing farm size-crop relationship. The proportion of area of a crop in different size class farms to the total acreage of that crop in each *tehsil* has been calculated. For each crop a distributional map showing these ratios has been prepared. In areas where sixty-six per cent³ or more of any crop acreage is shared by a given size class farms, it is designated, according to the class, as predominantly small, or predominantly medium or predominantly large. In areas where the crop ratio on any one size class farm is between thirty-three to sixty-six per cent of the total acreage of that crop in the unit area and a lower proportion of acreage on the

¹The cropping pattern in West Pakistan, worked out in a separate paper by the present writers has been reckoned on the triple criteria of :

- (i) The percentage of acreage under a crop to total cropped area by *tehsils*
- (ii) The ratio of acreage under a crop in a *tehsil* to total acreage of that crop in West Pakistan
- (iii) Yield per acre.

The values obtained on the basis of each criterion for each crop by *tehsils* have been ranked and the ranking coefficient calculated by dividing the total value of ranks by the number of criteria, viz. 3. For individual crops these values have been grouped in quintiles. For showing relationship of farm size with the cropping pattern dominant areas under that crop have been shown in the inset of the farm size map.

²Farm is the aggregate area of land operated by one person alone or with the assistance of others, without regard to location, size or title and used wholly or partly for agricultural production.

The Agricultural Census recognises the following farm size classes :

Small.....	1 acre and under—under 5 acres
Medium.....	5 acres—under 25 acres
Large.....	25 acres—150 acres and over.

³The selection of sixty-six per cent and thirty-three per cent and less than thirty-three per cent as the basis for three major divisions is made in view of the three major categories of farm size small, medium and large as adopted by the 1960 Agricultural Census.

*DR. KURESHY is Professor and Head of the Department of Geography, University of the Punjab, and DR. MISS ELAHI is Reader in the same Department.

next less important size class farm, are shown as mixed categories. The index of each map thus carries nine categories (Figs. 4-7). On these farm size-crop relationship maps dominant areas⁴ of each crop have also been marked in the inset maps. Areas for which *tehsil* wise figures are not available are left unrepresented.

GENERAL PATTERN OF FARMS

The cultivated area in West Pakistan is distributed over some 4.8 million farms of various sizes, varying from under 1 acre to over 150 acres. Since the number of the small size farms is about fifty per cent and the area only eleven per cent, it bears upon the average size of the cultivated farms so as to reduce it only to 7.7 acres. Majority of the farms, upto sixty per cent, are fragmented⁴ into four or five parts often widely dispersed over the village land. The total fragmented farm area is as high as eighty per cent of the cultivated land. The ratio of fragmented area invariably increases with the increasing size of the farms.

The overall distribution of cultivated area into the three size classes of farms shows that the largest proportion of the cultivated area, about fifty-four per cent, is occupied by the medium size farms and of this the largest ratio of about twenty-nine per cent is in farms of 12.5 to under 25 acres. The large farms of above 25 acres occupy thirty-five per cent of the cultivated area while the least area, eleven per cent, is shared by the small size farms. The farms of under 1 acre account for only one per cent of the total cultivated area.

Ratio of net sown area to the total is generally higher in the canal irrigated areas of upper Indus Plain and the sub-montane districts in the north and the *Derajat*⁵. It is lower in the canal irrigated areas of lower Indus Plain and lowest in western hill areas and the Baluchistan plateau.

Fragmentation of farms is extensive all over the area of study. It is in direct proportion to the size-class of farms.

Manuring is highly limited. It is in indirect proportion to the size-class.

Double cropping is limited. It is also in indirect proportion to the size-class.

Small Size Farms

Generally speaking the proportion of area in small size farms decreases from north and north east to south west (Figs. 1, 2, 3). The distribution by districts shows that nowhere the area in small farms exceeds thirty-eight per cent. In the mountainous and sub-montane areas in Hazara, Peshawar and Mardan, Potwar districts of Rawal-

⁴According to the 1960-Agricultural Census "Fragment is a piece of land forming part of a farm. Where a farm is split into pieces not linked with one another in any manner, each piece would constitute a fragment."

⁵The area between the Sulaiman Range and Indus in the districts of Dera Ismail Khan and Dera Ghazi Khan.

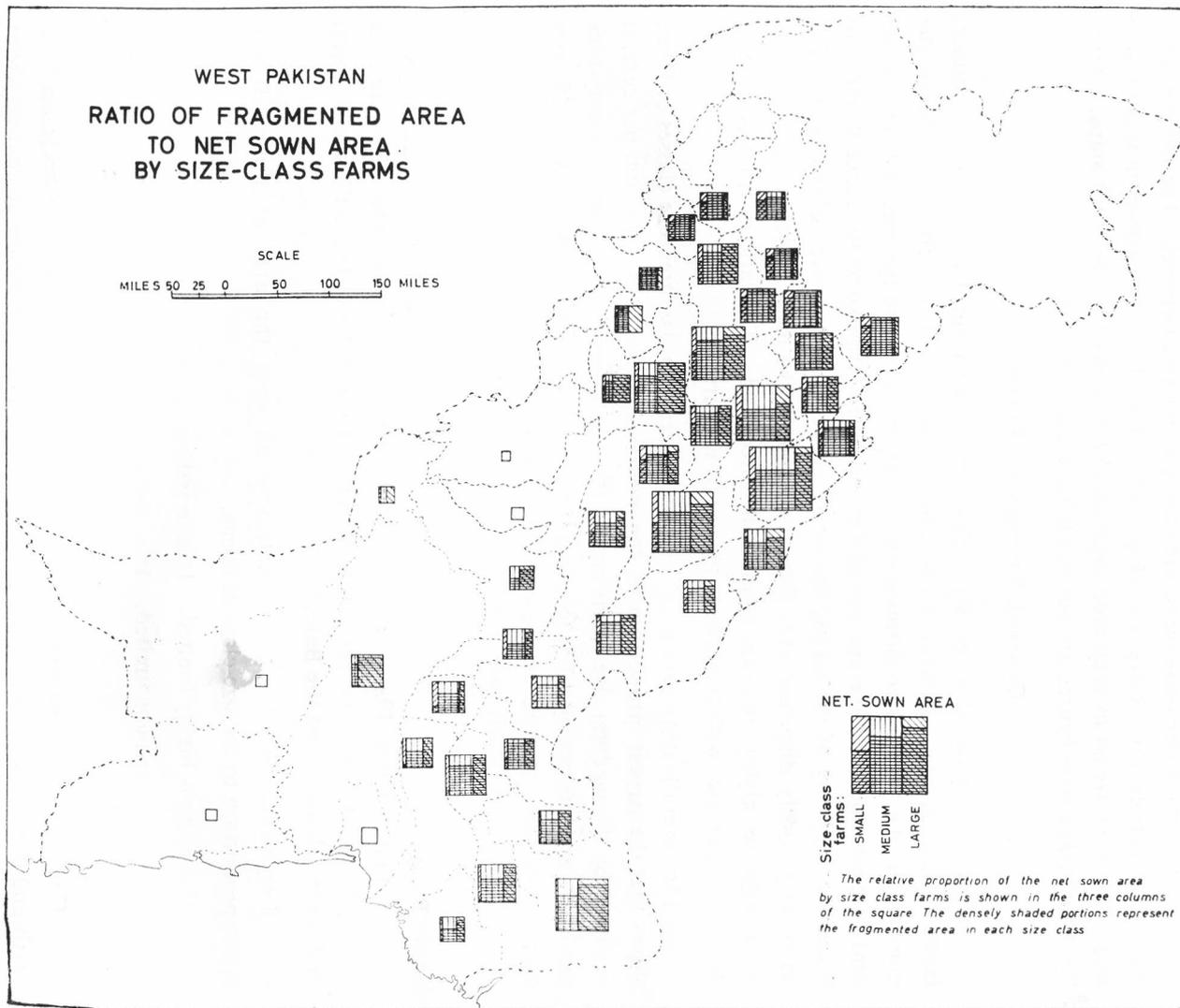


FIGURE 1

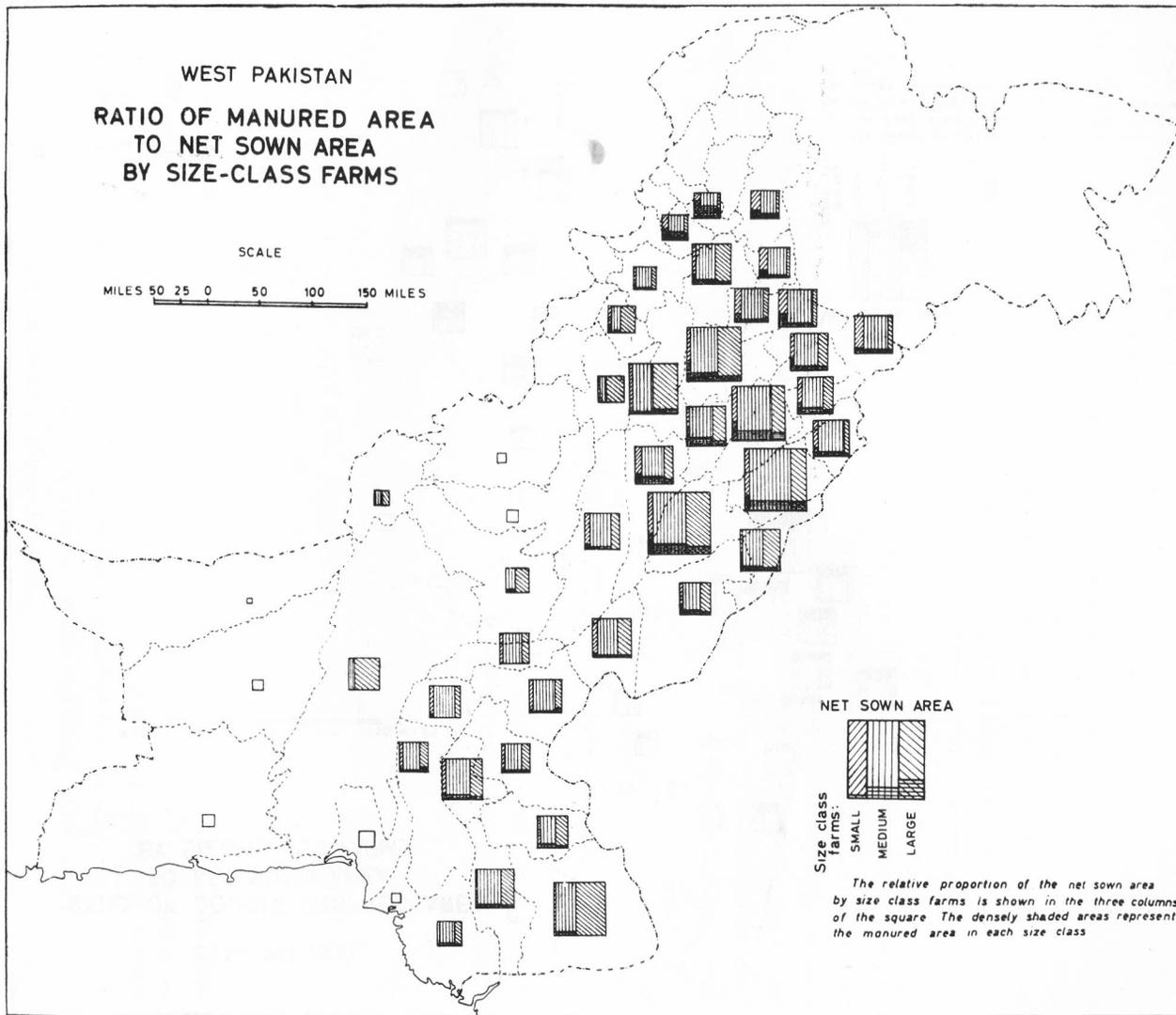


FIGURE 2

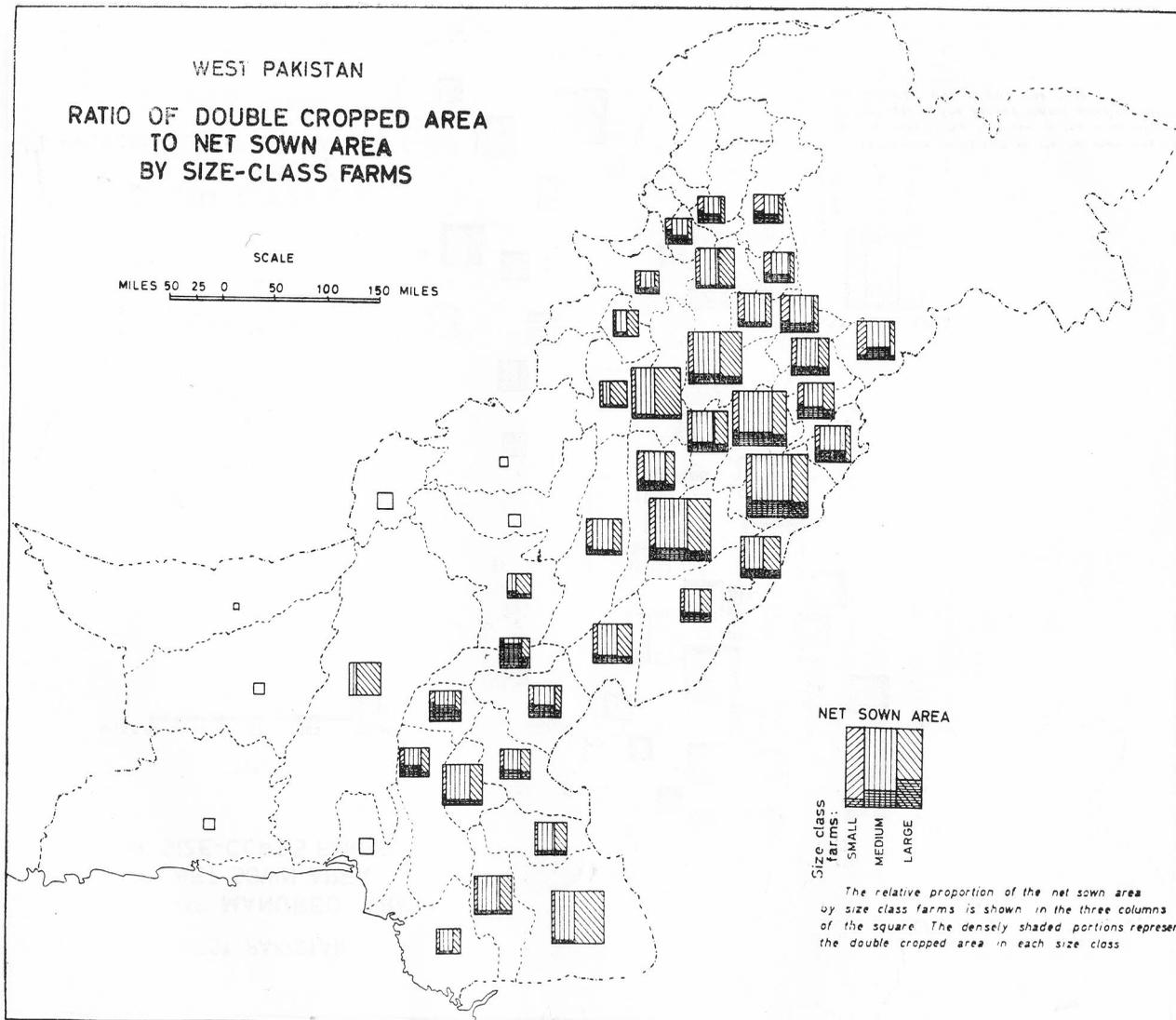


FIGURE 3

pindi and Jhelum, submontane districts of Gujrat and Sialkot, the area in small farms is higher than in other parts of the country, mostly remaining above twenty per cent the highest being thirty-eight per cent in Hazara and thirty-one per cent in Murree. Further details reveal that the *tehsils* of Abbottabad, Murree and Kahuta have fifty-three, fifty two and forty per cent of the farm area in small size farms respectively. Rough terrain, in spite of higher rainfall, limits the availability of large tracts of level land in general. Most of the northern highlands are covered with forests and grasses with cultivated areas generally along the valley flats and lower slopes. Over the Potwar the ravine cut land offers patchy cultivation except in few sizeable plains. The submontane districts of Gujrat and Sialkot have their eastern portions in the foot-hill zone of Siwaliks, badly eroded and strewn with *nallas*. In these old settled areas the high fertility of land and pastoral activities as a supplementary source of income help to support a large population over small farms. The hilliest and roughest parts in this humid and subhumid zone have larger proportion of small size farms.

In the upper Indus Plain the proportion of land in small farms varies from four per cent in Bahawalnagar to seventeen per cent in Muzaffargarh. Only few areas like *tehsil* Kasur of Lahore, Alipur of Muzaffargarh, D.G. Khan and Ahmadpur East of Bahawalpur show higher proportions. This region is irrigated by canal water and the greater part of it is formed of the newly settled canal colonies, where most of the irrigated farms have not yet been reduced to very small sizes.

In the lower Indus Plain in the newly irrigated lands the proportion of area in small size farms is in general even smaller, under ten per cent. Relatively higher percentage is found in parts of Sukkur, Jaccobabad and Larkana, the earlier irrigated and settled parts of the lower Indus Plains.

Over the western dry in the hilly area and the Baluchistan Plateau, conditions are entirely different over the northern humid and subhumid hilly areas. The proportion of area in small size farms remains generally below 5 acres but varies from 1 acre in Kharan to 10 acres in Quetta. Dearth of level land, lack of surface drainage and the low rainfall (10" over most parts) account for the least ratio of land in smaller farms as compared to other parts of West Pakistan. The small farms, with no substantial supplementary source of income, cannot adequately support even the thin population of the area.

Medium Size Farms

Over most of West Pakistan the medium size farms occupy more than half the total area except in the western hilly and submontane areas and the Baluchistan plateau. In the Indus Plains this ratio is below forty per cent.

Data by *tehsils* depict that the variations over the Indus Plain generally show no definite pattern and mostly remain between 50—70 per cent. In the western hilly and submontane areas and Baluchistan plateau, the low productivity due to rough terrain, aridity and lack of irrigation water account for this overall low proportion of area in medium size farms, which mostly remain between twenty-five to forty per cent.

The Large Size Farms

Farms above 25 acres are only eight per cent in number but occupy thirty-five per cent of the area. The proportion of area occupied by these large farms varies widely from eleven per cent to above eighty per cent in different parts. For obvious reasons this ratio increases from the north and northeast humid hilly and submontane areas to south and west, with arid but newly irrigated lands in the lower Indus plains and arid and hilly lands in Baluchistan Plateau. The least percentage of area in large farms is in Sialkot district where it falls to only eight per cent. Hazara and Rawalpindi follow closely with eleven per cent each. Campbellpur offers an exception among the northern hilly areas where the proportion of area in small farms is exceptionally low and in large farms exceptionally high as compared to its contiguous areas in the Potwar. Perhaps, the sizeable Chach plain and the Sil-Soan valley flats make it much less dissected than other parts of the Potwar and hence a larger share in large size farms.

In the upper and lower Indus Plain large farms generally occupy twenty-five to forty per cent of the area, the larger share being in Mianwali fifty-two per cent and Tharparkar sixty per cent. Both these areas are arid and sandy with limited irrigation water. Moreover these are newly settled areas and have low population densities.

Over the Baluchistan plateau and in the western submontane areas like Bannu and D.I. Khan large size farms invariably occupy more than half the area. This is, as explained above, partly the result of physical factors of hilly terrain, aridity and lack of irrigation water and partly a heritage of the tribal feudalism. Here in some cases the entire village area is owned by one land lord. This is reflected even in the detailed statistics of the large farms which reveal that in some parts upto forty per cent of the area is in farms of over 150 acres⁶.

FARM SIZE-CROP PATTERN RELATIONSHIP

Wheat

There is hardly any area in West Pakistan that does not grow wheat but the dominant wheat areas are the Potwar plateau and the canal irrigated parts of the upper Indus Plains. In the lower Indus Plains only a few *tehsils* of Hyderabad, Sanghar and Tharparkar districts are important wheat producers.

⁶Agricultural Land Use Survey carried out in the villages of Ahmad Khan, Zai and Kuchlag in the Quetta district has substantiated this view.

The farm size and crop pattern of wheat depicts that remarkably extensive areas come under the category of mixed medium-large size farms (with 33-66 per cent of wheat acreage in the unit area on medium farms and a lower ratio on large farms) less extensive but sizable areas come under medium-small (33-66 per cent of wheat acreage on medium farms and the next lower ratio on small farms) and predominantly medium (66 per cent or more wheat acreage on medium farms) size classes. The latter category (predominantly medium) is markedly more conspicuous on the map in the lower Indus plain as compared to the upper Indus plain. It is noteworthy that the area under predominantly small (66 per cent or more of wheat acreage on small farms) and the predominantly large (66 per cent or more of wheat acreage on large farms) size class farms is extremely limited or practically non-existent. No marked difference is notable in the farm size crop pattern over the general area of wheat cultivation and the dominant wheat belt (area of concentration of wheat.)

Over the greater part of the Potwar and the submontane districts of Hazara, Mardan and parts of Peshawar, wheat falls over small and medium size farms. Murree and Abbottabad *tehsils* are the only areas where wheat is mostly grown over the mixed category of small-medium farms. Both these *tehsils* however, are outside the important wheat areas. The rest of this region grows wheat mostly over the mixed category of medium-small farms, the percentage over the medium farms varying from over 40 to 62 and over small farms varying from 20 to 40. The tendency in the medium category is generally in favour of farms of above 7.5 to under 25 acres and in small farm category in favour of farms of about 2.5 to under 5 acres.

Over the greater part of the main wheat belt in the canal colonies of the upper Indus plains wheat is grown over the mixed category of medium-large farms. Jaranwala *tehsil* of Lyallpur, Sahiwal and Okara *tehsils* of Sahiwal and Khanewal *tehsil* of Multan district are exceptions where it is generally grown over medium size farms. In these *tehsils* the medium size farms form more than sixty-six per cent of the total farm area. The medium-large category shows that the greater acreage of wheat is distributed over farms of 7.5 acres to under 50 acres which generally have more than half the total acreage of wheat, the greater share among these occurring over farms of 25 to under 50 acres.

In the lower Indus plains distribution of wheat over the various farm sizes does not depict a well defined pattern. However, in the dominant wheat producing areas, it is mostly grown over medium-large and dominantly medium size farms.

Over the Baluchistan plateau and western submontane areas of Bannu and Kohat wheat is predominantly a crop of large size farms of over 25 acres. Only

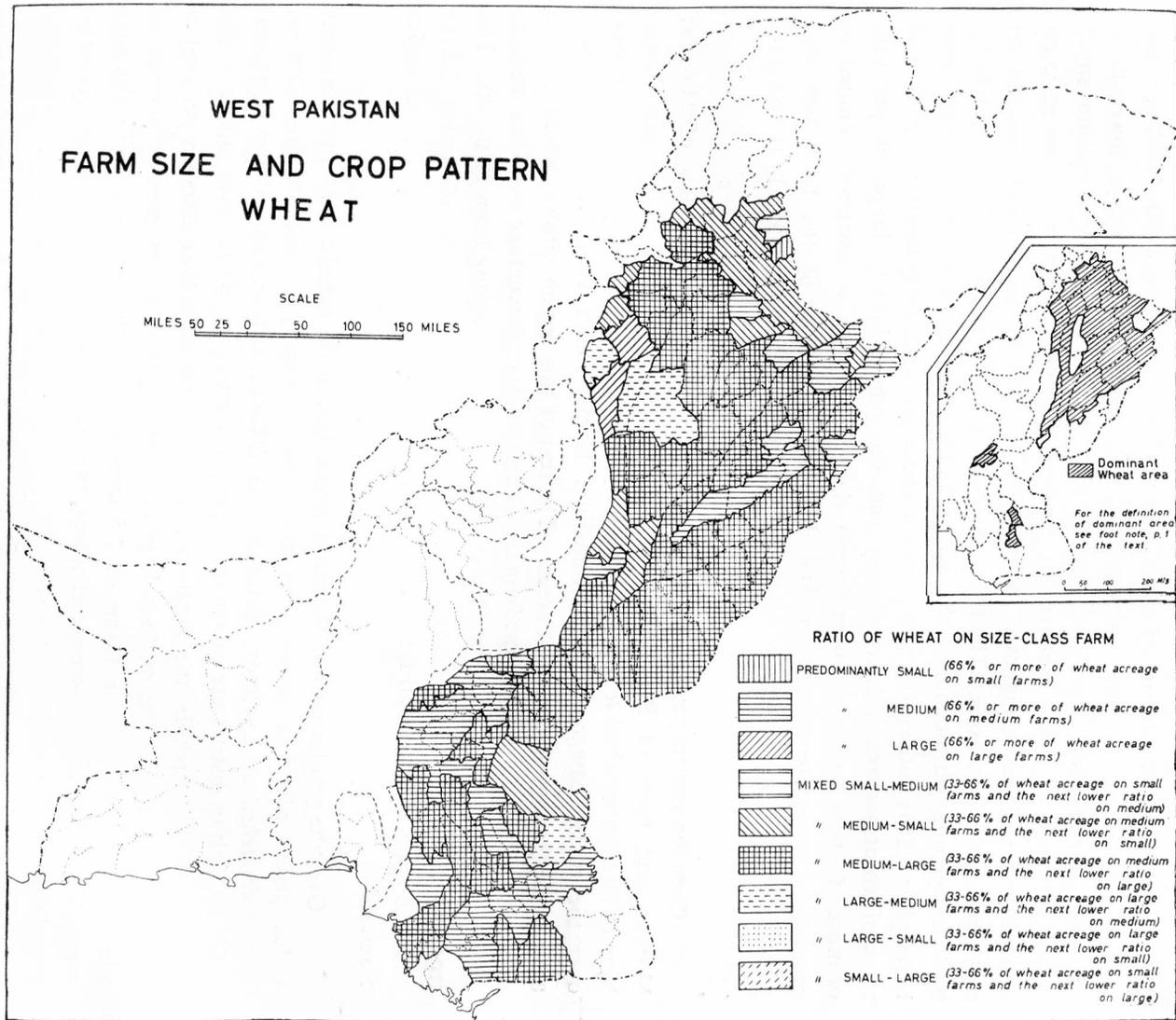


FIGURE 4

in few areas like parts of Kohat it shows close relationship with medium-large farms.

The foregoing discussion on the distribution of wheat leads to the conclusion that wheat in its general pattern of distribution over the various size farms keeps close to the general ratio of area in each size class farms with a tendency to occur over the larger size farms of the category. Even on the small size farms it occurs least on farms of under 2.5 acres whereas in the medium category it is mostly distributed over the larger size farms of the class.

This relationship, leads to the conclusion that wheat forms a part of the extensive cultivation pattern. This becomes further clear when the degree of fragmentation, manuring and intensity of cultivation is examined in each size class farms. The application of manure (only 12 per cent of the cropped area of all farms in West Pakistan is manured) decreases invariably with the increasing size of the farms. The manured area fluctuates from above forty per cent in farms under 1 acre to a usually low percentage of under 5, in farms of above 150 acres. Similarly the intensity of cultivation also decreases on larger farms, indicating that wheat mostly grows over areas with medium cropping intensities.

Rice

Rice is a specialised crop in West Pakistan. Its cultivation is highly localized on gently sloping or almost flat areas with adequate supply of water. Over West Pakistan about sixty per cent of rice acreage is shared by the medium size farms, in which category farms from 12.5 to under 25 acres share the largest proportion of rice area.

Rice cultivation is areally extensive in 3 out of the 9 categories shown on the map. These 3 categories are 1. Dominantly medium (66 per cent or more of rice acreage on medium farms). Land under this category is more extensive in the lower Indus plain than in the upper Indus plain. 2. Mixed medium-large (33-66 per cent of rice acreage on medium farms and a lower ratio on large size farms) and 3. Medium-small (33-66 per cent of rice acreage on medium farms and the next ratio on small farms).

In the upper Indus plain, in the most important rice growing areas comprising of Gujrat, Sialkot, Lahore and a few *tehsils* of Lyallpur and Sahiwal districts it occurs mostly over dominantly medium farms and medium-small mixed category. The other important relationship is with medium-large farms in Gujranwala and Sheikhpura. In these areas from among the medium farms category rice occurs mostly on farms from 12.5 to under 25 acres, lesser on 7.5 to under 12.5 acre farms and least on 2.5 to under 5 acre farms. Only in Sialkot relatively larger proportion of rice is cultivated over farms of 7.5 to under 12.5 acres. In Gujrat and parts of Sialkot it occurs mostly on medium-small farms with a considerable proportion of area in farms of under 5 acres.

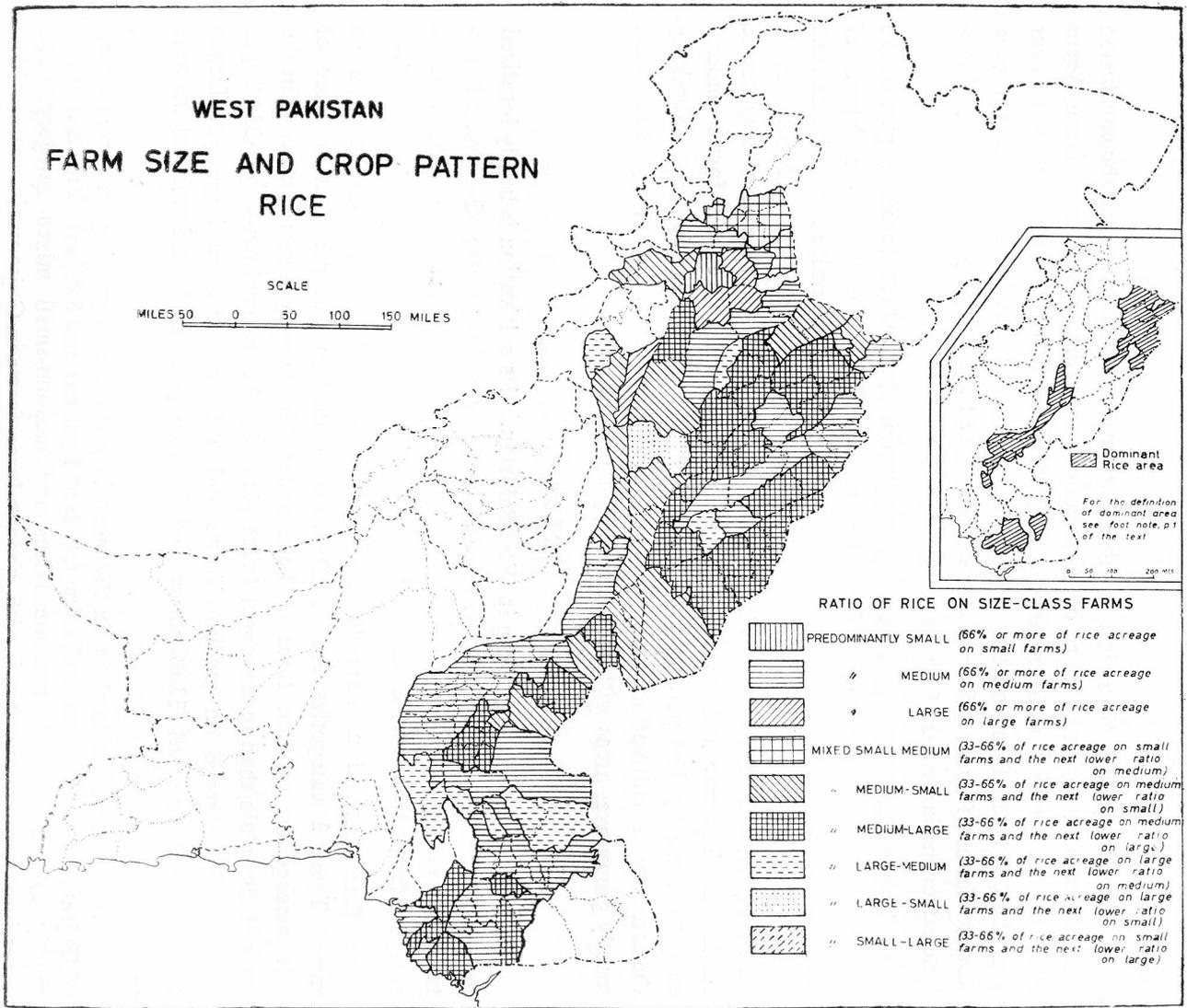


FIGURE 5

In Gujranwala and Sheikhupura medium-large farms have the largest share of rice acreage. Here a greater portion of rice falls on 12.5 to under 25 acre farms with a substantial portion grown over large size farms of 25 to under 50 acres. Whereas this farm size and crop pattern relationship is very common in case of wheat, it occurs only in a few parts in the case of rice.

D. G. Khan and Muzaffargarh districts also show the same pattern. In the upper part of the lower Indus plains in the three main rice producing districts of Sukkur, Jacobabad and Larkana medium size farms share the largest proportion of over sixty-six per cent of the rice acreage. In the southern parts in Hyderabad, Thatta and Tharparkar, the dominant pattern remains the same. Only two *tehsils* of Hyderabad and one *tehsil* of Thatta have a substantial acreage over large farms of 25 under 50 acres.

As compared to wheat the distributional pattern of rice in the main rice region shows less variations over the various size class farms. Whereas in case of wheat the dominant pattern is formed of medium-large category, in rice it is of dominantly medium with only a few exceptions. The distribution of these two cereals is, therefore, generally complementary as in very few areas both these cereals are of equal importance.

Sugarcane

Sugarcane with great demand of water supply is also a specialised crop. It shows concentration in three major zones—Kabul valley, parts of canal colonies of upper Indus plain and Bahawalpur plain and in the lower Indus plain in parts of Khairpur, Nawabshah, Tharparkar and Hyderabad districts.

An important feature of the areal distribution of sugarcane cultivation is that, while considering West Pakistan as a whole the mixed medium large category predominates, it is the predominantly medium category which covers a larger expanse in the dominant sugarcane belt, particularly in the upper Indus plain. This distributional pattern is different from that of wheat and rice in the following respects :

- a) The high percentage category of predominantly medium is somewhat larger than that of rice and much more so than that of wheat ;
- b) The difference in the farm size-crop relationship between the general area of sugarcane cultivation and the dominant sugarcane belt is more pronounced than in case of wheat and rice.

In the Kabul valley it is mostly grown on medium-small and dominantly medium farms. This commercial crop, is treated as an annual crop and is highly fertilised and intensively irrigated. The largest share of sugarcane acreage in Mardan is over the larger size farms of the medium group of 12.5 to under 25 acres, whereas

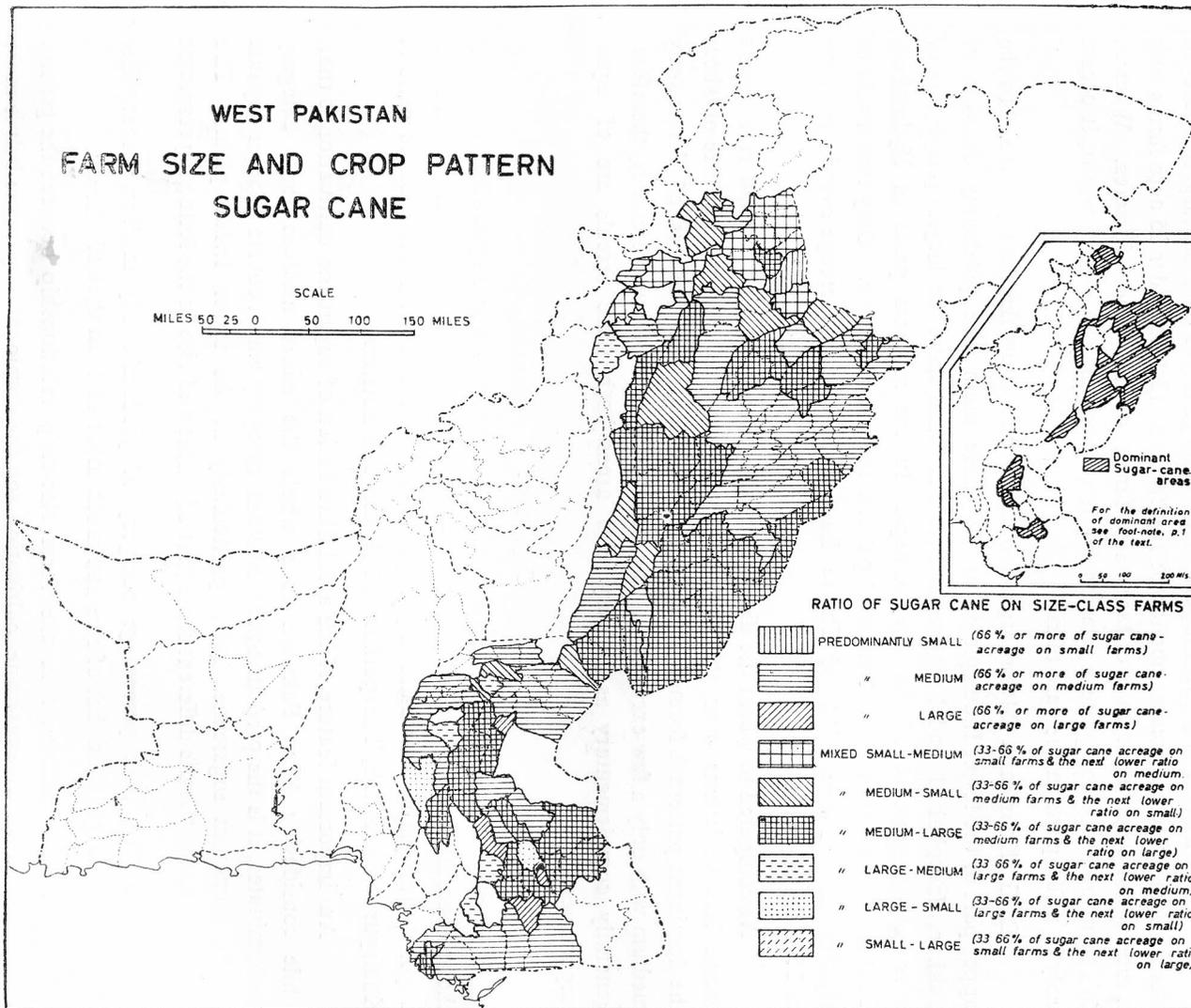


FIGURE 6

the largest share in Peshawar is of farms ranging from 7.5 to under 12.5 acres. In both these districts of Kabul valley a substantial portion is grown over small farms of 2.5 to under 5 acres. The fairly high density of population and high productivity of land has resulted in this pattern.

In the canal colonies of upper Indus plains in parts of Sargodha, Lyallpur, Lahore, Multan, Sahiwal, Sialkot, Gujrawala and Gujrat, it is mostly grown over dominately medium size farms and in some *tehsils* it is grown over the mixed category of medium-large farms with minor variations. In areas where sugarcane is mostly grown over the medium farms the greater share is of 12.5 to under 25 acre farms. In Sialkot a considerable acreage is shared by farms of 7.5 to under 12.5 acres.

In areas of medium-large farms the substantial share is that of 25 to under 50 acre farms *e.g.* in Sargodha and Jhang. Over the Bahawalpur plain too, this mixed category of medium-large farms dominates the pattern with substantial share of 25 to under 50 acre farms.

In the lower Indus plain, in areas of sugarcane concentration only one relationship that of mixed medium-large farms dominate. These are the newly settled and thinly populated areas of less intensive farming practices.

Cotton

Cotton is also a specialised non-cereal crop like sugarcane in West Pakistan and is usually treated as an annual crop. However, its distributional pattern in relation to farm sizes is different from that of sugarcane, especially in areas where both these cash crops are of equal importance, like parts of canal colonies of upper Indus plain. There are two areas of cotton concentration —one in the upper Indus plain and the other in the lower Indus plain on the whole this crop depicts dominant pattern of mixed medium-large farms with only a few exceptions.

In the upper Indus plain a comparison of the two maps of cotton and sugarcane reveals that in areas where the two crops show equal concentration, as in parts of Lyallpur, Sahiwal and Multan, cotton falls on the medium-large whereas sugarcane, as discussed earlier, falls mostly on dominantly medium size farms. Cotton in these areas is largely grown over 12.5 to under 25 acre farms from among the medium size group and over 25 to under 50 acre farms from among the large size group, with considerable acreage over farms of 50 to under 150 acres. The share of 50 to under 150 acre farms increases in the Bahawalpur plains and in lower Indus plains in Sanghar, Hyderabad and Tharparkar districts.

From the detailed study of acreage over different farm sizes it is evident that in comparison with sugarcane it grows over relatively larger farms. Sugarcane is a more paying crop than cotton and its cultivation over medium size farms in the upper

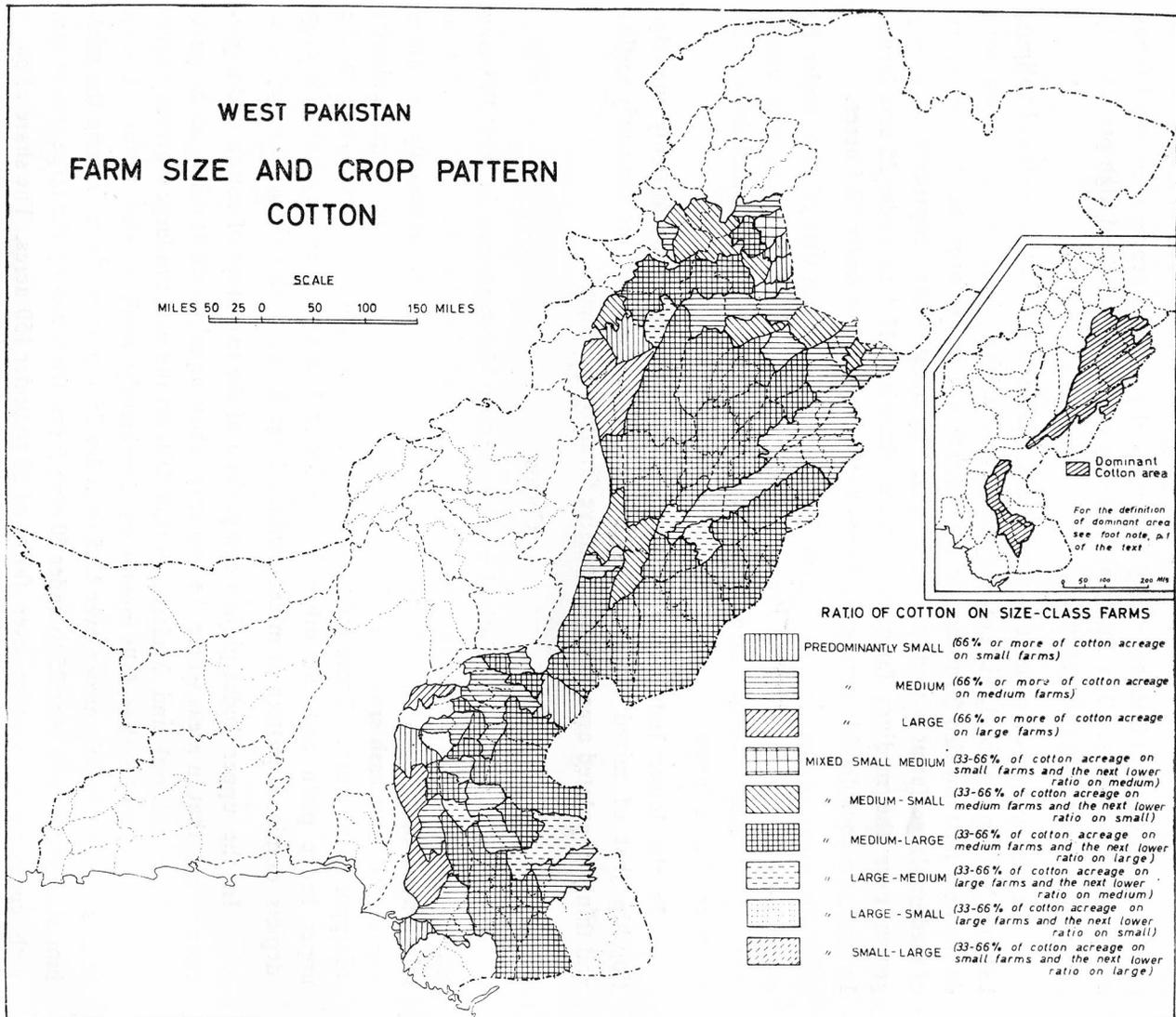


FIGURE 7

Indus plain, is more convenient. Sugarcane demands much more water and manuring and large size farms are less suited for the purpose with the present day practices of manuring and water frequencies and very little use of machinery.

The overall farm size-crop relationship can be summed as follows :

1) In general a high measure of selectivity for any given farm size is not traceable. Mixed medium-large category with 33-66 per cent of the total acreage of a given crop on medium farms and the next lower ratio on large farms predominates. This pre-dominance is more marked in case of wheat and cotton and less so in case of rice and sugarcane. The reasons for this non-specialised areal distribution of crops by size classes of farming seem to result from the fact that the advantages of large-size farms are mitigated by a high measure of fragmentation, non-mechanisation of farming, least application of manure, low intensity of cropping (small proportion of double cropping) and the lack of interest evinced by absentee land lords in the management of the land. The small size farms cover a mentionable proportion of the cultivated land in old settled districts of the upper Indus plains and areas of rough terrain in the north away from the main agricultural core comprising of the canal irrigated plains. Secondly, these small size farms are not given as much attention by the farmer as these are generally expected to attract in intensively cultivated areas of the world. Both manuring and double cropping on the small farms, though proportionately larger on this size class than on others, are in themselves not very pronounced.

2) The general non-selectivity mentioned above does not obliterate the regional variations in farm size crop relationship, with crops mostly grown over small and medium-small farms in the northern hilly and submontane areas, and medium large and predominantly medium farms in the Indus plain, the latter being slightly more extensive in the upper than in the lower Indus plain.

Areal expanse of predominantly medium category, with a high percentage of 66% and over acreage of a given crop in the unit area on medium farms, is more marked in upper Indus plain for sugarcane and cotton and in lower Indus plain for wheat and rice.

3) The difference in the farm size crop relationship in the general area of cultivation on the one hand and the dominant belt of a given crop on the other is not well marked in case of cereal crops, but is quite well marked in case of cash crops, with predominantly medium category being more extensive in the respective dominant belts than outside. It denotes that the cash crops in their respective areas of concentration tend to avoid both larger and small farms. Of the two cash crops, sugarcane and cotton, the former tends to occupy comparatively small farms than the latter. This is in keeping with the greater demands of sugarcane in irrigation water and manuring which can be met more conveniently on smaller farms.

NEWS AND NOTES

INTERNATIONAL UNION FOR QUATERNARY RESEARCH

INQUA is an interdisciplinary Union grouping geologists, geographers, soil scientists, anthropologists, archaeologists, palentologists, botanists, ecologists, palynologists, climatologists, glaciologists, oceanographers and specialists of other disciplines working for a better knowledge of environment and its history during the Quaternary period.

The International Union for Quaternary Research has following objectives :

- 1) To encourage the interdisciplinary study of all problems dealing with the quaternary period as defined in geologic stratigraphy ;
- 2) To facilitate and to co-ordinate international co-operation for this study through the organization of international congresses and through Commissions, created for the study of specific problems.

Under the presidentship of Gerald M. Richmond of U. S. Geological Survey, Denver (Federal Center, Denver, Colorado, USA, 80225,) INQUA had made the following progress since 1965 :

- 1) INQUA has become affiliated with the International Union of Geological Sciences as a member organization.
- 2) INQUA has become affiliated with the International Union of Biological Science (IUBS) and has organized a liaison committee on Quaternary Biology within the Biological Division of that Union. Professor William Mullendars of Belgium is Chairman.
- 3) INQUA has become affiliated with the International Union of Prehistoric and

Protohistoric Sciences (IUPPS) and has organized a liaison committee with that union. Professor L. Balont of France is Chairman IUPPS is not an ICSU Union.

- 4) INQUA is in process of becoming affiliated with the International Geographical Union and this affiliation is scheduled to be approved at the congress of that Union in India this year.

The VIII congress of the INQUA will take place in Paris, August 30 to September 5, 1969. The meeting will include nine Commissions (quaternary shorelines, nomenclature and correlation of the quaternary, neotectonics, origin and lithology of quaternary deposits, Absolute age of quaternary deposits, the quaternary map of Europe, quaternary regional maps, tephrochronology, and palespedology, twelve sections or categories of talk and lectures (geomorphology, submarine geology and morphology of plant, paleontology and paleopedology, animal paleontology, paleoclimatology, stratigraphy, sedimentology, neotectonics, cartography, absolute ages and paleomagnetism, human palentology and prehistory ; and symposia to be announced by INQUA Committees. Seventeen pre and post-meetings field trips are planned, and a one day excursion in the Paris area will be held during the meetings.

For additional information contact Mr. H. Elahi (Secretary General of the VIII INQUA Congress, 19 rue Saint Jacques, Paris 5e France) who will supply a circular and preliminary preference questionnaire. Those who wish to participate should note that the deadline for return of questionnaire to Mr. Elahi is June 5, 1968.

University of the Punjab.

ANIS A. ABBASI

**TWENTY-FIRST INTERNATIONAL GEOGRAPHICAL CONGRESS,
NOVEMBER-DECEMBER 1968**

The Twenty-first International Geographical Congress met in New Delhi from December 1 through 8. This time Professor S. B. Chatterjee of India was the president of I.G.U. Elaborate arrangements regarding accommodation and transportation, keeping in line with the traditional Indian hospitality, were made for the delegates who had gathered in the historic city from all over the world. Besides, a large number of geographers from various parts of India had also come to attend the conference. There were more than a thousand foreign delegates, among whom those from the United States of America predominated in number which was followed by Canada.

From Pakistan there were six delegates who attended the Conference including Professor Kazi S. Ahmed of the University of the Punjab as leader. The other members were Professors Nafis Ahmed and Fazal-ul-Haq of the University of Dacca, Shamsul Islam Siddiqi of the University of Karachi, Hameeduddin Ahmad of the University of Peshawar and Iqtidar H. Zaidi of the University of the Punjab. Professor Kazi S. Ahmad also contributed a general article on Pakistan to the souvenir publication on developing countries presented by I. G. U. Another was a research paper by Dr. I.H. Zaidi on 'Land Tenure System : A Problem in Political Geography'.

The sectional meetings of the Congress remained being very well attended throughout the period. The rooms allotted to some of the sections were used to be full to the capacity. Over one thousand papers were presented to various sections. Geomorphology attracted the largest number of papers which was followed by Regional Geography and planning and urban geography respectively (Table 1).

TABLE I—NUMBER OF PAPERS CONTRIBUTED TO
VARIOUS FIELDS

Geomorphology	...	144
Climatology, Hydrology, Oceanography & Soils	...	92
Biography	...	74
Complex Physical Geography	...	27
General Economic Geography	...	32
Agricultural Geography	...	55
Land Use and Land Use mapping	...	41
Industry and Power	...	51
Trade and Transport	...	34
Urban Geography	...	104
Population Geography	...	62
Rural Settlement	...	32
Historical Geography	...	28
Political Geography	...	29
Regional Geography & Regional Planning (including Applied Geography)	...	131
Cartography and Photography	...	101
Technique, Methodology and Documentation	...	29
Total :-		1066

Source : Abstracts of Papers, 21st I. G. U. Congress, India, 1968.

It is interesting to note that despite the widespread tendency to downgrade regional geography in recent years as a *genre* of the subject (which is unfortunate indeed) it continues to form an important forum of attracting a good number of scholars. Those working in the field of cultural geography seem to be more particularly interested in this approach and find the forum of regional geography more rewarding for the presentation of their papers. Although there were relatively small number of papers presented to the section on quantitative methods, but as a glance through the abstracts would show, this method has been used profusely by the scholars presenting their papers in other sections like geomorphology, economic geography, urban geography and others. This indicates the

increasing importance of statistical technique in the analysis of geographical data.

In addition several pre-congress and post-congress symposia were organized at various places in India. Hence, besides attending the main congress at New Delhi, some of the delegates from Pakistan also participated in a pre-congress symposia on land use organized by Aligarh Muslim University. Apart from these symposia field study meetings pertaining to certain regions were also arranged, viz, Jammu and Kashmir, East Rajistan, Darjeeling and Sikkim Himalaya, Meghalaya and Assam Valley, Sunderbans, Kaval Towns of Uttar Pradesh, Dehradun and Mussoorie, Growth of Delhi through centuries and Calcutta conurbation.

These purely academic meetings were dovetailed by a number of excursions by air, rail and road arranged before and after the Congress. An eight-day International Geographical Tour to Nepal was also arranged which attracted quite a good number of foreign delegates. The Pakistani geographers, with the exception of Dr. Fazlul Haq (who stayed in India to participate in some of these programmes) could not participate in any of these programmes and also in the post-congress symposia, because they had to

rush home to attend the Second All Pakistan Geography Conference which was to be held in the last week of December.

Two new associations under the I.G.U. were also organized, namely: Association of Asian Geographers and Common Wealth Association of Geographers. Dr. Shamsul Islam Siddiqi was elected a member of the Executive Committee of the latter.

The concluding session of the Congress elected Professor Stanislaw Leszczycki (Poland) as the President and Professor Chancy D. Harris (Chicago) as Secretary of the I.G.U.

It was noted that the next International Geographical Congress scheduled for 1972 would be held in Montreal, Canada. The other suggestion for the venue was the U.S.S.R.

On the whole, the Congress was well organized and the delegates were provided all facilities. The Main Congress was held in the modern new building Vigyan Bhawan in New Delhi, which is equipped with all modern facilities needed for such purposes.

IQTIDAR H. ZAIDI

University of the Punjab

For any field of learning there cannot be anything more unfortunate than the passing away of a promising scholar who possesses talent and potential to do creative work. In the late Shamsuz Zoha (may he rest in peace) we, the Pakistani geographers, have lost one such colleague. He combined in himself the qualities of a scientific geographer as well as that of a gifted poet. His sad and untimely death occurred on January 13, 1969.

Mr. Zoha hailed from one of the distinguished Syed families of Bihar (India) known for their religious piety and literary tradition. He was born in one of the suburbs of Patna and received his early education in Muzaffarpur where his father practised law. After passing his High School Examination in 1940 Zoha joined Patna College from where he obtained his B.A. degree in 1944. The literary taste that he possessed as a part of his family background was further refined and stimulated by his close association with some of the established scholars of Urdu literature working at Patna College. He grew into a gifted poet and his first poem was published during his college days.

However, his interest in geography seems to have prevailed supreme, for after his B.A. he decided to pursue higher studies in geography which was one of his main subjects of study at college level. Hence in the pursuit of learning he came to Aligarh Muslim University, the then Eldorado for geographical studies in the subcontinent. Here he got a chance to work with Professors Kazi S. Ahmad, Tahir Rizvi and late S. Muzaffar Ali. He completed his M.A. from this University in 1946 and after staying for a few months in Bihar, Zoha came to Karachi. Here, after the establishment of Pakistan, for a very brief period, he did some journalistic work as a columnist for 'Dawn' a leading newspaper of the country. In 1948



he went to Quetta and joined Government College as a lecturer in Geography. There he managed the college classes from first year to fourth single handed and through his devotion and interesting lectures, he made geography one of the most popular subjects among students. Here again inspired by the calm and serene atmosphere of Quetta and natural beauty of its surroundings he wrote several poems, especially sonnets, which earned him a place among the high ranking modern poets. Such literary interests, however, did not come in the way of his scientific endeavours. Intrigued by the physical landscape of Baluchistan Zoha wrote articles entitled, "Physiographic Personality of Baluchistan" which appeared (in two instalments) of *Pakistan Geographical Review*, Vol. VII, Numbers 1 and 2.

In the meantime he came in contact with Baba-i-Urdu Maulvi Abdul Haq who was concentrating his efforts on securing a respectable place for Urdu in national life. Baba and his associates were convinced that Urdu as the medium of instruction for higher education cannot only replace English but it

could also play an important role in developing national consciousness and solidarity. They had established Urdu College for testing such ideas. Impressed with Mr. Zoha's background, fine literary taste (particularly with his writings in Urdu), scientific bent of mind, and creative works, Babai Urdu and Mr. Aftab Hasan (the then Principal) offered him a post in Urdu College as Lecturer in Geography.

Thus from Quetta, sacrificing the benefits of Government Service, he came back to Karachi and joined Urdu College in 1954. It is here where I came in closer contact with him and became intimate friends. During his stay in the college he made positive contribution to promoting the cause of Urdu as an effective medium of instruction and also to the cause of geography, by making it more interesting through his lectures with literary flavour.

In 1957 Professor I. R. Khan, the then Head of the Department of Geography of the University of Karachi, secured his services for the Department. His literary taste coupled with clarity of thought and the depth of knowledge soon earned him fame as a great teacher. His main interest was in Historical Geography and Asia.

Again, Mr. Aftab Hasan, who had now become Director of a newly established Bureau of Publication of the University of Karachi, persuaded him to join the Bureau as its Assistant Director. He joined, although reluctantly, the Bureau and served it till he breathed his last. Here, he was in charge of translation, editing and production of the Text-books as well as books of scholarly standards. His versatility, devotion to duty and hardwork and charming manners made him extremely popular among his university colleagues. The Vice-Chancellor of the University, Dr. Ishtiaq Husain Quraishi, in

his own books, published by the Bureau, has acknowledged Mr. Zoha's able performance. His services to this Bureau must be written in red letters. He was a principal member of the committee on translation of geographical terms instituted by the Bureau. He was editing the Urdu version of *Anglo-America* by White and Foscue which he leaves unfinished. He also worked for several years as Associate Editor of *Jadid Science* a leading scientific journal in Urdu published by the scientific society of Pakistan.

Despite his association with the Bureau of Publication he remained faithful to Geography. Even for his poems he would select topics of geographical interest. His poem, "Kanar-i-Bahr-e-Arab" (The Shore of the Arabian Sea) is his master piece in this respect. During his stay in Quetta his interest in the historical geography of Baluchistan was aroused and after joining the University of Karachi he started working more actively on this project. In order to use place names as a tool in this study he took a special training in linguistics. This training combined with his knowledge of Arabic, Persian and Turkish languages helped him a great deal in carrying out his proposed study. He had begun writing and the first drafts of two chapters were ready when he fell ill and was unable to recover again. On the basis of what he discussed with me, I am sure the study would have made significant contribution to the knowledge as well as the philosophy of the subject. Let us hope that some one completes this unfulfilled mission of the departed soul.

Mr. Zoha is survived by his wife, two sons and two daughters. Every one who has met him will always cherish his memory.

IQTIDAR H. ZAIDI

University of the Punjab

SECOND ALL PAKISTAN GEOGRAPHICAL CONFERENCE, LAHORE

The Second All Pakistan Geographical Conference was held in Lahore, from 26th December 1968 to 1st of January 1969. The Conference was inaugurated by Professor Hamid Ahmad Khan, S. Pk., Vice-Chancellor, University of the Punjab, on the morning of 26th December in the Punjab University Auditorium at the New Campus.

The function started with the recitation from the Holy Quran after which the President of the First All Pakistan Geographical Conference Dr. Kazi S. Ahmad, S. I., Professor Emeritus, University of the Punjab, Lahore, requested the President of the Second All Pakistan Geographical Conference, Professor Nafis Ahmad, S. I., Head of the Department of Geography, University of Dacca, to take the chair. Welcome address was given by the General Secretary Professor Col. K. U. Kureshy, Head of the Department of Geography. While speaking on the discipline of geography, Professor Kureshy said that geography "has now grown from a descriptive field to a highly sophisticated science and it no more adheres to the deterministic approach. We live in a period of social and technological revolution in which man's ability to manipulate the process of nature is increasing at a rate which is difficult to follow".

The inaugural address was read out by Prof. Hamid Ahmad Khan in which he pointed out that "Geography promotes the concept of one world".....it is not only our hopes for the future but also the planning of our present, to which geographers can make a worthy contribution..... The task before our geographers, therefore, is continually to assess the strength of the physical basis of Pakistan to seek to coordinate it with our cultural needs".

The Presidential Address titled "Some Aspects of Economic Development of Pakistan with Special Reference to Industrialisation, 1947-68" was presented by Prof. Nafis Ahmad. In his address the history of industrial growth and its relationship with the development of power, transport, and agriculture was discussed. Prof. Nafis Ahmad while discussing the present stage

of industrialisation in Pakistan said, "Developing countries like Pakistan do not need a long gestation period of a past development pattern before they can reach the take off stage..... Internal peace and quiet and sense of security are essential to ventures in the field of industrial investment whether public or private.....Pakistan has to continue to forge policies of economic growth to combat poverty and ignorance."

After the Presidential Address the Associate Secretary, Dr. Miss M. K. Elahi, Reader, Department of Geography read out the Goodwill Messages.

The Sectional meetings were held from 27th December to 30th December 1968. There were six Sections in all:—

- Section I Geomorphology, Hydrogeography, Climatology and Oceanography
- Section II Economic Geography
- Section III Population, Settlement and Social Geography
- Section IV Political and Historical Geography.
- Section V Regional Geography and Regional Planning.
- Section VI Applied Geography and Cartography.

Section I was presided over by Dr. A. I. H. Rizvi, Reader, Department of Geography, University of Dacca, Dacca. In his presidential address on Pakistani Geomorphology he stressed the need of recognizing geomorphology as a full grown science. He said "A whole science of geomorphology must pursue its own goal of studying landforms in their entirety and for their own sake." Dr. A.I.H. Rizvi while discussing the importance of training geographers for conducting research in quantitative and applied geomorphology further added, "Applied Geomorphology can make effective contribution to the understanding of basic aspects of such phenomena of national importance as floods, aridity and salinity, navigability of streams, and effects of terrain on military operations."

The presidential address of Section II titled "Economic Geography in the Twentieth Century" was delivered by Professor Shamsul Islam Siddiqi, Head of the Department of Geography, University of Karachi. Professor Siddiqi discussed the development and changes in concepts and approaches of economic geography in various countries of the world.

Section III was presided over by Mr. Qaiser Ali Khan, C.S.P., Director General, Social Welfare, Government of Pakistan. In his address on "The Crisis of Identities," Mr. Qaiser Ali Khan acknowledged the full appreciation by geographers of social dynamics of change for a better understanding of social geography.

Dr. Miss K. Yusuf, Principal, Government College for Women, Rawalpindi presided over the section of Political and Historical Geography. Her presidential address "Great Powers and Asia" was a clear analysis of the political developments in Asia and their relationship with the international politics. It concluded with a prediction note of China being accepted as a great power which may change the entire political trends in Asia.

Professor M. M. Memon, President of Section V, read his address on the "Soil and Water Resources of the Lower Indus Region". He discussed the importance of adequate water supply and curing the areas stricken with the high salinity for the agricultural development of the region.

Section VI was presided over by Dr. Hamid-din Ahmad, Head of the Department of Geography, University of Peshawar, Peshawar. In his presidential address "Applied Cartography", he brought out the importance of cartography as a major tool of geographers and said "as man continues to struggle and improve his environment, so will the cartographer, and he will consider his latest product as the foundation stone for newer and better maps in future".

General lectures were delivered on "The Problems of Developing Countries" by Mr. Fazal-ur-Rehman Khan, S.Pk., C.S.P., Director, Pakistan Steel Mills Corporation, Karachi and "Traffic

Problems in Lahore" by Mr. Shamsul Haq, Deputy Director, Town Planning Department, Government of West Pakistan. Lahore.

A Symposium was held on 'Geography and National Planning' in which Professor K.W. Thomson from New Zealand and Dr. R.S. Mathieson from Australia were the main speakers.

A two-day excursion tour to Mangla Dam-Texila-Rawalpindi-Islamabad was arranged for the delegates. It was an excursion cum study tour in which the salient geomorphological aspects of various areas and the cultural landscape were studied under the supervision of Mr. Anis A. Abbasi, Lecturer, Department of Geography, Punjab University.

There were about 150 delegates, including 13 foreign delegates from both the hemispheres who attended the conference. The foreign delegates who attended the Conference were:

1. Professor Chauncy D. Harris, Department of Geography, University of Chicago, Chicago, Illinois, USA
2. Mrs. Chauncy D. Harris, Chicago, Illinois, USA
3. Dr. Marie A. Sosce, 126 West 86 Street, New York, USA
4. Mr. Albert P. McCarthy, Saint Louis University, USA
5. Prof. Dra. Paulina Quarleri, Buenos Aires, Argentina
6. Miss Maria Renee Cura, Buenos Aires, Argentina
7. Mrs. Fryda Schultz de Mantovani, Buenos Aires, Argentina
8. Dr. P. Gentelle, Paris, France
9. Prof. Kardono Darmojuwono, Jogjakarta, Indonesia
10. Prof. Cemal Arif Alagoz, Turkey
11. Prof. K. W. Thomson, University of Massey, New Zealand
12. Dr. R.S. Mathieson, University of Sydney, New South Wales, Australia
13. Miss Siegrun Freyss, West Germany.

Pakistan delegates consisted of geographers from all the Universities of Pakistan and a number of Degree Colleges. Apart from Professional geographers, a number of geographers working in various capacities in the Government and semi Government organizations and other walks of life, participated in the deliberations of the Conference.

All efforts were made by the Organizing Committee to make the delegates feel at home. Following were the members of the Organizing Committee :—

1. Dr. Kazi S. Ahmad, S. I., Professor Emeritus, University of the Punjab, Lahore (President)
2. Prof. Col (Retd.) K.U. Kureshy, Head of the Department of Geography, University of the Punjab, Lahore (General Secretary)
3. Dr. Miss M.K.Elahi, Reader, Department of Geography, University of the Punjab, Lahore (Associate Secretary),

Members

4. Mr. Anis A. Abbasi, Department of Geography, University of the Punjab, Lahore
5. Mr. Masaud A. Mian, Department of Geography, University of the Punjab, Lahore
6. Mr. Muhammad Jamil Bhatti, Department of Geography, University of the Punjab, Lahore

On the whole the conference was a great success. This could not have been possible without the cooperation of the staff of the Department, and the University authorities and help offered by the Government and Semi Government Organizations, Banks and Private Business concerns. The chief donors were the Central Government; Pakistan Geographical Association, Habib Bank Ltd., United Bank Ltd., Pakistan Cycle Industrial Co-operative Society Ltd., Industrial Development Bank of Pakistan, Premier Insurance Company of Pakistan Ltd., Muslim Insurance Company Ltd. and Lahore Hardware Stores.

M. K. ELAHI

University of the Punjab.

BOOK REVIEWS

Geography: Its Scope and spirit. Jan O.M. Broek, with a concluding chapter suggesting methods for elementary and secondary teachers by Raymond H. Muessig and Vincent R. Rogers. xii and 116 pp., maps, diagr., bibliogr., table, index. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965. 9¼ x 6 inches. 1.75 (paperback).

"Whatever view we may hold concerning the nature and scope of geography, no doubt all would agree that its purpose is to add to man's knowledge of reality. Methodology adds nothing to that knowledge, but only to our understanding of such knowledge." Richard Hartshorne. *Perspective on the Nature of Geography*, 1959 (pp. 6-7).

This small, but pleasantly written, volume is one of the many published under the "Social Science Seminar Series." This series, according to its editors, "presents scholarly viewpoints on and information about history, geography, political science, economics, sociology, and anthropology. This social science material is complemented by creative and practical methods, tailored to each of the individual fields, for elementary and secondary teachers."

Geography: Its Scope and Spirit is a commendable volume. It will be welcomed not only by the teachers but also students and general readers. In so short a volume it is naturally difficult to do more than indicate the main lines of geographic thought and methodology. Professor Jan O.M. Broek wrote the first six chapters, which deal with geography per se. These chapters cover a wide range of topics—"Geographic Thought and Practices," "Development of Geographic Thought," "Modern Viewpoints in Geography," "Some Research Themes," "The Methods of Geography," and "the Essence of Geography." The final chapter (Chapter 7), which suggests methods for classroom teachers, is composed by the editors of the "Series"—Professors Raymond H. Muessig and Vincent R. Rogers.

To this reviewer the finest chapters are those dealing with modern viewpoints in geography, the essence of geography, and suggested methods for teachers. Chapter 3 deals with the modern

viewpoints in geography—the humanistic viewpoint, the social-cultural approach, the historical dimension, and facets of location. This excellent review comprehends some of the more important finding of scholars like von Thunen and Marsh. The author masterfully concludes by saying that the concern of geographers is with "spatial relations between real places, not mere abstract models a la von Thunen" [my italics]. Students of methodology will be especially interested in a number of fundamental interlocking concepts presented in Chapter 6, which deals with the essence of geography. "The comparison of these viewpoints," Broek asserts, "...actually clears the way for a better comprehension of the nature of geography." Chapter 7 deals with suggested methods for teachers. The authors suggest five salient geographical ideas, hoping that these "will encourage teachers to enlarge their own vistas and those of their students."

Geographers in general must find the book interesting and valuable. The readers are exposed to important concepts, to a considerable range of geographic techniques, and to a large body of geographic knowledge. The strength of the book lies in the choice of subject matter, in lucid and effective presentation of geographical ideas, and in some excellent maps. For those who desire to enlarge their knowledge of the field a well chosen, but highly selective, bibliography is added to the first chapter.

In spite of its strengths, geographers would probably confess to some disappointments. There are some serious omissions and editorial weaknesses. One cannot refrain from wondering why in Chapter 5, which deals with methods in geography, no mention is made of field techniques. It is believed that the volume, in this omission, fails to reflect a true picture of American geography. In Chapter 2, on the other hand, the work of Varenus is being discussed under "Middle Ages and Renaissance." "The reviewer feels that this should have been discussed under the heading "Beginnings of Modern Geography."

Nevertheless, Dr. Broek has succeeded in providing a lucid, thoughtful, and stimulating introduction to the scope and spirit of geography.

BILAL AHMAD

University of Karachi

The North West Frontier of West Pakistan: A Study in Regional Geography. David Ditcher. Oxford University Press, London (1967), XII and 231 pp; maps, halftones, index, bibliography: 635 (\$ 10.00).

The North West Frontier of West Pakistan is the first regional geography to be produced on this area. In his introduction David Ditcher has laid severe emphasis on the sharp interactions between the people and the environment, and in fact, takes the physical environment as the basis of the regional subdivisions ignoring the human aspects to a large extent. However, he is somewhat uncertain as to why the region should be treated as an entity, whether this basis should be physiographic or demographic; or because statistics are available for the region as a whole.

This uncertainty becomes evident, in the following seven chapters which deal with the physiographic divisions of the area. In each case, the political and administrative divisions are also recognised in his consideration of the tribal states and agencies as separate units, with a further breakdown into insufficient portions on the physiographic, climatic, historical, economic and demographic aspects of each.

Sample studies of villages, local tribes, as well as isolated individual cases illustrate an attempt on the part of the author to compensate for his neglect of the human aspect. These studies, however, do lend a realistic and live expression to an otherwise dry dissection.

The economic and social problems faced by the people are synthesized in the final chapter. The main problem is recognised as the necessity of adjustment by the people to a land they formerly 'lived off'. This involves primarily issues of land utilisation, the inherent culture, and the administrative and governmental attitudes. These attitudes on the local as well as the national level have, through nepotism and sheer lack of interest, been fundamentally responsible for the low development of the region. This section also includes the study of a few selected industries together with the type and direction of trade. The book is rounded up with a number of appendices mainly giving agricultural and industrial

statistics followed by a substantial bibliography and index.

Maps and figures, in fair number, are scattered throughout the book, but reflect the neglect to survey on the part of the authorities and hesitance on the part of the tribesmen to let them do so. An adequate collection of illustration is presented at the end, showing pictorially some of the physical and cultural scenes.

In short the *North West Frontier of Pakistan* can be called a fairly adequate regional geography. It is, essentially a book tasting, very strongly, of the out of date concept of environmentalism as illustrated by the generalisation. "Because of the cropping wilderness of their mountains, the Pathans have been able to remain free of the troublesome external authority of social institutions in a way that is almost unprecedented on the history of either the eastern or western world". Repeated accusations against governmental attitude and administration are also not justified. Furthermore the appendices and statistical information do not in any way compensate for the immature and inadequate style of the book. As a first regional geography of the North West Frontier, however, the informative value of the book cannot be denied.

MISS FAREEHA RAHMAN

University of the Punjab.

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