

“ *A GEOGRAPHICAL
ANALYSIS* ”

*(INCLUDING PHYSIOGRAPHY)
OF
THE KHAIRPUR STATE*
Post-Barrage Investigation

BY
M. B. PITHAWALLA.
B.A., B.SC.,
Research Certificate, University of London.
KARACHI (1935)



REPRODUCED BY
SANI H. PANIWAR

A GEOGRAPHICAL ANALYSIS

(INCLUDING PHYSIOGRAPHY)
OF
THE KHAIRPUR STATE
POST-BARRAGE INVESTIGATION

BY

M. B. PITHAWALLA.

B.A., B.SC.,
RESEARCH CERTIFICATE, UNIVERSITY OF LONDON.
KARACHI
1935.

REPRODUCED BY:

SANI H. PANHWAR (2018)

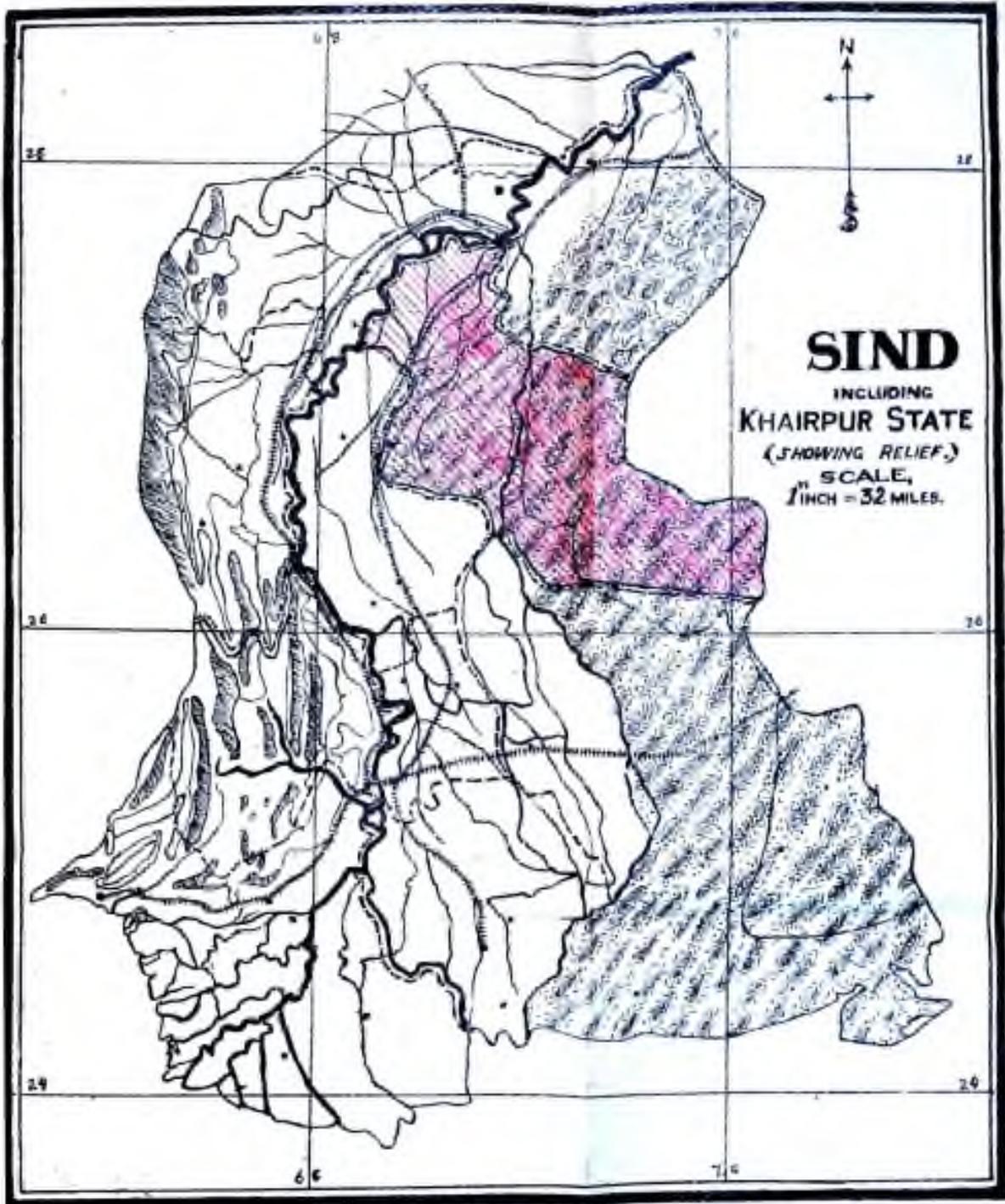
FOREWORD.

This is the first of a Series of Geographical (Regional) Studies of the important Native States of India, under contemplation, and is reprinted from the Journal of the Sindh Historical Society (Vol. I Part IV). It forms part of my forthcoming publication on the LOWER INDUS BASIN of SINDH, which was commenced by me at the University of London under the able guidance of Professor E. G. R. Taylor, D.Sc., F.R.G.S., in 1932-33.

My thanks are also due to the State officials especially Khan Bahadur J. R. Colabawala, the State Engineer, and other public bodies for helping me in the collection of the data, to the Council of the Society for permission to reprint this Paper and to Rev. R. W. Matheson, M. A., Kerr Tray. Scholar (Edin.), I. E. E. for going through the press proofs.

I hereby cordially invite collaboration of students of geographical research for the publication of the whole series, which will be a useful and instructive one. It will, no doubt, be an aid to the acquisition of comprehensive knowledge of the physical and economic conditions of vast areas of land, covering the Native States, and will prove to be a groundwork for their historical studies.

M. B. P.
KARACHI,
7-9-1935.



I. INTRODUCTION.

Close to the very gates of the Sukkur Barrage with two special feeders to its credit and between the Indus, the ancient Mehran, and the Rajputana desert, lies the only Native State in Sindh, *viz.* Khairpur. In itself it is a land of contrasts,—the richest of soils in the valley on one side and the sandiest of deserts on the other the hottest days in summer and the coldest, frostiest nights in winter very precarious rainfall and a more or less perfect irrigation system water-logged areas in proximity to places where wells are hundreds of feet deep sand-belts and clay-belts forming a labyrinth of soils abundant palm trees and Babul forests along the banks of the Indus but not a blade of grass in parts of the Nara Taluka relic of the old Talpur Mirs' kingdom but now with a British minister ruling the destinies of the people, who claim relationship with the Sumras and Sammas of old. Even the shape of the bullock carts and the type of bricks used at present in the State are as old as the sand-hills of the Thar. It is a most interesting region from the point of view of historical geography but unfortunately the records preserved are few and the landmarks are fewer still.¹

An attempt has been herein made, however, to present a geographical analysis of the State, based on personal observations and contact with the officials, who were good enough to supply some data. In a State covering more than 6,000 square miles, there is not a good metalled trunk road worth mentioning, though the partially navigable Indus, the largest of the Barrage canals *viz.* the Rohri, and the N. W. Railway run side by side through one side of the State territories, and gradually the fertile fields on the west pass into the undulating sand-hills eastwards towards Rajputana. Travelling is made exceedingly difficult thereby and the whole State is now in a critical condition from which it must emerge gloriously some time. This attempt is mainly to inquire into the geographical conditions, which have made the State what it is today and which are likely to affect its future.

¹ NOTE.—Dr. G. S. Ghurye of the Department of Sociology, University of Bombay, has just found a number of relics of archeological interest from the sands of Kot Diji in the Khairpur Taluka. I have examined some of them and consider that they are likely to throw some light on the life of the people who once inhabited an old valley of the Indus. His pupil, Mr. Thakkur, is also reported to have found some Neolithic remains at Naru-jo-Daro. The whole State needs an archeological survey.

II. SITUATION AND EXTENT OF TERRITORY.

The present Khairpur State is only a fragment of the large and fruitful estate of the old Talpur Mirs—almost the whole of Sindh being under their jurisdiction before the advent of the British. It lies between the latitudes of $26^{\circ} 10''$ and $27^{\circ} 46''$ North and the longitudes of $68^{\circ} 20'$ and $70^{\circ} 14'$ East, thus stretching from east to west to about 120 miles and from north to south to about 70 miles. The total area covered is 6,050 square miles.

The actual boundaries, however, swing with the course of time and the river Indus. They have changed considerably during the XIX century, as can be seen from the history which follows. (See Sketch Map).

III. A HISTORICAL SETTING.

The State in its original condition was quite a different one. Its history extends far into the history of Aror, the Capital of the ancient Hindu Kingdom of Sindh, now in ruins, only about 12 miles to the north of it. After the downfall of this Kingdom at the hands of the Arabs, its glories passed on to the Mahomedan conquerors of Sindh and later on to the native converts to Islam. Later still, the Afghans, Persians, Turks, Moghuls and lastly Baloochis, all had their share of plunder and sovereignty, till at last the State settled down under the Talpur dynasty of Sindh.

How the State of Khairpur was carved out.

How the State was actually carved out is an interesting story. "Shadad, grandson to a certain Kaka or Begum, whom all the Talpur Chiefs claim as their common ancestor, quitted his native mountains for the banks of the Indus, and colonized at a distance of 12 miles from the ancient ruins of Brahamanabad, the town which still bears his name.

"One of Shadad's sons, named Behram, was murdered either by, or at the order of the Kulhoras but a second, Chakur, became a considerable Zamindar in the districts into which his father had immigrated, and it was this latter son who was father to Sohrab, the founder of the Khyrpoor State.

"At length in 1783 A. D. and after many misundertakings between the rulers and their mercenaries, Fateh Ali, grandson to Behram, in revenge, as it is said, for the murder of his grandfather, and of another Talpur, excited his clansmen to revolt, and upon the rebellion proving successful, established himself in Hyderabad as chief ruler in Sindh. Sohrab and another Chieftain, named Thaira, were, it appears, subordinately associated, with him in power, but they shortly left the capital – Sohrab *en route* to Khyrpoor and Thaira towards Shahbunder, in Lower Sindh.....

"Sohrab repairing to the town of Khyrpoor there declared himself Ameer of the adjacent districts and a tributary of the King of Kabul".....²

By conquest and other means, Sohrab extended the limits up to Sabzalkot and Kashmor in the north, the Jaisalmir desert in the east and the borders of Kacch Gandava in the west.³

² Selections from the Records of Bombay Government, No. XVII, New Series Lieut. Lewis Pelly 1854. Pp. 105-106.

³ W.W. Hunter—*Imperial Gazetteer of India*, p. 134, Vol. 8.

Sohrab founded the city of Khairpur where stood the village of Boira and the Zamindari of the Phulpotras.

Treaties with the British.

In 1809 a treaty, guaranteeing an eternal friendship between the Talpurs and the British was signed owing to the danger of Napoleon's foreign policy in the East.⁴

In 1811 Mir Sohrab abdicated in favor of his eldest son, Mir Rustom. It may be stated in this connection that the names Sohrab, Rustom and their ancestors, Behram and Mubarak, suggest a Persian origin of the Talpur tribe, who held sway over the whole of Sindh and up to 1813 paid a tribute to the Afghan king. Rustom was weak and unfriendly towards his brother Ali Murad. The former died on the island of Manora in 1832 and so Ali Murad got the Chieftainship at last. Before this event the Khairpur State was acknowledged by the British as an independent State. The geographical advantages of such an alliance were duly shown by Lt. Burnes, e.g. the following extract from the treaty of 1832 with Mir Rustom Khan: —

"ARTICLE 1:

There shall be eternal friendship between the two States.

ARTICLE 2:

The two contracting powers mutually bind themselves from generation to generation never to look with the eye of covetousness on the possessions of each other.

ARTICLE:

The British government, having requested the *use of the river Indus and the roads of Sindh* for the merchants of Hindustan, etc., the government of Khairpore agrees to grant the same within its own boundaries on whatever terms may be settled with the government of Hyderabad, namely Mir Murad Ali Khan Talpore.

Sd/- W. C. BENTINCR".⁵

At the time of the First Afghan War, the British took a step further and desired the occupation of Shikarpur and also assistance from the State for the passage of troops through Sindh. Khairpur always acquiesced, while other Mirs refused.

A similar treaty was made in 1838 with Mir Rustom Khan.

⁴ A. W. Hughes—*Gazetteer of the Province of Sindh*, p. 431.

⁵ *Treaties, Engagements and Sanads* (India), Vol. VII, Bombay Presidency 4th Ed. Compiled by Aitchison. Pp. 337-379.

"ARTICLE 6

In order to improve by every means possible the growing intercourse by the river Indus Meer Rustom Khan promised all cooperation with the other powers in any measure which might be hereafter thought necessary for extending and facilitating the commerce and navigation of the Indus.

ARTICLE 183:

The Ameer shall not object to the occupation of the fortress of Bukker as depot for treasure and munitions."⁶

It is said that as Bukker lay in the midst of the river and not on either bank of the Indus, the British readily secured it, although the river itself was, previously fixed as the natural boundary between the two States.

Since Mir Ali Murad cordially supported the British policy of trade and administration in Sindh, Khairpur was allowed to retain its political existence and as he rendered loyal and valuable services to the British against the wishes of the other Mirs, with arms and diplomacy at the battles of Miani and Daba, the Khairpur Mir flourished and he alone was afterwards allowed to rule independently within the British Suzerainty.

And yet step by step the Khairpur Mir was also losing ground. By the treaty of 1842, fresh boundaries were settled:

"ARTICLE 1:

The pargannah of Bhoong Bhara, the third part of the District of Sabzalkote and the villages of Gotkee, Maladee, Chaonga, Dadoola and Uzezpore and all the territories of the Ameer of Khairpore, or any of them intervening between the present dominions of His Highness the Nawab of Bhawalpore and the town and district of Roree, are ceded in perpetuity to His Holiness the Nawab.

ARTICLE 2:

The town of Sukkur and the islands of Bukkur and the adjoining islets and the town of Roree are ceded in perpetuity to the British government."⁷

Later still in 1850 after the famous Commission, the Mir lost Kandiaro, Ubarao and Mathelo, three very fertile places, as will be seen from the following extract from the Proclamation:

⁶ *Ibid.*

⁷ *Ibid.*

"The Ameer's guilt has been proved. The Government of India will not permit His Highness Meer Ali Moorad Khan to escape with impunity, and a great public crime to remain unpunished.

Wherefore the Government of India has resolved and hereby declares that Meer Ali Moorad Khan of Khairpore is degraded from the rank of Rais and that all his lands and territories, excepting those hereditary possessions only, which were allotted to him by his father Meer Sohrab Khan, shall hereafter be a portion of the British Empire in India.

The inhabitants of those territories are hereby called upon to submit themselves peaceably to the dominion under which they have passed, in full reliance that they will be defended against the enemies, and protected from harm, and that unmolested in their persons, in their property and their homes, they will be governed with just and mild authority.

Sd/- H. B. E. FRERE, Commissioner."⁸

Even at the time of the Indian Mutiny of 1857 the Mir of Rhairpur was loyal to the British as he sent his eldest son Nawaz Khan to march to Shikarpur against the rebels.

In 1866 a special *sanad* was granted to the Mir for succession to the Khairpur gadi.

In 1862 The British Government the individuality of the State.

In 1894 Mir Ali Murad died and Mir Faiz Mohammad Khan succeeded. There was no event of outstanding merit however, till Mir Faiz Mohammad died and his son Mir Imam Bakhsh came to the throne. Troubles then arose for the Mir on account of the unstable condition and fluctuations of the course of the Indus Which even today swings for miles on either side at certain points of its course through Sindh.

The, treaty of 1901 was signed by the Mir regarding the Jamrao canal issuing from the Eastern Nara as to the alluvial accretions on the western boundary of the Khairpur State caused by changes in the course of the river Indus.

"ARTICLE I

His Highness the Mir agrees to transfer in full sovereignty to the British Government the triangular portion of territory shown on the plan (Marked A) of about 154 square miles.

ARTICLE 3:

⁸ *Ibid*

The British Government agrees to recognize the centre of the deep stream of the river Indus as it flowed in the month of March 1900 (Marked B) as the permanent boundary between the Khairpur State and the British State of Shikarpur and to abandon its claim on such of the alluvial deposits, forests and other territory at present on the left bank of the said deep stream of the Indus and on the frontage of or adjacent to His Highness's territory as are at present in the occupation of the British Government.

Similarly His Highness the Mir abandons all claim to the alluvial deposits and other territory in his occupation and possession on the right bank of the deep stream as aforesaid."⁹

Mir Imam Baksh died in 1921 and the present Mir Ali Nawaz Khan succeeded. No changes in the limits of the State have taken place in recent years.

Present Limits.

Thus at present the State territories are bounded on the north by the British territory of Sukkur-Rohri Taluka, on the west by the mid-stream of the Indus (a natural boundary), on the south and south-east by the British districts of Nawabshah and Thar Parkas and Hyderabad, and on the east by the Native States of Jodhpur and Jessalmere.

It is divided into five Talukas of Khairpur, Gambat, Mirwah, Faizgunj and Nara. The first four are cultivable areas, while the Nara Taluka largely consists of desert land. (See Sketch Map).

Curiously enough there are three small island-like areas, within these State limits, in the possession of the British, *viz.* Ulra and Phulwahan Jagirs and Manghanwari--Kingri Tapa, which includes the town of Pirjo Goth and in which is situated, the famous independent spiritual *gadi* (throne) of a long line of Peers descending from the Prophet.

⁹ *Ibid.*

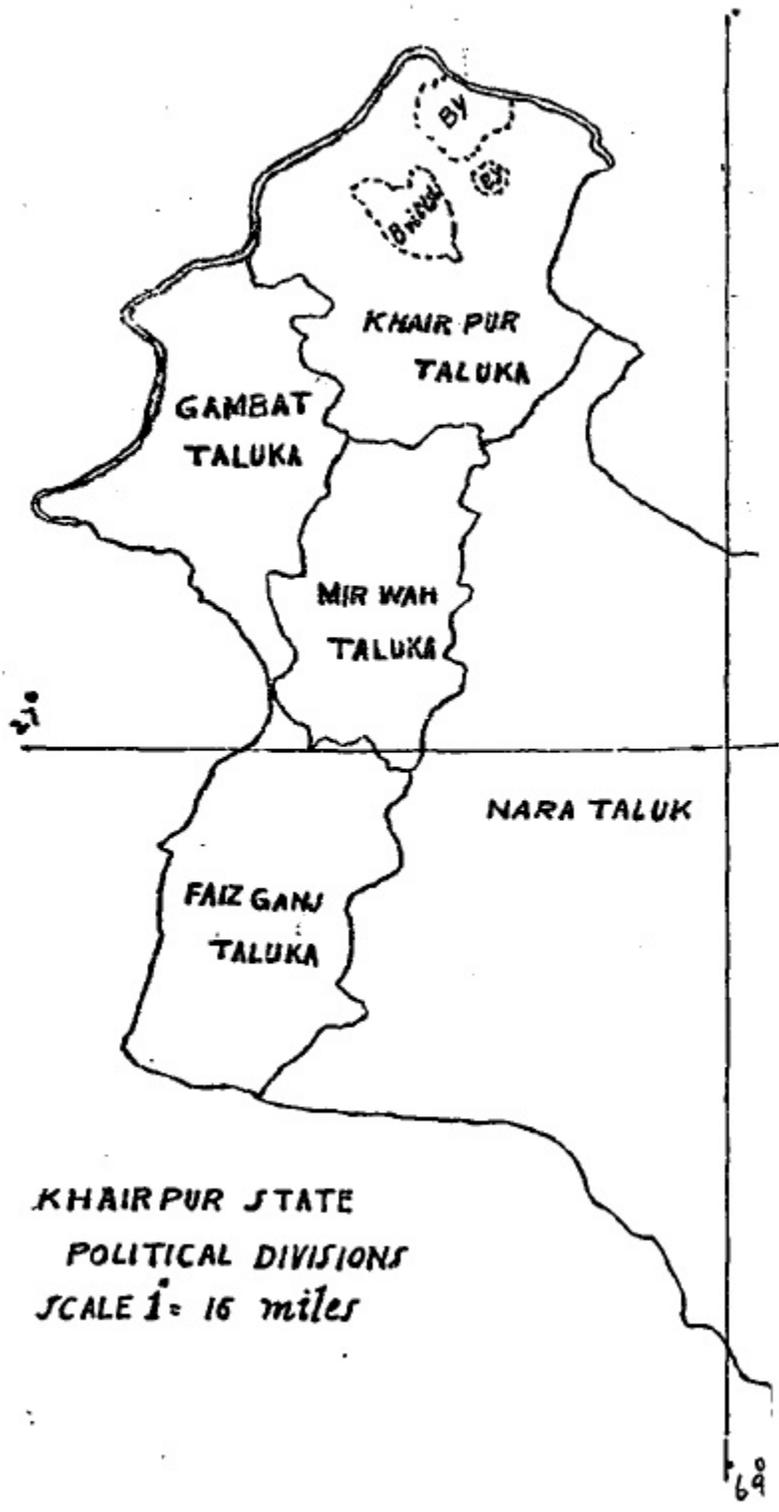
IV. PHYSIOGRAPHY.¹⁰

Physiographically, the Khairpur State forms part of (1) the Eastern Valley Section and (2) the Desert Section, both belonging to the Province of the Lower Indus Basin.

Eastern Valley Section.

This is limited by the Indus on the north and the west and by the desert on the east. In the south it is bounded by the Nawabshah and the Thar Parkar districts. The elongated narrow strip of valley land on both sides of the Eastern Nara, falling within the State and below the 250 feet contour, is also included in this Section. It is overgrown with vegetation generally during the rainy season and largely cultivable.

¹⁰ The section forms part of the author's forthcoming work on "The Physiography of the Lower Indus Valley."



Alluvium.

The whole Section is spread over with Quarternary alluvium for many miles. There is a gentle slope from north to south from the 190 feet contour near the Barrage to the 130 feet line at the southern extremity of the State.

The soil consists of belts of sand and fine clay deposited by the river Indus, which has furrowed and re-furrowed the land in many places. It is therefore very rich in minerals specially mica flakes, shining even in their smallest particles. There are also plenty of salts in the soil, especially sodium chloride.

Rock System.

The solid rocks within the area form a range of hills known as the Ghar, striking north and south with a very low dip towards the east and showing a well-marked escarpment on the western margin. (See Geological Map). It extends for about 18 miles in the Sukkur-Rohri district and for about 30 miles more southwards in our State, with an average height of about 200 feet and breadth of about 18 miles. These hills are remarkable for the rich Tertiary fossils, especially nummulites, as in other parts of Sindh. It is a typical Kirthar series _ of rocks of the Eocene age, mostly consisting of nummulitic limestone intermixed with clays and gypsum as under:¹¹

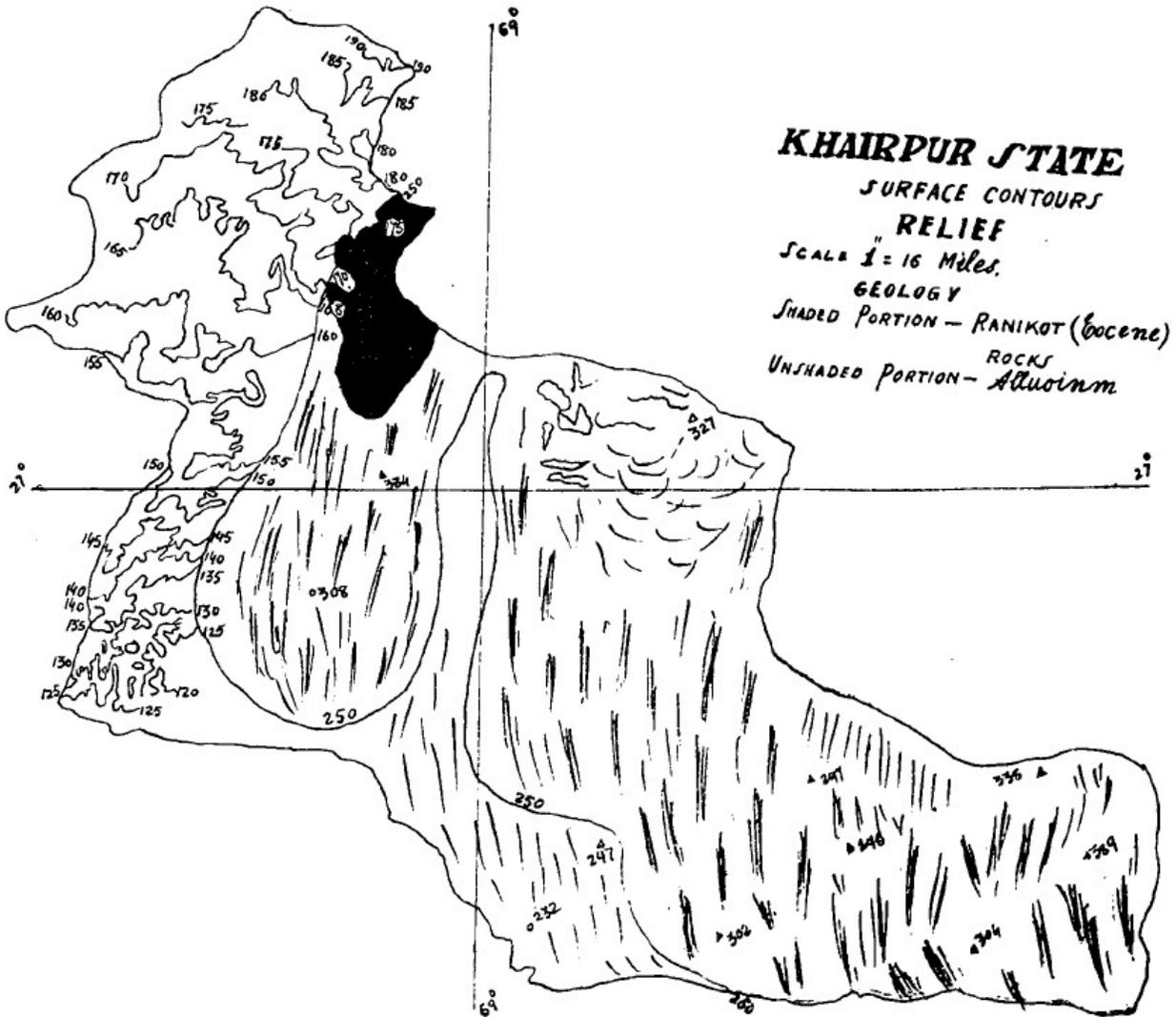
- (i) White and yellowish limestone containing numerous nummulites, *e.g.* Spica, Granulosa, etc. weathering very soon and forming flat-topped craggy hummocks with small nodules of ironstone.
- (ii) Hard limestone, yellow and of fine texture, fractured in places and not quite fossiliferous, but containing nodules of flint, at times very large in size.
- (iii) Pockets of clay, especially Fuller's earth, green clays with gypsum, marl or argillaceous limestone, soft and easily decomposed.
- (iv) White limestone series with abundant nummulites.
- (v) A bed of pale, green clay with gypsum in beds and veins and deep red clay resting on a band of brown limestone, abounding in fossils.

The eastern boundary of the hills is traceable for a good distance but towards the south it is covered with sand-hills to a great extent, so that only here and there a few outcrops of rocks are seen. "Between the Eastern Nara and the Mirwah, the large canal running to

¹¹ W. T. Slanford "*Geology of Western Sindh*" - M.G.S. 1. -Vol. XVII. Pt. 1 Pp. 101-102.

the west of the Rohri hills, the country 50 miles south of Rohri is a wilderness of sand-hills without water. The few outcrops of rock which occur do not rise into ridges, as they do further north and the dips are very low, the beds being almost horizontal."¹².

On the western side, however, the hills are escarped, the beds dipping only 1 or 2 degrees to the eastward. The section exposed shows the soft nummulitic limestone overlying colored clays.



"About Kot Diji there are numerous detached hills. Those at the town itself are escarped and are apparently connected with the main range of rock, no alluvium intervening, for limestone crops out every here and there amongst the sand-hills east of the town. Some

¹² Ibid p. 107.

isolated rises west of the Mirwah or Khairpur canal appear completely surrounded by alluvium.

Further south again, the rocks show no escarpments and dipping slightly to the S. W., get themselves covered up with sand hills. Only a few isolated patches of limestone can be found nearby."¹³

This line of hills is also named differently at different points in its course through the State, *e.g.*, Shadi Shahid, Peer Koka, Goondero, Kot Diji etc. On top of these hills are found oysters, cockles and other shells of distinctly marine origin.

Drainage.

The drainage of the area consists of the flood waters of the Indus on one side and the Eastern Nara on the other.

*The Indus and its regimen.*¹⁴

The river in proximity to the State is in the aggrading stage and brings in much fine silt, as it is derived from soft rocks of sedimentary origin and carried in suspension. Its bed is here higher than the surrounding country and its channel shifts from time to time especially a few miles below the Bukkur Gorge and the Barrage.

Its regimen is of the greatest importance to cultivators while its floods are a source of danger to their fields. The minimum guage reading at Bukkur is in January or February, at times as low as 0.5 ft. with a discharge of 24,092 cusecs only, while the maximum goes up to 16 or 17 ft. with a discharge of 600,000 cusecs in July-August, that is in the rainy season. In the months of April and May, there is another rise in the river due to the melting of the snows on the Himalayas.

The Indus often overflows its own channel in the rainy season, and as it is such a great danger to the neighboring fields, elaborate bunds or dams have been built along the sides. of the stream several miles in length, leaving the enclosed area as *kutch* land or *Ketis*. This is overgrown with forests in some parts. The tendency of the river is always to break through these bunds and inundate the surrounding land due to the general rise of the level of the river above it. Even after the completion of the Sukkur Barrage its eastering propensity above the gorge has been noticed, which means a great anxiety to the P.W.D.¹⁵ for the safety of the Barrage itself . It must be remembered that some of the river-waters at one time did flow past Aror through the old gorge 4 miles southward and almost through the same Eastern Nara cut newly made, but of course in the

¹³ *Ibid* p. 108.

¹⁴ Indus River Commission Records. 1902-1903.

¹⁵ Public Works Department.

opposite direction.¹⁶ The navigability of the Indus in its course beside the Khairpur State is not great, both the force of the current and the depth of water being unreliable in the different seasons.

It must be herein noted that the Indus has all throughout its career, in prehistoric as well as historic times, been a changing stream shifting its channels from side to side. To compensate for this disadvantage, the river has left behind vast fields of fertile land, which can be easily irrigated along beds and channels, which were once its own active water-ways.

The Eastern Nara.

This is the ancient channel of the Hakra or Wahinda, the lost river of the desert.¹⁷ Unlike the Indus, the Nara is not an aggrading stream. It has a deep and meandering channel and is navigable in general. Before the construction of the Barrage, the Eastern Nara was "a series of sluggish pools in the dry season".¹⁸ The old Nara cut, which lay beside the Rohri town, has been abandoned and the new cut is now used as stated above. Near the Barrage itself its channel is 350 feet wide (bottom) and 12-13 feet deep. Its length within the State is about 200 miles. How this Nara river has come to be a mere relic of the old powerful stream of the Hakra or Wahinda, how it fertilized a very large part of the present desert land and how a number of important towns were ruined on account of hydrographical changes in this region are subjects to be dealt with elsewhere.

Besides these two rivers, there are a few hill torrents down the Ghar hills during the monsoon season whenever there is a strong current, but these are not a reliable source of water supply.

The Desert Section.

The rest of the land, which is nearly three-fourths of the whole area, is covered over with sand dunes, striking somewhat N.E. — S.W. towards the extreme end of the State, but almost in other parts, as the S. W. monsoon wind current is felt less and less. The general rise of ground covered thus with the sand, is about 300 feet.

This region is a part of the great Indian Desert, known to geologists, as the most singular tract in India".¹⁹ It is arid, sterile and desolate except in those parts where showers of rain are received at times.

¹⁶ W. T. Blanford "Geology of Western Sindh," p. 106.

¹⁷ C. P. Oldham—"Notes on the Lost River of the Indian Desert" Cal. Rev., Vol. LIX. 1874 Pp. 1-27.

R. D. Oldham—"On the Probable Changes in the Geography of the Punjab" J.A.S.B. Vol. LV Pt. 2, 1886 Pp. 322-343.

¹⁸ W. W. Hunter—*Imperial Gazetteer of India*, p. 133. Vol. 8.

¹⁹ W. T. Blanford — J.A.S.B., Vol. XLV, Pt. 2, p. 89

Nature of Sand-hills.

There are parallel ridges called '*bhits*', and towards the extreme end of the State striking N.E.—S.W., a direction almost parallel to the course of the monsoon. As we move towards the Nara the direction changes, as the force of the wind current is reduced, until they strike almost N.—S. Towards the north the longitudinal '*bhits*' are connected by transverse ridges. But where the '*bhits*,' though longer, are haphazard, there is developed a region called '*tails*' or valleys between the sand hills. Where the quantity of sand is very great, '*dra-ins*' or plateaux are formed. These change their shape with the direction of the wind and contain soft and deep sand. There are hollows called '*kochurs*' in neighborhood of such accumulations. It is in these that we come across a large number of the salt-lakes known as '*dhunds*'.²⁰

Sir Bartle Frere suggested a novel theory that the sand-hills were formed and thrown into waves by earthquake shocks, as the ridges of rock hills are formed by earth movements and lateral compression. He also considered the Allah Bund in the Rann of Cutch as an example of "a typical Thar sand, billow".²¹ But R. D. Oldham has given a satisfactory explanation of the two types of hills met with in the Desert Section *viz.* the longitudinal and the transverse.²² Both are the result of wind action, the longer axis of the one being perpendicular to that of the other. The transverse ridges represent the waves or ridges at right angles to the wind direction. Later on, there are valleys produced between them as the result of denudation by the same agency of wind, when the contents are swept away and the intervening ridges are left behind as longitudinal hills, striking N.E.—S.W. Says Oldham: "If one of the transverse type of sand hills be examined, it will be seen that the windward slope is by no means a uniform plane but it is composed of long narrow ridges, parallel to the direction of the wind, with intervening depressions probably kept open by a concentration of the wind in them and a consequent increase of transporting power, if not an actual development of power of erosion. It seems probable that the longitudinal type of sand hill is due to the exaggeration of this effect, by which the depressions, instead of being comparatively shallow and causing mere saddles in the general ridge, are carried almost, if not quite, to the base of the accumulation".²³

Whence all this sand.

The sources of the present accumulated sand are probably many. (1) It might have been derived from the limestone rocks sub-aerially denuded. (2) A large amount of it must have been carried by aeolean agency from the Rann of Cutch and the coastal strip of

²⁰ G. Cotter—"Alkaline Lakes and Soda Industries of Sindh," M.G.S.I., Vol. XLVII Pt. 2.

²¹ W.T. Blanford--J.A.S.B. Vol. XLV Pt. 2 Pp. 97-100. Sir B. Frere--J.R.G.S. Vol. XV, 1870.

²² R.D. Oldham—"Geology of India." 1893 Pp. 455-56.

²³ *Ibid* P. 457.

Sindh. But (3) the chief source of the sand is supposed by geologists to be the floor of the sea which once occupied portions of the Indus basin in past geological ages,²⁴ "Both the distribution of salt and the prevalence of sand-hills point to the same conclusions and it is reasonable to infer that the sea, which, at no remote period, covered the Rann of Katchh, extended for a considerable distance both to the north up the Indus valley and to the N. E. up the basin of the Luni The sands of the Indian desert appear to have been blown from an old coast line in the Indus valley along the northern edge of the Rann of Katchh and probably in the valley by the strong south-west wind and they remain spread over the country for want of streams to carry them back to the sea".²⁵

The sand is pale gray in color and consists of rounded grains of quartz, felspar, hornblende, mica, etc., evidently derived from the rocks in the higher mountainous region.

Dhunds.

These are of two types, (1) Fresh water *dhunds* and (2) Salt water or natron-producing *dhunds*. Those, which are in the vicinity of the Eastern Nara through which water is discharged into them, do not possess much salt and are almost fresh, with weeds growing and crocodiles living in them. But on still lower grounds and further from the Nara, they are like "huge flat-bottomed evaporating pans." They are only about 10 feet deep and a mile long. As water is evaporated, salt is accumulated in the form of crust. Their shape is elliptical with their long axis parallel to the main '*bhit*', that is, the wind direction. But round about the shores of these salt lakes even the water is sweet and drinkable.

These salt '*dhunds*' are another proof for the tract being in communication with the parent sea in the past. Evidences of a raised sea bottom are abundant in the rocky outcrop already referred to. And these '*dhunds*' are remnants of the sea itself. They are lower in level than the fresh water lakes, and the springs in them are 15-20 feet above the water, while those in the fresh-water lakes are much lower. "It is a natural conclusion that the original surface of the ground at this spot was not higher than the bottoms of the '*dhunds*' are now, that it was much lower than the present alluvium of the Indus and the Indus plain has been raised to its present height by the accumulated silt deposited from the river since the '*dhunds*' have been cut off and isolated by the sanhills."²⁶

Cotter²⁷ has given a detailed description of some 129 *Dhunds* in the Khairpur State itself, 68 of which are by the Nara, on the west 23, on the east of it 45 and the rest in the Kot

²⁴ *Ibid* P. 430.

²⁵ W.T. Blanford, — J.A.S.B. Vol. XLV, Pt. 2, P. 103.

²⁶ W.T. Blanford, — J.A.S.B. Vol. XLV Pt. 2 P.94.

²⁷ G. De P. Cotter—"The Khairpur State." Cbs. II & III. M.G.S.I. Vol. XLVIL Pt. 2. Pp. 217-248.

Jubo region. The Kalar, around and in the bed of a *Dhund*, is dissolved by rain water percolating through the soil and redeposited in pure form as the water of the lake is evaporated. Thus these *Dhunds* are "Maintained by the *Sim* or percolating water escaping from beneath the sand plateaux or dra—ins," and form "belts of country lying between the drains and covered by *bhit* (longitudinal ridge), and *tali* (valley)".

Economic Resources.

(1) *Kharo Chaniho*. The natron-producing lakes or *dhunds*, mentioned above are a source of income to the State, as they yield a kind of impure sesqui-carbonate of soda mixed with common salt. The annual income at present is about s. 50,000 a year. It was formerly exported to Northern and Central India but now a Karachi merchant exports it to Bombay. It needs development.

In 1909 a sample of it was forwarded to Professor Gajjar of Bombay for report which, however, is not found in any State records.²⁸

The following analysis of Khan) Chaniho from the *Dhand* Bagarwaro in the Khairpur State is available in a Memoir of the Geological Society of India²⁹:—

CO ₂	Cl.	SO ₄	Na ₂ CO ₃	NaHCO ₃	NaCl.	Na ₂ SO ₁	Na ₂ C0
18.48	5.3	19.3	33.4	17.6	8.8	28.6	1.8

(2) *Sodium salts* can also be produced from halophytes or natron-producing plants by burning them and lixiviating the ashes.

(3) *Fuller's earth*. Another workable economic product in the State is Fuller's earth, of which there are numerous pockets in the Kirthar series, already noticed. The annual income on this account is Rs. 15,000. It is used in bleaching works.

(4) *Colored clays*. Within the limestone beds are also found clays of various colors.

(5) *Flints*. Flints, at times as large as those measuring a foot in diameter, are found embedded in the upper layers of the hills.³⁰

(6) *Petroleum*.—An experimental well was dug by the Burmah Shell Co., in 1922-23. They are said to have given to the State a royalty for prospecting to the amount of 2 lacs of rupees. They made a boring up to the depth of 900 ft. or so beside the Mir Wah on its left bank and about 3 miles distant from Khairpur. The Kirthar range of hills is about 20 miles distant from the spot. The Company is reported to have suddenly stopped the

²⁸ Administration Report of the Khairpur State, 1909.

²⁹ G. Cotter—M.G.S.I., Vol. XLVII, Pt. 2, 1923 P. 276..

³⁰ W.T. Blanford—Geology of Western Sindh, P. 103.

work within a year of its commencement, and not a trace is left of the boring or the core. I examined the locality and found that the rocks in the Ghar hills are favorable of oil conditions and that the dome of them could be located nearby. But as the deposits of Fuller's earth in pockets indicate and the lenses of coal deposits near Lynyan (Kotri)³¹ have shown, the oil shales may be scanty and the resources limited. No report of the oil prospecting by the Burmah Shell Ltd. is forthcoming and the people of the locality ascribe their sudden stoppage of prospecting to some political reason!

(7) *Forests and Agricultural products.*—The soil between the Indus and the Mir Wah is most fertile and the richest asset of the State. Indigo is also a commercial product.

The valleys near the Ghar range and the flooded banks of the Indus yield forests of good growth, while the Eastern Nara passes through another belt of good soil, capable of excellent crops. Pioneering would be greatly profitable.

³¹ W. T. Blanford — "*Geology of Western Sindh*" P. 192.

V. CLIMATE.

The Khairpur State shares the climate of Upper Sindh to a great extent both as regards temperature and rainfall. The thermal equator passes by and aridity is the characteristic of the Nara Taluka. There are great diurnal and seasonal ranges of temperature and the sky is clear for the greater part of the year. The cyclonic condition developing in the first months of summer in Khairpur and other parts of the Sindh desert is, in a way, serviceable to the Indian monsoon for the generation of the current, but both the seasons bring little rain for the area, though there is not a month of the year in which there are no drizzles and even a few cents are recorded at times. The afternoons, generally after 4 o'clock, are very hot in summer, while frost is common in winter nights towards the end of the cold season. The winds generally blow from the south and southeast from March to September and from north and north-east from October to February, as at Sukkur, 15 miles to the north of Khairpur. The region also participates in the storms of the hot as well as the cold season, the eastern and western disturbances just passing across it. The worst part of summer *viz.* Chaliho (40 days) is from 17th May to 25th June, and another Chaliho in winter lasts from 17th January to 25th February. Dust-storms followed by coolness of the air are also frequent in the dry interiors due to the vigorous convection currents towards the close of the day in summer and sometimes in winter. The pleasantest months are November, December and March. Humidity is low and the climate is on the whole dry and healthy.

The following Table shows some of the temperatures recorded at the State dispensaries in the various Talukas.

Temperature.³²

Year.	Khairpur		Gambat		Mirwah		Faiz Ganj	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1924-25	120	38	..	..	112	52	106	49
1925-26	119	43	..	..	116	52	114	41
1926-27	117	37	..	..	115	59	117	42
1927-28	117	38	..	..	116	44	116	44
1928-29	119	45	..	113	113	49	115	36
1929-30	118	46	118	48	114	49	114	44
1930-31	110	47	116	46	118	53	114	44
1931-32	119	51	120	50	110	46	118	59
1932-33	117	50	116	46	110	57	110	61
1933-34	115	45	110	40	102	58	110	60

The figures do not seem to be reliable. The temperatures were not regularly recorded at the various dispensaries. The maximum temperature is not any of the means, but the actual highest recorded in one particular year, so also the minimum. But even these figures show that the country is uniformly very hot in summer and cold in winter. The seasonal range of temperature is also considerable.

Rainfall.

Rainfall in the State is very scanty and unreliable. The greater portion of it is received during the months of July and August, while there are a few winter showers received in December, January and February. The earliest summer showers are received in May in some years, which is very rare in Sindh. The average annual rainfall at Khairpur Mirs for the past 13 years is 3.63 inches.

³² Administration Reports of the Khairpur State 1924-1934.

Rainfall at Khairpur Mirs Month by Month.

Year.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1921	....	....	....	....	....	....	1-12	....	....	....	....	1-34	2-46
1922	0-03	0-25	....	....	....	....	....	1-30	....	....	....	0-14	1-72
1923	0-13	0-93	....	....	0-04	0-08	....	0-58	....	....	....	....	1-76
1924	0-02	0-49	....	0-10	....	....	0-04	....	0-99	....	....	0-03	1-37
1925	....	....	....	....	....	0-45	1-60	0-23	....	....	0-25	....	2-53
1926	0-15	....	0-76	....	1-00	....	1-66	1-97	0-22	....	....	....	5-76
1927	....	0-30	....	0-03	0-12	....	0-12	....	....	....	....	....	0-57
1928	....	....	....	0-27	....	....	....	....	....	....	....	....	....
1929*	0-15	....	....	....	0-10	....	11-18	6-59	....	....	....	0-37	18-39
1930	0-04	....	....	....	....	0-30	2-13	....	....	....	....	....	2-47
1931	....	0-13	....	....	....	0-83	....	....	....	0-07	....	....	....
1932	....	....	....	....	....	....	....	....	....	....	....	....	3-45
1933	0-10	0-04	....	0-13	....	....	0-40	3-97	....	....	....	....	4-64
Average	0-04	0-14	0-05	0-04	0-09	0-12	1-64	1-19	0-09	0-05	0-05	0-14	3-63
Average for Karachi**	0-13	0-30	0-02	0-02	0-02	0-28	4-17	2-14	4-64	0-04	0-20	0-18	9-14

Administration Reports of the Khairpur State 1921-1934.

* Flood Year

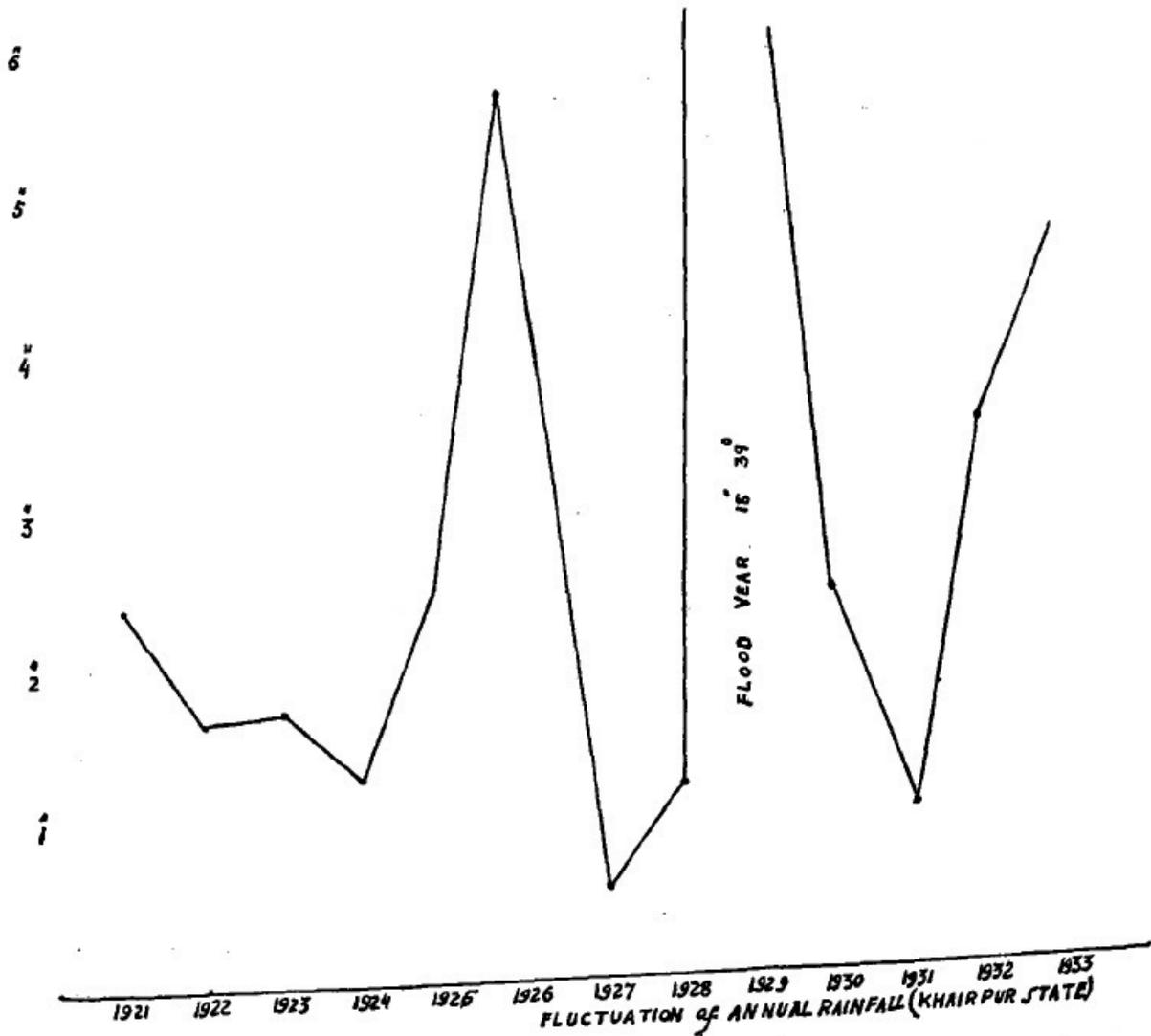
**India Weather Reviews (India Meteorological Department) 1901-1930.

The following comparative table shows the total annual fall (average) for the whole State and the total rainfall (average) at Karachi and at Sukkur. (See Graph).

Year.	Khairpur State. [1] (Average)	Karachi [2].	Sukkur [2].
1921	1-12	16-90	..
1922	1-62	1-99	..
1923	2-62	5-57	..
1924	0-93	3-69	..
1925	3-07	4-38	..
1928	4-05	20-04	..
1927	2-76	8-09	..
1928	0-74	2-39	..
1929	10-27	4-13	..
1930	8-15	16-07	1-76
1931	0-92	0-73	0-26
1932	4-12	12-78	5-41
1933	5-02	20-11	5-84
Mean Annual	3-50	9-14	3-31

[1] Administration Reports of the Khairpur State 1921-1934.

[2] Indian Weather Reviews, 1901-1933 (India Meteorological Department).



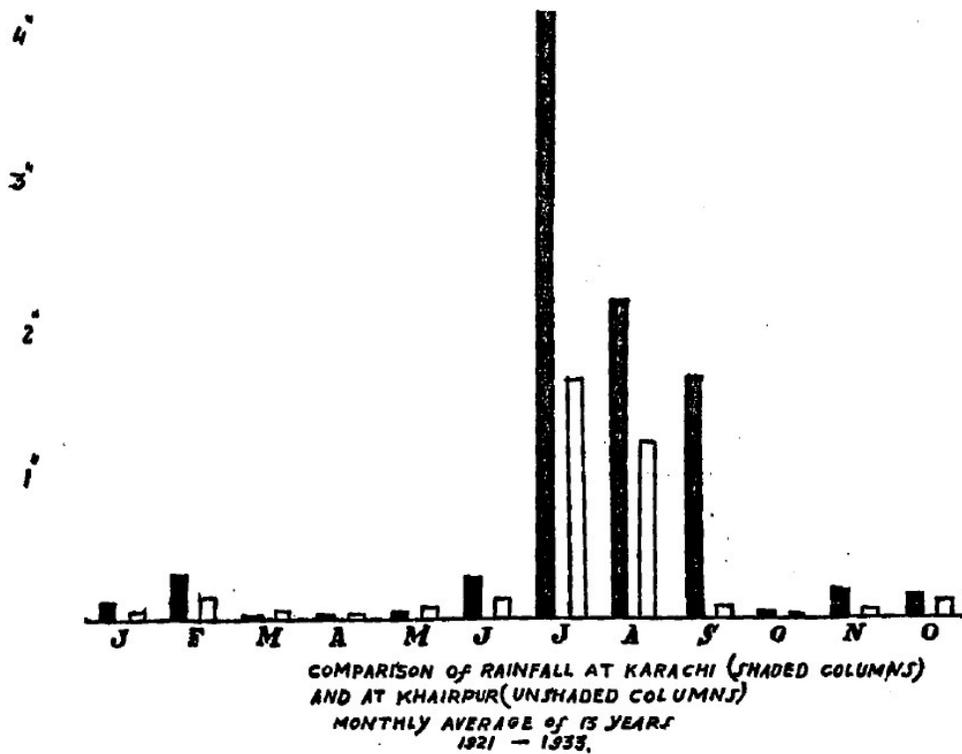
The above figures reveal the facts that the rainfall in Khairpur is not only far less in amount than that at Karachi but also that a flood year, at the former place does not coincide with the flood year at the latter. There is again no doubt that it has considerably increased in recent years, though it is decidedly uneven in both the places. The year 1929 is well known for its great floods in Khairpur and the damage it did to the State, while only a year before there was very scanty rainfall, as also in 1931.

Distribution of Rainfall

Within the State itself the distribution is also can be seen from the rainfall in Talukas:³³

Year.	Khairpur	Gambat	Mirwah	Faiz Ganj	Nara
1930	2-47	4-31		7-88	..
1931	1-03	0-41		2-09	..
1932	3-45	2-45	5-74	4-89	5-30
1933	4-64	3-96	3-46	8-58	6-33
1934	4-17	2H.09	0-45	4-21	0-15
Average	3-15	2-64	3-53	5-53	3-92

Thus, though the State has two seasons of rains, the rainfall is meagre and irregular. Consequently, it forms part of the climatic region of Arid Lowland in India, and is also under the influence of a dry wind system for a good part of the year. Aridity is greatest in the hot weather season. In winter when the skies are clear, the nights are calm and the air very dry; there is a likelihood of frost.

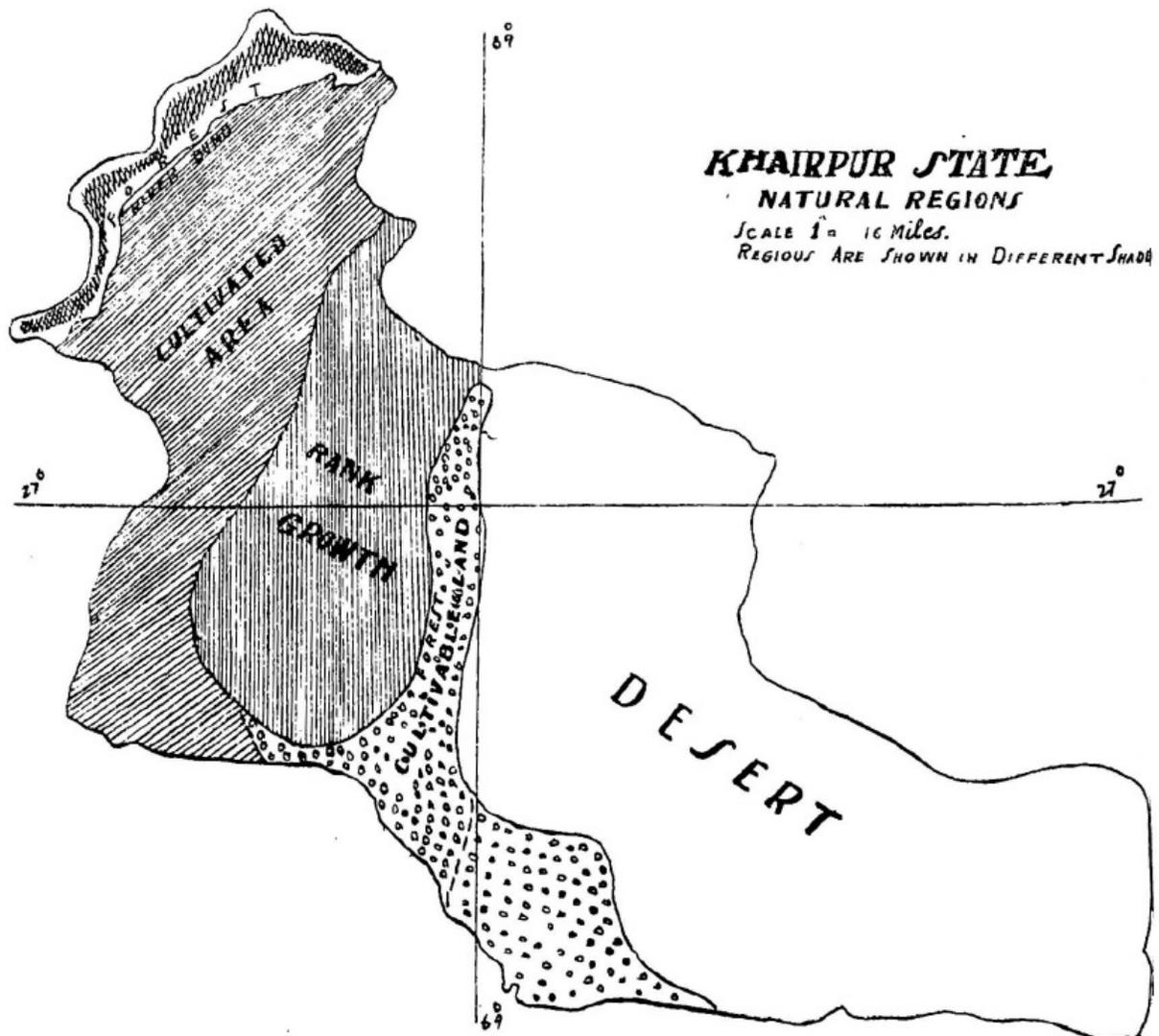


³³ Administration Reports of the Khairpur State 1930-1934

VI. NATURAL REGIONS AND VEGETATION.

Such a soil and climate, as are described above, give birth to a corresponding flora — a scanty, chiefly herbaceous vegetation and to some extent a mixture of Sindian, African and European types. Here also the dates can ripen and the pomegranate blossom well.

There are three natural regions into which the area can be divided. (1) Forests, (2) Grasslands and (3) Desert land. The forests along the banks of the Indus soon pass into the grass land, then gradually into semi-desert scrub land and desert land (See Sketch Map).



(1) *Forests.* These are no great tropical forests but are more like Scrub (thorn) forests, extending from half a mile to a mile along the Indus bank, and also about a mile and a half deep along the narrow Nara valley. They receive the required moisture from the

flood waters during the monsoon season and consist mainly of Babul, Kundi and Tamarisk. They bear thorns and spines as protective weapons against animals. The area covered is nearly 333 square miles, of which two-thirds are reserved as Shikargahs or hunting grounds (Moharis).

Other vegetable products are *Tali*, *Neem*, *Siranb*, *Lesoori*, *Berry*, *Giduri*, *Kirir*, *Khuber*, *Kandero* and *Ukk*. On the rocky parts of the land there is scanty product of *Babul*, *Khabar* and other rank growth.

The bulk of the forests are situated at Mohari Chhor in the Gambat, at Tori Sanhro in the Khairpur and Maroro in the Mirwah Talukas. The annual income is about Rs. 13,000 derived from the sale of wood and '*Yaksali*' cultivation.

The State has begun to encourage afforestation and nearly 35 acres in the Khairpur Taluka and 38 acres in the Gambat Talukas have been platted with *Babul* trees,

Types of Trees:

The following is a number of typical trees growing in the State:—

<i>Kind of Tree.</i>	<i>Peculiarity and use.</i>
Neem	Has medicinal property. Gives good shelter in summer.
Babool	Gives gum and bark for tanning leather. Is grown on banks of canals to strengthen them.
Tamarisk	Grows well in jungles. Its wood is used for water wheels and as fuel.
Lassoori	A fine tree. Fibre is used for robes. Its fruits are eaten by natives as medicine.
Kandi (<i>Prosopis Spicigera</i>)	A stunted Babul grows in valleys especially. Used as fire wood.
Tali (<i>Dalbergia Sissoo</i>)	The finest tree in Sindh. Thickets and hedges are also grown with them.

(2) *Grasslands*. These now form the cultivable area of the State yielding grains and cotton of the best variety. As the rainfall is scanty, the land becomes dry and barren very soon, if there is no sufficient moisture received from the numerous canals which run through this section.

The typical grasses growing in the area are (1) *Sur* or long reed grass (Elephant grass) growing along canals and river banks, and (2) *Bun* grass growing nowadays in water-logged areas.

Halophytes containing Na-salts also grow in some localities.

(3) *Desert and Semi-desert lands.* This section is largely covered with sand-hills, interspersed with flat areas called Pats. Little vegetation supporting scanty life can grow in the latter after some showers of rain are received. Otherwise the common desert plant is *Kundi* of the Mimosa family. Others are those having thick fleshy stems and leaves and very long roots to enable them to store water for a long time. Bushes and thorns are rarer in this section. There are about 80,000 acres of cultivable land in this region.

Some parts of the flood plains called '*kutchha.*' land, flooded by the Indus, are also barren, except the mounds on which vegetation is not entirely destroyed.

VII. WATER SUPPLY AND IRRIGATION.

in the absence of any reliable rains, the value of water is very great in the whole State. Wherever possible, the little rain water received is allowed to accumulate in pools called *Khuds*, from which water is drawn for domestic purposes.

Wherever the flood waters of the Indus percolate through sand belts and gather on lower grounds, they form lakes of fresh water. These again, pass through salt beds and brackish soil and gather still lower down into salt-water lakes or '*Dhunds*,' noticed above.

Old System of Irrigation in *Kharif* and *Rabi* Seasons.

The State possesses an ancient system of water channels, cut during the regime of the early Mirs, *viz.* Mir Wah (60 miles the largest), Main Wah (16), Faiz Nahar (50), Ali Nawaz Wah (24), Nasarat Wah, Faiz Wah (24), Abdul Wah (28), Sanhro Wah (20), Satio Wah, Ali Bahar Wah (54), Viho Wah (28), Pandhro Wah (24), and their branches and distributaries to the extent of about 1,000 miles in length. They are generally found to have been cut in a zigzag manner, without any regard to the velocity of water or to the silting up of their beds. There being no Zamindari system in the State, it appears that the cultivators carried the canals in any way they wanted for their own fields. The gradient being low, $\frac{1}{2}$ inch to 1 inch in a mile, the canals could be cut in any direction and to any length. They were therefore difficult to control. Wherever the beds of the canals were lower than the fields, the system of lifting water by means of the Persian wheel was adopted. The canals again, were fed only by the seasonal inundations of the Indus and so the irrigation was as irregular and unstable as the river itself. Another defect of the old canal system was that there were no observation or inspection paths provided along the channels, so that repairs of breaches etc., to the banks were difficult to make. In the *Rabi* season, the river itself being at its lowest, the only irrigation possible was by means of wells, whose depth varied from time to time and from place to place. Very little water came through the canals themselves.

Participation in the Sukkur Barrage.

As Khairpur was the only Native State, which lay beside the Barrage the question of its participation in the new scheme was a keen one. It is said that the Khairpur State did not at first want to join, as it could manage its *Rabi* cultivation by means of the old irrigation system. But as the biggest of the Barrage canals, *viz.* the Rohri had to be cut through the State territory, crossing some of the State canals themselves and as the Scheme provided no *Rabi* supply to the State, it had eventually to fall into line with the system from June 1932. (See Sketch Map).

As its territories lie adjoining the left flank of the Barrage, no less than four large canals pass through them, (1) Eastern Nara (2) East Khairpur Feeder (3) Rohri (belonging to the British) and (4) West Khairpur Feeder (See Sketch Map).

(1) Eastern Nara Canal Cut Total length of the whole canal 525 miles, width of bed at head 346 ft.

The old Nara, which passed by Rohri and Aror, has been abandoned and a new direct cut through the old Indus gorge at the latter place has been made under the Barrage scheme. This canal is the widest of all the seven canals and flows into the Nara river lower down. The waters flowing now through the Nara are plentiful and are likely to fertilize the narrow valley situated in the Khairpur State. The maximum discharge at the head is 13,649 cusecs.

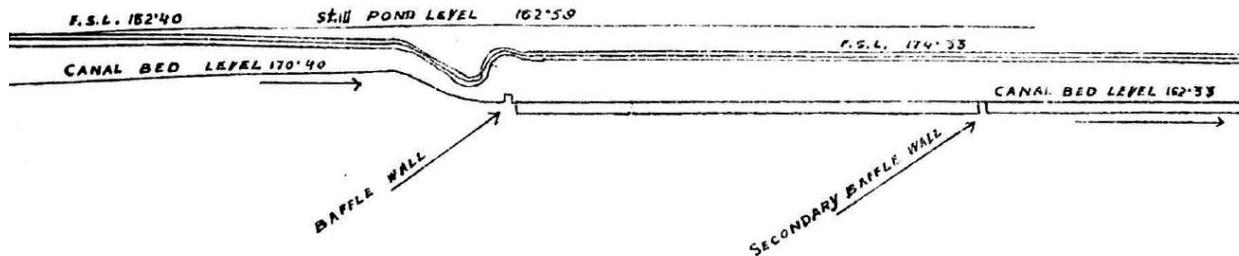
(2) East Khairpur Feeder Total length 13 miles, width of bed at head 82 ft.

This is also a new cut from the Barrage itself specially for irrigating the Khairpur State territories on the east of the Rohri canal, which runs almost parallel to it. It is connected with the Mir Wah, which is the main State canal and to which a regular and plentiful supply is now assured. The maximum discharge at the head is 2,094 cusecs.

(3) *Rohri Canal*. Length of canal 208 miles. Width of bed at head 247 ft., Max. discharge at the head 10,883 cusecs.

This is the longest of the Barrage canals, 208 miles in length running practically from north to south and far into the Hyderabad district, commanding an area of 2,831,024 acres. It is 240 feet wide in the bottom, wider than the Suez canal and 12 feet deep. Due to the height of the land near the head of the canal, the Rohri had to be left on higher ground and given a number of falls in its course to the south. One such important fall of 8 feet lies within the Khairpur State at a place 19 miles down from the head of the canal, called Tando Musti Khan, after which it is now known. (See Diagram).

**TANDO MASTI
KHAN 8 FT
FALL (ROHRI
CANAL)**



"Every irrigation engineer knows that when the slope of the country is too steep to be absorbed by the gradient in the canal, which is limited by the velocity of the water which the soil can stand without erosion, 'Falls' or 'Rapids' are introduced to suit natural contours of the country."³⁴ The most suitable fall for the Rohri canal, designed by the Barrage engineers, Hawes and Colabawala, is the Standing Wave Flume Meter Fall, a sketch of which is given herein. (See Sketch.)

By it "a standing wave is generated at the foot of the Fall with a view to localize the dissipation of the extra energy and to produce a stilling effect at the foot of the fall."³⁵ The effect of this Fall on the running of the canal is that although the water falls, at Tando Musti Khan, through a height of 8 feet, the velocity of water in the canal before and after the fall remains the same, *viz.* 3½ feet per second.

(4) *West Khairpur Feeder.* Total length 45 miles, width of bed at the head is 79 ft.

This is another new cut, connecting the old Wahs of the Khairpur State on the west and securing its discharge from the Barrage for feeding the western canals and distributaries, *viz.* the Faiz Wah, Abdul Wah and others. The maximum discharge at the head is 1936 cusecs.

It is to be noted that as the Rohri canal, belonging to the British, had to be cut through the State territories in its very early stage, some of the old water courses belonging to Khairpur were disconnected and disused. Hence the construction of the two feeders specially for the State. Side by side with this, the work of remodeling the old State canals, *e.g.* the Ali Mahar Wah, has been undertaken by the State so that the irrigation system may be brought to perfection. Except for a brief period of a week in December

³⁴ J. R. Colabawala Bombay Engineering Congress Paper 123. 1927 P. 1.

³⁵ *Ibid* P. 2.

and three weeks in March for cleaning and repairs, the canals do not cease to function during the year.

There is no doubt that the new regime of perennial irrigation in place of the old inundation canals has given to the State a new life. There is now security of tenure and regularity, and control of water supply for all seasons during the year.

River Bunds.

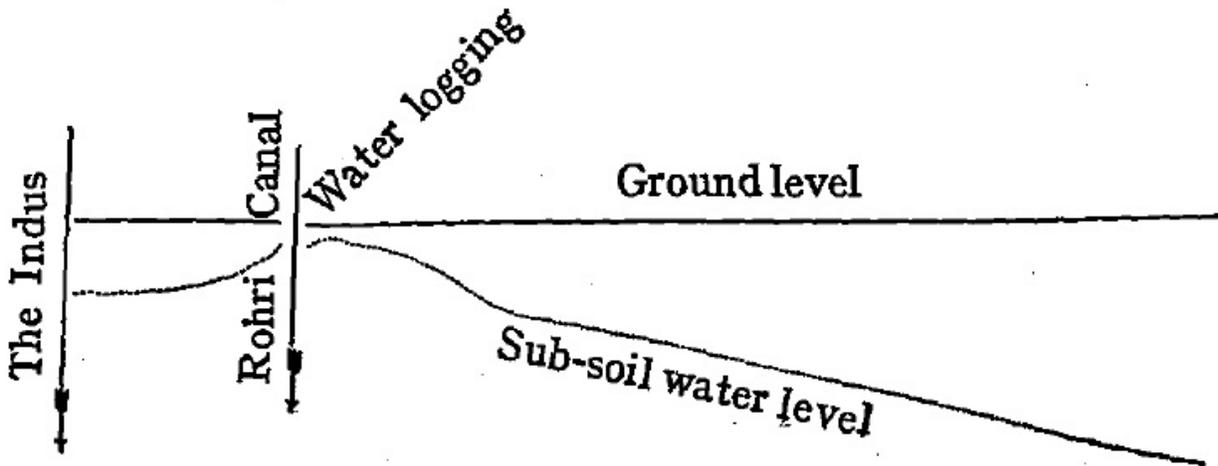
Before the construction and opening of the Barrage even, the inundations of the Indus had produced great damage to the State lands and estates during all abnormal years, the river being extremely awkward at times. So there are what are called protective bands along the river banks at a distance of about eight miles from the channel. They are called Khairpur Protection Bund, Lundi Bund, and Sagvan Bund and the Loop River Bund. The land between the river and these Bunds is '*kutch*' and is largely left uncultivated, especially in the *Kharif* season.

Every season there is a danger of there being breaches in the Bunds and much vigilance has to be exercised by the P.W.D. The following years are remarkable for heavy floods and damage in the State 1876, 1903, 1929 and 1932. In the year 1876, due to abnormal rains, there was an excessive flood which endangered the Khairpur Taluka and the Khairpur Protection Bund had to be built. Similarly in 1929 there were breaches in the State Bunds and there was considerable damage done to crops. Such floods are bound to occur owing to the river bed being on high ground. The total length of these Bunds is about 61 miles in addition to the Loop Bund of 11 miles.

Sub-Soil Water Level.

The Barrage, now controlling the flow of water in the wet as well as the dry season, has come to be a boon to the State. Many fields which were lying barren for want of sufficient water are now being regularly cultivated and both the *Kharif* and *Rabi* crops are getting more and more abundant.

But one baneful effect of the increased water supply, and the passage of the new and fully supplied canals especially the Rohri and particularly the Tando Musti Khan fall in its course through the land, has been a considerable amount of seepage and an unexpected rise in the subsoil water-level. The water level in the reach immediately above this Fall is well above ground-level and it is also a coincidence that this reach in a length of about 6 miles had to go through a sandy belt. This is in Khairpur only 3 miles from the Rohri canal. Here the water level has considerably risen affecting the safety and health of the people.



Great damage has been already caused to Khairpur lands and the villages adjoining them.

A study of the hydro-isobaths within the Barrage Zone in the dry and wet seasons shows that the sub-soil water level fluctuates and in some localities it distinctly rises to about 4. ft. in October. Several fields have thus been waterlogged, owing to the rise of water by capillary action through sand belts.³⁶ Had the canals been cut through clay belts, there would have been less trouble of this kind.

As we go eastwards towards the Nara, the sub-soil water level falls and the depth of wells varies from 6 feet to 10 feet. Further eastwards the level falls rapidly, until in the sandy desert area, there is no water in the wells above 300 feet and man and beast cannot easily live. Several wells in Khairpur yield brackish water as the water percolates through salt layers within the subsoil. (See Diagram).

Kalar.

Large tracts of cultivable lands have also been ruined on account of Kalar, that is, "land in which ordinary crop cannot be grown or can only be grown with difficulty, due to the presence of water soluble salts in quantities exceeding their various toxic limits."³⁷ After the new irrigation system has been established, there has been grave anxiety in the minds of the cultivators regarding the future of their lands on account of this new circumstance. There is considerable salt in the soil and sub-soil, and after this is brought up to the surface by seepage and the water gets evaporated, the land is simply covered with salt.

³⁶ "Problems of Drainage and Water-logging in Sindh"—Report 1934.

³⁷ C. G. Hawes—"A Note on the Sub-soil Investigations made in the area commanded by Lloyd Barrage Canals" Bombay Engineering Congress 1932—Paper No. 188, Footnote P. 8.

There are two typical varieties of Kalar, black Kalar and white Kalar. The black one is somewhat better than the white variety for purposes of agriculture, as it contains at least some moisture. The white variety is very dry and gets easily swollen.

VIII. AGRICULTURE.

There is no separate Agricultural Department in the State but the P.W.D. seek the aid of the Sindh Agricultural Department. Copies of its bulletins - and circulars are supplied to them.

Divisions of Agricultural Lands.

- (1) Those cultivated by inundation only: About 40,000 acres of crops are raised annually in the Ketis or Kutcha land by means of flood waters (*sailab*) from the Indus *e.g.* Rice.
- (2) Those watered by wells *e.g.* Wheat and vegetables are grown in the Khairpur and Gambat Talukas by well water in the *Rabi* season.
- (3) Those watered by irrigation canals and their distributaries. The majority of the State crops are raised thereby, in both the seasons, *e.g. juwari*, wheat and cotton.

Growth of Cultivation.

The following table³⁸ shows the growth of the State lands under cultivation, excluding the Shikargahs and Jagirs:

	1932-33	1931-32	Difference
	(Acres)	(Acres)	(Acres)
Kharif	1,13,494	1,16,767	+3,273,
Rabi	63,850	1,11,498	+47,648
Total	1,77,344	2,28,265	+50,921

	1932-33	1933-34	Difference
	(Acres)	(Acres)	(Acres)
Kharif	1,16,767	1,36,582	19,815
Rabi	1,11,498	1,36,527	25,029
Total	2,28,265	2,73,109	44,844

Thus it can be seen that the crops have considerably increased since the opening of the Barrage, nearly a lac of acres of land more have been brought under cultivation. The *Rabi* crops especially have increased to more than double the crops in 1931-32. The cultivation in the *Kharif* and *Rabi* seasons of last year is considerably more than double

³⁸ Administration Reports of the Khairpur State 1931-1933.

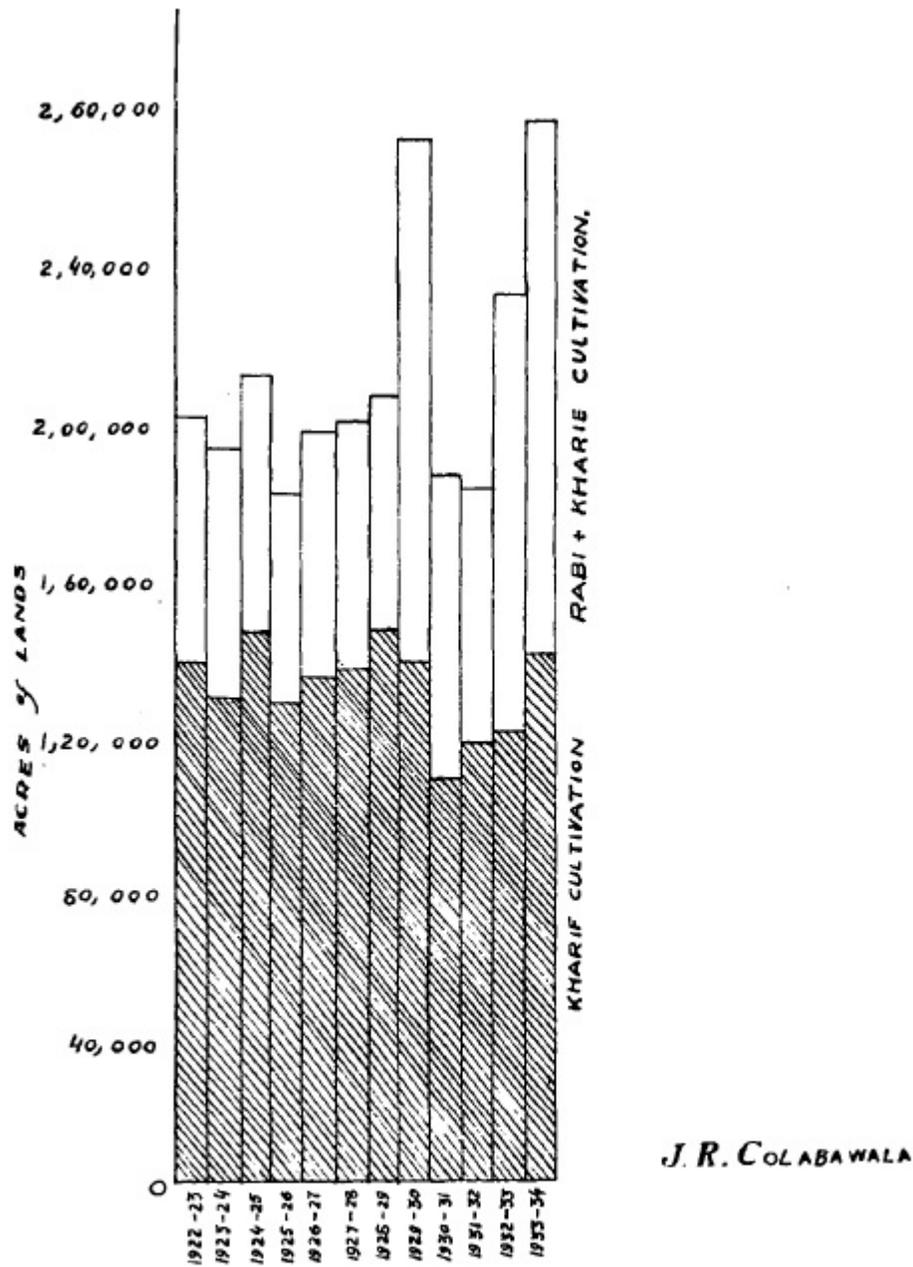
the average *Khariif* cultivation for 1922-23 to 1932-33 and four times the average *Rabi* crops for the same period, as can be gathered from the accompanying graph. (See Graph.)

Effects of Perennial Irrigation.

This prosperous condition can only be ascribed to the regular and plentiful supply of *Rabi* water from the Barrage as the following tabular statement³⁹ will show:

Year.	Amount of Rainfall in the State.	Nature of Inundation.	Extent of Crops. Acres (approximately)	
			(<i>Khariif</i>)	(<i>Rabi</i>)
	Inches.			
1925	3.07	Inundation satisfactory	1,43,000	64,000
1926	4.04	Indus did not rise high Canals did not run well.	1,24,000	64,000
1927	2.76	Fair level in the river but inundation briefer.	1,30,000	66,000
1928	0.74	Canals worked well at the end of season.	1,32,000	54,000
1929	10.27	Inundation good. Cultivation flourished. July rains and floods.	1,42,000	64,000
1930	8.15	Effect of last year's floods,	1,34,000	1,34,000
1931	0.92	Inundation deficient at the end of season.	1,04,000	78,000
1932	4.12	River rose late and fell early. Inundation below the average. Portions of Ketis flooded.	1,14,000	65,000
1933	5.2	Inundation of short duration. Barrage regulators work.	1,16,000	1,12,000
1934	6.01	Perennial supply of water	1,36,000	1,36,000

³⁹ Administration Reports of the Khairpur State 1925-1934.



J. R. COLABAWALA

KHAIRPUR STATE (EXCEPTING NARA TALUKA)
GROWTH of CULTIVATION

Thus it is clear that although the rainfall is irregular and often scanty and the river inundation deficient, there has been a steady growth of crops during the last three years. There is, nowadays, no consideration of the shortage or heaviness of rainfall or the nature of inundation. *Rabi* water supply is assured and '*lift*' land is converted into '*flow*' land. Only with the development of agriculture and agricultural facilities, the

Khairpur State is bound to flourish. The following note in the State Administration Report of 1933 is significant "The State was given by the Government the benefit of a water supply from the Barrage for the entire *Rabi* season without prejudice to the British Sindh requirements and to the general question of the States liabilities to the extent of Rs. 26.79 lakhs. This increased the cultivation considerably and brought prosperity to the State and to its cultivators. The flooding of the '*Ketis*' (Kacha land) along the river was also satisfactory and better than the previous year."⁴⁰ The most remarkable thing about land cultivation in Khairpur is that there is no Zamindari system and the land is held chiefly by individual farmers who cultivate it in their own private fields.

And yet there is an immense area of cultivable land estimated at 3,09,574 acres, waiting to be brought under cultivation for want of land owners and cultivators. (See Graph.)

Now, and then, the crops suffer from frost, white ants, ball worms and other insect pests.

Nature of Crops.

In a region with a very scanty rainfall, only millet and pulses should thrive best. The winter season with its very dry climate is suitable for growing wheat. The next best crop is cotton, which grows well in all irrigated areas, while there are some chances for rice cultivation also in sandy wet parts of the State. The chief crops raised therefore are wheat, *bajri*, *juwari*, cotton and rice. Before the Barrage few farmers knew wheat, but now good wheat is grown in some of the Talukas. Other crops are barley, gram, peas, *mung*, oilseeds and tobacco.

There are good prospects of improving the quality of cotton in the State. Both the cotton and rice plants reach a greater height in the State soil than elsewhere, as it is not only sandy but also silty to some extent and deep, so that the irrigation water can easily run off and the air necessary for the growth of the plants can enter the inner layers. American cotton is likely to grow very well.

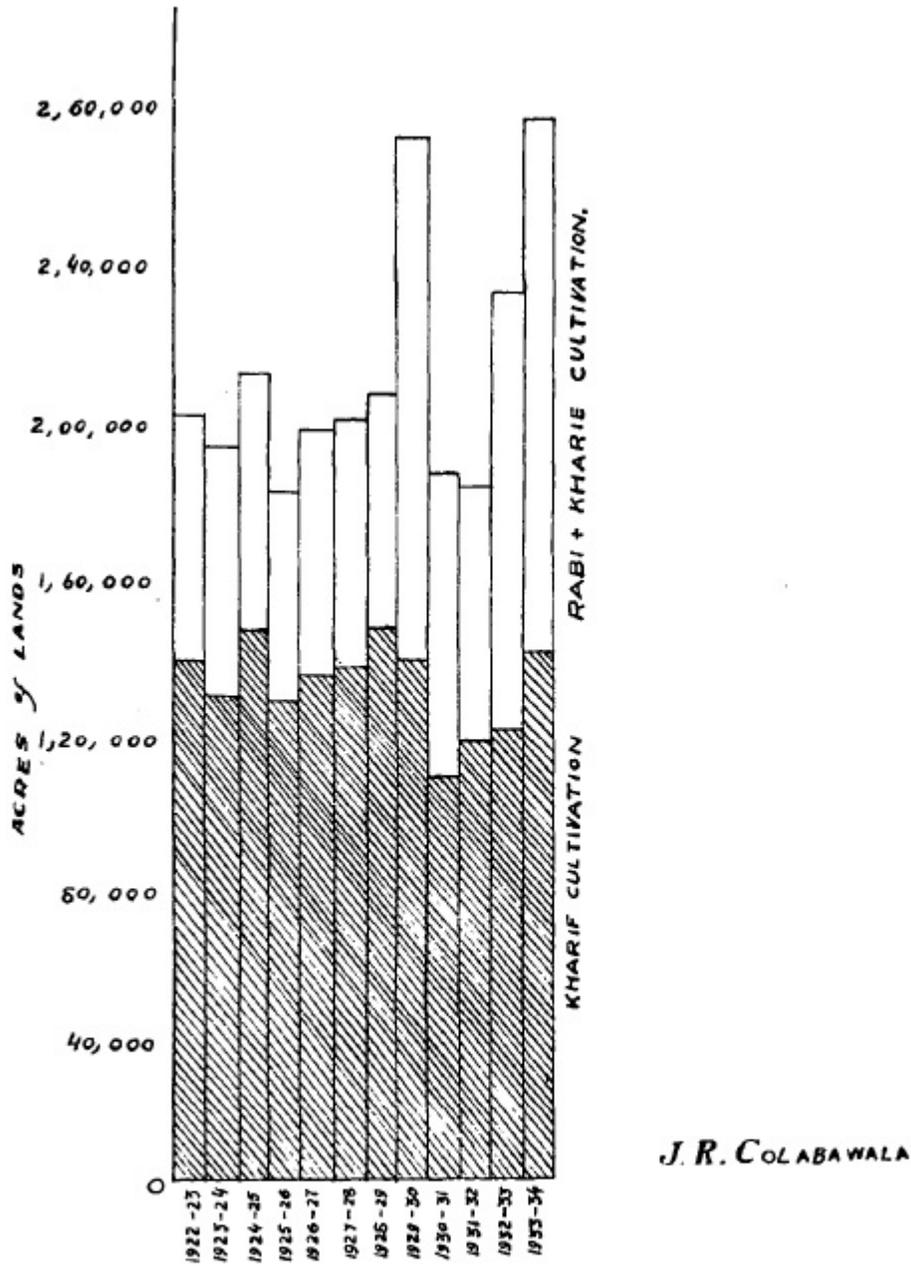
Vegetables, Flowers and Fruits.

Cabbage, tomato, and Spinach, grow in abundance. Real English flowers, such as pansies, mignonettes, petunias, phloxes, balsams, violets, sweet peas and a very marked variety of roses, such as cabbage, Marechal Niel, Chinese Red are cultured: It is remarkable that roses grow in the State lands all throughout the year and plentifully.

Among the fruits are oranges, grapes, mangoes, plantains, mulberries, pomegranates, berries, lemons, watermelons, dates, gourds and grapefruits.

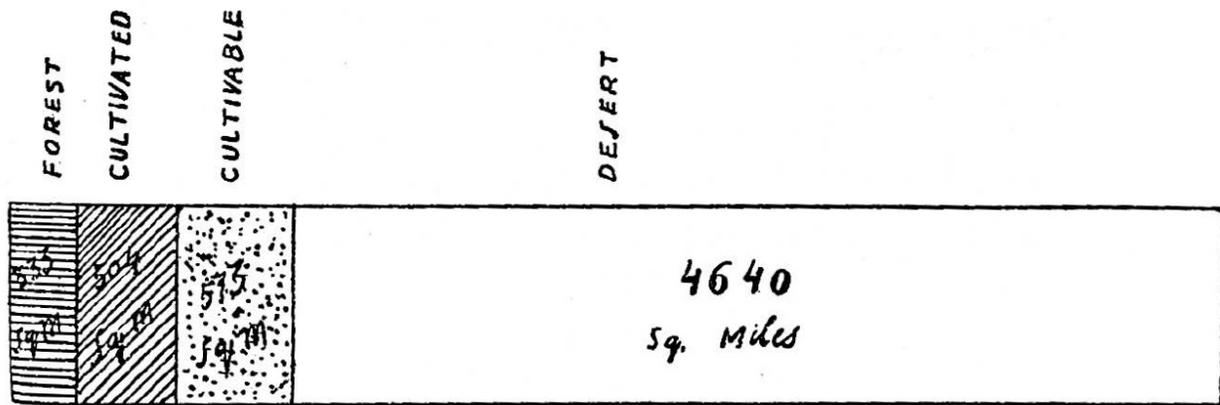
⁴⁰ Administration Report of the Khairpur State 1933 p. 19.

Opium poppies are also grown in the Khairpur Taluka, while the Cultivation of *Bhang* is restricted to persons competent to deal with it.



J. R. COLABAWALA

KHAIRPUR STATE (EXCEPTING NARA TALUKA)
GROWTH of CULTIVATION



6050
sq Miles
of
KHAIRPUR STATE
CULTIVABLE AND DESERT
LANDS

IX. COMMUNICATIONS.

These consist of

1. Railways
2. Roads
3. Camel paths
4. Canal routes. (See Sketch Map).

Railways.

There is no State railway constructed in the area, but the only communication by rail through the Khairpur territories is the N.W.R., which runs almost parallel to the Indus, due north and south. There are altogether 8 railway stations, covering about 44 miles within the State limits, *viz.* Begmanji, Khairpur Mirs, Tando Musti Khan, Pir Katpar, Gambat, Ranipur Riyasat, Setharja and Mahrabpur Jn. On the Jodhpur Railway, Khadro and Dhoronaro Stations also serve the State.

Roads.

The roads provided for by the State are as under:—

Metalled road	8 miles.
Earth-roads (chief)	400 miles.
Earth-roads (ordinary)	400 miles.
Total	808 miles.

Out of these, 225 miles of roads are hay-covered and motor-able. The rest are mere earth-roads and uncovered. All of them are very dusty, and for this reason the system of covering them with hay is very peculiar and economical and is generally adopted throughout the State.

The following roads in the Indus Valley Section are important:

1. Khairpur-Sukkur road, forming part of the Karachi-Multan trunk road.
2. Khairpur-Kot Diji road, connecting the old Mirs' seat with the town of Khairpur.
3. Khairpur-Pir Jo Goth road, leading to the sacred seat of the Pir.
4. Khairpur-Kot Lalu road, running almost parallel to the Railway and mainly along the Ali Bahar Wah.

Good and durable bridges exist over the State canals, some of them being ancient.

Camel Paths.

These are the only means of communication through the Nara Taluka and other desert tracts, crossing and re-crossing sand-hills.

Canal Routes.

Although there were not even observation paths constructed in the past along the various canals, good and motor-able roads have now been built on the banks of the newly constructed water courses, such as the East and West Khairpur Feeders, the Rohri Canal etc., (about 75 miles). These are meant for canal inspection and official, use only.

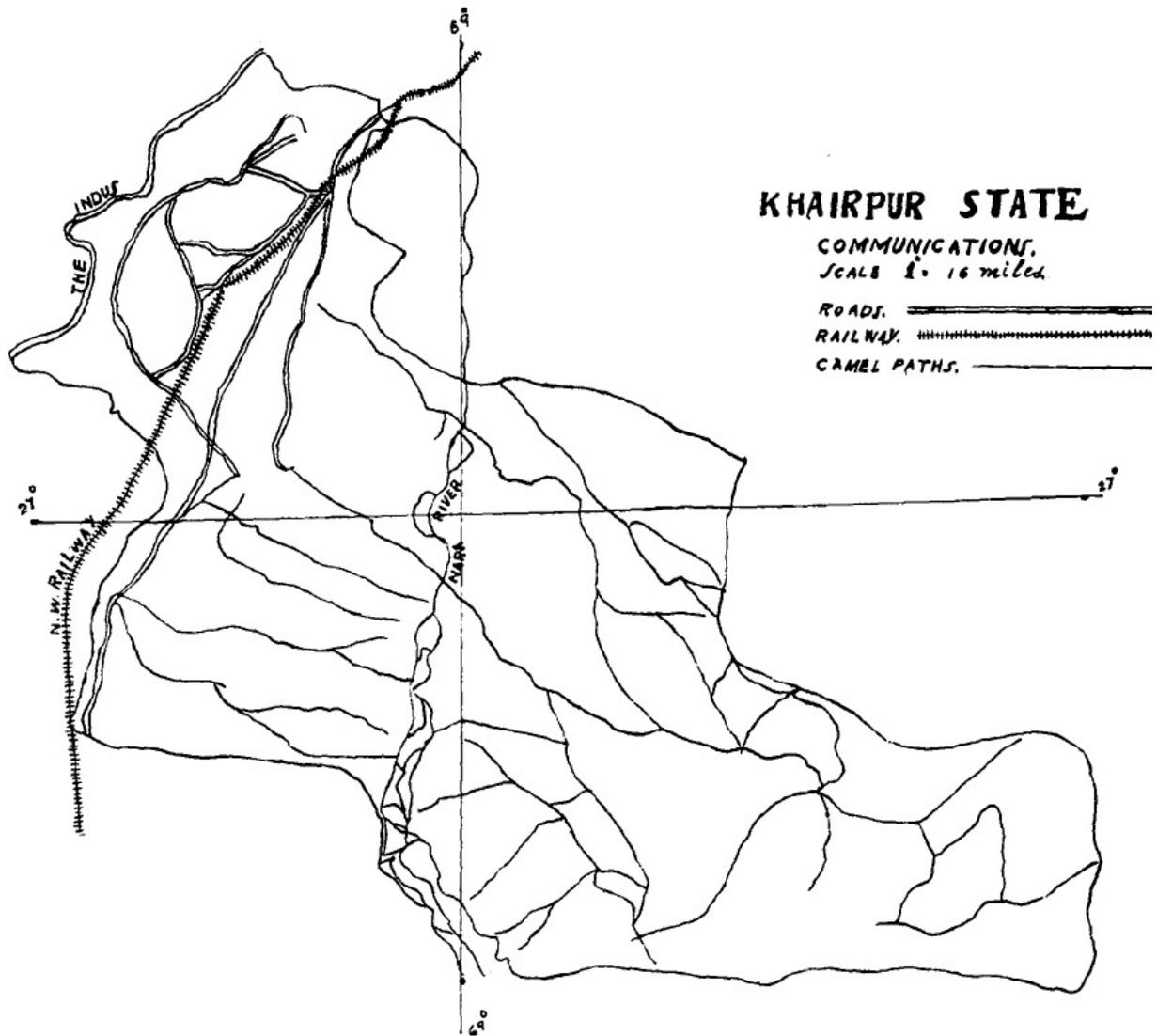
X. POPULATION.

The population of the State⁴¹ consists of Moslems (83%) and Hindus (17%)—Moslems 186,577, Hindus 39,894, Others 712,—Total 2,27,183.

Moslems.

These are mostly Sunnis (Sindhis) by caste, while the ruling family and a few others are Shias (Baluchees). Most of the Sunnis, again, belong to the Sumra and Samma classes, who were Hindu converts to Islam in the Arab days. They are engaged in agriculture. Among the Baloochees there are the tribes of Rind, Muri, Chandia, Jatoi, etc.

⁴¹ W. W. Hunter-Imperial Gazetteer of India Vol. 8 Pp. 134-135.
Dracup and Soriey — Census Report, 1931 Vol. 8 Pt. II.



Hindus.

The largest number of the Hindus are Lohanas and Banias who are engaged in trade. They at present, prefer to live in towns together, e.g. Gambat, Ranipur, Khairpur, but formerly they occupied the eastern parts (Nara) of the State.

Other Hindus are the Soda Thakurs and Rajputs, who are strong and freedom-loving.

Occupation.

More than two-thirds of the population live on agriculture, which is the chief industry. The rest are traders, artisans and labourers. There are a few occupied in industries.

Professions.

Professions.	Male.	Female.	Total.
Pasture and agriculture.	53,909 494	494	54,403
Trades.	5,876 41	41	5,917
Domestic servants.	2,425 1	..	2,425
State servants.	464	1	465
Textiles.	1,009	125	1,134
Potters.	392	15	407
Butchers.	62	2	64
Shoe Makers etc.	569	16	585
Embroiderers.	1	..	1
Barbers.	361	..	361
Well sinkers, stone cutters, etc.	383	32	415
Hunters, fishermen, etc.	482	19	501
Breeders of animals.	160	..	160
Market gardeners.	210	..	210
Forest officers, rangers.	15	..	15
Estate agents.	11	..	11
Rent Collectors.	9	..	9
Boat Owners, etc.	134	1	135
Railway servants.	17	..	17
Post Office and Telegraph servants.	19	..	19

Proportion of Bread-earners and dependants to population.

Population.	Bread-earners.		Working dependants		Non-working	
227,183	Male	72,684	Male	2,940	Male	49,430
	Female	1,205	Female	567	Female	100,357
TOTAL		73,889		3,507		149,787

Growth of Population.

Census Year.	Male.	Female.	Total.	Remarks.
1872	..	..	130350	21 per square mile.
1881	70,746	58407	125919	..
1891	..	..	128611	..
1901	..	..	199313	33 per square mile.
1911	1,21,783	102039	223822	..
1921	1,07,223	85929	193152	..
1931	1,02,129	102129	227183	37 per square mile.

The above census figures show that there is a growth (+101,264 variation in the period from 1881 to 1931) of population during the last seven decades with the exception of 1921, ever since the time of Mir Faiz Mohammad Khan, after whom the Faiz Wah is named. On inquiry it was found that the drop was due to several causes *viz.* influenza, forced labor, the Great Wax and the State political troubles, when migration took place. The forced labor or *Chher* was abolished by H. H. Ali Nawaz Khan in 1921, which year also saw the inauguration of the State's largest canal *viz.* Ali Nawaz Wah. (See Graph).

Another marked peculiarity of the census reports is that females are fewer than males.

Distribution of Population.

The following is the distribution of the State population by Talukas and villages:

Taluka.	Population.	Important Towns.	Number of Villages and Towns.
Khairpur	93,317	Khairpur, Lukman, Tando Musti Khan, Kot Diji.	133
Gambat	69,610	Garnbat, Khuhra, Ranipur, Hingorja.	
Mirwah	34,823	Thari;Tando Mirali.	
Faiz Gani	15,999	Chang, Karundi	
Nara	13,419	Sorah	

Towns and Villages classified by Population.

No. of persons.	No. of towns and villages.	Population.
Under 500	33	7,388
500-1000	23	16,589
1,000-2,000	37	56,667
2,000-3,000	32	92,285
5,000-10,000	7	42,000
10,000-20,000	1	11,582

Houses in Towns and Villages.

Chief Towns 2	Houses	3,372	Average	1,686 houses per town
Villages 131	Houses	37,996	Average	290 houses per village

Manner of Distribution.

The urban population of the State is 17,868, while the rural is 209,315.

Within the State the tendency of the people is to gather together:

1. Round their fields near the canals in Tandos *e.g.* Tando Musti Khan
2. Round religious places or tombs of saints *e.g.* peer Jo Goth, Darajah.
3. Round forts, *e.g.* Kot Diji.
4. Round old battle fields *e.g.* Halani.
5. In towns along the railways or trade routes *e.g.* Khairpur, Gambat, Ranipur.
6. In villages, near the fields and pasture lands, *e.g.* The Nara Taluka.

Notes on Towns.

Khairpur.⁴²

This town was originally founded by Mir Sohrab Khan in the village called Boira and the Zamindari of the Phulpotras. In 1894 Vazier Kadir Khan established it as the State

⁴² W. W. Hunter—*Imperial Gazettes of India*, Vol. 8. P.137.

capital. It is by far the largest town, being the official centre and seat of the Minister. The population is over 15,000 of which half are Moslems and the other half Hindus. Its situation is favorable on the Mirwah and about 13 miles south of the Barrage. It is the centre of an important agricultural district with railway connections and also midway between the rocky eminence of the Ghar hills and the Indus river. The town is not well laid out and the houses are mostly mud hovels. The best building in Khairpur is the Guest House, called Faiz Mahal, but owing to seepage it also has its arches getting cracked. Other bungalows are affected likewise. The native town has narrow winding streets as is usually the case with other Sindh towns. It has a good trade in indigo, *jowar*, *bajri*, and oil seeds and its manufacturing industry is weaving and dyeing. Outside the town are the tombs of Mahomedan saints e.g., Pir Ruhan, Ziauddin, Haji Jaffar Shahid.

Kot Diji.

This is an old and ruined fort situated on a rocky eminence, a spur of the Ghar range, round which a small town has grown. "It consists of a number of separate fortified heights, connected by a loop-holed curtain and was no doubt regarded at one time as a place of great strength but it has been abandoned as a fortress."⁴³ There is, on the topmost height, an old gun with some Portuguese inscription. Till recently the Central Jail was located here. Near the town is the chief residence of the Mir and his family. About the town there are old water channels, now covered over with sand.

Gambat and Ranipur.

These are the chief Hindu centres of trade where fairs are held every year.

Halani.

This is an old battle-field, where Abdul Latif Kalhora was defeated by Mir Fateh Khan in 1781.

Fort Imamgarh.

At this place Mir Rustom Khan was defeated by Sir Charles Napier in 1843.

Pir Jo Goth.

It is some 12 miles to the west of Khairpur. The town has grown up round the tombs of the Pirs and the fort is about 30 years old. It is within one of the enclaves of British territory (Kingri Topa). The Pir Pagaro, a most influential Pir in India, is in jail at present. He is the leader of the Hurs.

⁴³ J. W. Smyth, - Gazetteer of the Province of Sindh. Vol. B. P. 44.

Migration of Population.

According to the census of 1901, there were 18,400 Khairpuris found in British India, working in railways and canals, while 9,900 aliens lived in the State. The latest census reports show the number of Khairpuris in British India to be increasing, while that of aliens in the State to be 6,843 only.

As stated above, the Hindu element of the population in the State has shown a tendency to migrate to towns, such as Gambat and Ranipur.

Due to seepage and water-logging, the people who lived in villages which are destroyed along the Rohri canal have moved to the interior. Lukman town has been nearly destroyed owing to the same troubles and the rich and cultivable fields are all covered with Kalar. The population has been shifting to places near Khairpur.

Literacy among the Muslims is 8,139 males and 480 females, total 8,619 *i.e.* 4%, while that among the Hindus is 3,181 males and 247 females, total 3,428 *i.e.* 8%. Education, though not popular, is spreading among the people living in towns. The total number of pupils drawn from various parts of the State and studying in the State A.V. schools at Khairpur, Kot Diji, Gambat, Piryaloi, Hingorja, Bhangoo Behan, and Khairpur Mirs, is 531. In the Naz High School there were 196 Moslem and 145 Hindu boys studying in 1933. In the villages there are a number of Mulla schools, in which 6,293 pupils were studying in the same year. Female education, except among a few Banias in Khairpur, is not at all popular.⁴⁴

Mortality is low; a reference to the vital statistics for 1933 and 1934 shows that the ratio of births and deaths per 1,000 of population was 13.7 and 14.3 and 9.6 and 11.7 respectively.

⁴⁴ Administration Report of the Khairpur State 1933 p. 19

XI. TRADE AND MANUFACTURE.

A few of the indigenous arts and crafts are still preserved in the State. While a large majority of people are engaged in agriculture, a small proportion of the townsmen are engaged in minor trades and manufactures. The old cottage industries are cotton and silk fabrics, colored cloth, lacquered work, pottery and swords making. Opium, Salt and saltpetre are also manufactured.

<i>Kind of Industry.</i>	<i>Place.</i>	<i>Manufacture.</i>
Cotton weaving	Gambat, Pir jo Goth	Khais (coloured bed sheets) and Susi cloth.
Cotton weaving	Ranipur	Chandnis (white cotton coverlets with red borders) and towels.
Woollen weaving	Uman (Fait Ganj)	Farashies (carpets)
Carpet weaving	Khanpur	Giles Carpet Factory.
Silk weaving	Lukman (Khairpur.)	Silk cloth.

The last industry, namely, silk weaving, is very creditable to Khairpur, as the native craft is kept up with improved electric machinery of hand-loom. The silk cloth is fine and durable while the silk yarn is imported from Mysore.

Dyeing in fast color is a specialty of the State.

Exports and Imports.

In the earliest returns of the exports and imports of Khairpur, we find Rs. 5,36,508 worth of articles exported to British Sindh and Jaisalmir, chiefly Indigo, cotton, wool, wheat and *ghi*, and Rs. 2,52,620 of imports of rice, wheat, piece goods, barley and molasses.⁴⁵

In 1886, the exports of goods such as indigo, wool, cotton, grain, tobacco, skins, amounted to 5¼ lacs of rupees, while the import of goods such as rice, wheat, barley, sugar, oil, silk, molasses and piece goods amounted to 2½ lacs of rupees. In 1908, however, the exports and imports of the State were equal *viz.* 6 lacs each. '*Kharo chaniho*' (sodium salts), Fuller's earth, grains of all kinds, hides, tobacco, indigo, wool, cotton and hand-made cloth are some of the exports of the present day.

There is a very interesting industry of country liquor distillery at Lukman, of which Seth Khemchand Diwan Manghersing & Co., are the contractors. Various kinds of liquor, possessing medicinal properties, are prepared in it. Native ingredients of spices and even of animal matter are used, while the molasses are imported from the Punjab. The manufacturers possess some carefully dispensed prescriptions and the following

⁴⁵ A. W. Hughes Gazetteer of the Province of Sindh, 1876 Pp. 428-429.

varieties of liquor are made Dumbo, Partridge, Rose, Mush, Chandan, Elachi, Banana, Orange, Mango, Almond, Pista, Jiri, Nim, Auk and Tooh. The same manufacturers have now obtained a license to prepare English liquor also, and another one to export their products to Sindh.

Toddy trees are plentiful in some of the Talukas and a movement is afoot to secure a license for toddy.

The rising generation in the State are given an industrial bias in the Sir Mir Ali Murad Khan Talpur Industrial School established in 1894. Carpentry, smithy, embroidery, carpet making, pottery and lacquered work are taught.

State Revenues.⁴⁶

The State revenues amount to Rupees twenty lacs nearly, of which the following are some of the main sources:

Land Produce	1932-1933.	1933-34.
a. Land Revenue	11,67,135	13,77,340
b. Fuller's Earth	15,834	15,334
c. Kharo Chaniho	38,720	59,143
Excise	1,76,285	1,74,255
Other Taxes	89,110	1,02,663
Cattle Ponds	17,205	18,183
Ferries and Fisheries	10,833	7,611
Forests	14,552	10,533

⁴⁶ Administration Report of the Khairpur State 1934, Appendix XXI.

XII. ANIMAL LIFE.

In an arid region with an extra-tropical climate as is described above, the fauna is scanty and more allied to that of the Iranian plateau than to other Indian provinces.

Among the domestic animals are cattle, horses and camels. The camel is by far the best beast of burden. Bullock carts with their peculiar creaking wheels are common and horse riding is practiced by the better class of people in towns.

Wild Animals.

Tigers used to live in the jungles of the State but the species is now not found. The scrubland is the home of wild pigs, which destroy crops, while in the Shikargahs there are jackals, wolves, foxes, hares, wild cats, deer, stags, hyenas and snakes. Crocodiles live only in the Eastern Nara, while reptiles, especially venomous, are also not numerous.

Birds, etc.

Among the birds are jackdaws, owls, crows, sparrows, doves, pigeons, peacocks, geese, partridges (black and grey) and water fowls. Palah and tortoises are the common fish. The numerous lakes, *dhunds*, marshy channels etc., are the breeding spots.

Agriculture Stock.⁴⁷

Bullocks	21,205	26,290
Cows	24,951	30,630
Buftaloes	20,353	18,459
Horses	8,857	10,829
Donkeys	4,731	4,938
Sheep and Goats	47,785	61,560

There were altogether 16,111 ploughs, 756 carts for passengers and 3,432 carts for goods utilized in the whole State last year.

Shikargahs.

Shooting is not allowed in the Shikargahs without the permission of the Mir Sahib.

⁴⁷ *Ibid* Appendix V.

XIII. LIFE OF THE PEOPLE.

Relation of Geography to Human Life.

The life of the people living in the region is greatly affected by the climate—extreme temperatures and little rainfall. They live largely on agriculture, in huts and tents in villages and forests and in mud-houses with flat roofs in towns. They sleep in the open or on terraces whenever the nights are hot and unbearable. The bricks of their houses are sundried, because there is plenty of sunshine and little rainfall. The streets are extremely narrow so that much glare is warded off in summer and heat conserved in winter. They usually wear loose clothes and men put on big, white turbans—a typical tropical dress.

in rural areas the chief property possessed by people is their flock of sheep and goats, living on any grass that can be had in flat areas. They, therefore, move from place to place for fresh pasture, living a nomadic life.

Both the Hindu and Mahomedan sections of the people live amicably and they do not seem to be much concerned with politics. The non-cooperation movement did not touch them at all. The people who derive their energy from the hot sun are self-satisfied, having no affairs but their work of cultivation, and do not mind who rules the State, for, such is the influence of the climate and the physical environment.

Vestiges of a Foreign Influence.

Reference has already been made to the different castes and classes of people living together in the State. The ruling race of the Baluchis, deriving their culture from the Persians (Iranians), has made a mark on the character of the people, as can be seen from the following:

1. We have noticed above the meanings of the names of some of the ancestors of the Mirs of distinctly Persian (Iranian) origin.
2. The Sindhi language which is prevalent in the State is half Persian (Iranian) and half Sanskrit. The ancient name of the river Indus is Mehran,⁴⁸ as the Arab geographers have popularized it. It is a purely Persian (Iranian) nomenclature. Other names of towns and villages have also similar Persian (Iranian) traces *e.g.* Tur, Mehrani, Khairpur, Manak Bahman.

⁴⁸ H. G. Raverty — "*The Mihran of Sindh and its Tributaries*" J.A.S.B. Vol. IX Pt. I. 1893.

3. One of the most remarkable features of the life of the Mirs was their recreation in the Shikargahs or hunting grounds, which were so common in the days of Persian (Iranian) kings. Small enclosures in the neighborhood of capital towns and large ones in the forests for prolonged tours were provided for. Even the present Mir possesses his own private hunting grounds. Polo is another purely Persian (Iranian) game, popular among the Sindhis.
4. Even in the architecture of India there are signs of Persian (Iranian) influence. The ruins of Pataliputra (Patna)⁴⁹ have provided ample evidence of a distinctly Achcemenian (Persian) contact, if not lineage. So are the shapes of domes and arches, which are the predominant characteristics of mosques, tombs and palaces built in Khairpur.
5. But the best of all, is the system of irrigation which is wholly adopted here. The Persians (Iranians), under Darius the Great, were great builders of canals and the originators of the Persian wheel, which is so common in our agricultural fields for lifting water. It is strangely enough, still called 'Persian', a most tangible proof of Persian (Iranian) influence in this region.
6. And yet one more example of Persian (Iranian) craft is carpet weaving, the pattern of it being a piece of music done in a technical notation.

⁴⁹ Vide the author's "*Rock-Records of Darius the Great.*" 1918 Pp. 38-41.

XIV. THE BARRAGE AND AFTER.

The fate of the State is sealed with the Sukkur Barrage. Its effects are even, in its early stage, noticeable on:-

1. Agriculture and crops.
2. Soil and seepage.
3. Human habitations.
4. Population.
5. Climate.

Agriculture and Crops.

The State is mainly dependent on Agriculture and land revenue, which in the very first year increased from Rs. 10,27,903 in 1931-32 to Rs. 11,67,135 in 1932-33. The revenue system itself required, in the past, the State's share of the produce in kind. Since 1930, it is now received in cash at fixed rates of assessment throughout the territories. The assurance of water-supply, through the canals and their distributaries, has resulted in an assurance of taxes. Besides, there are no landlords to do profiteering between the State and the ryot, the fields being directly in charge of the peasant class.

The Barrage has begun to function successfully and regularly, which means prosperity to Sindh and to the Khairpur State. The following extract from the Government Annual Report of the Agricultural Department will throw light on this point:

"The transition from the former inundation condition of water supply to an assured and perennial irrigation system was the main feature of the agricultural year and constitutes an outstanding landmark in the history of Sindh.

"The first year's working of the Barrage irrigation must be regarded on the whole with definite satisfaction.

"Records of the levels of the river Indus during the year clearly show that, under the old inundation conditions of irrigation, the supply of water for crops cultivation over the greater part of Sindh would have been most inadequate and irregular.

"Accordingly, the controlled conditions of irrigation under the Barrage have amply demonstrated, at this early stage, their value and importance to the agriculturists of the province."⁵⁰

⁵⁰ Annual Report of the Department of Agriculture in Sindh 1932-33.

Wheat has begun to be grown successfully and arrangements have been made for producing American cotton. Improved seeds of *jowari*, etc., have been imported. There are good prospects of the potentiality of the land yielding improved crops in all the Talukas, including the Nara.

The development of the Nara Taluka is only delayed for want of money. Forests have grown on either side of the valley to the extent of 1½ miles in width. This area is cultivable and the Eastern Nara canal is big enough to supply the State lands with Water for cultivation and colonization. Much pioneering is needed for all this.

Lastly, the Barrage has enabled the cultivators not only to receive enough water at any time of the year, but also to prolong the *Kharif* crops and to extend the area of cultivation.

Soil and Seepage.

But there is also the darker side of the Barrage to consider. As in the case of every irrigation project in the world, soil seepage has resulted from the increased water supply and the passage of very large volumes of water through the State soils and subsoils. This has damaged the State fields and properties to the extent of thousands of acres of arable land. The loss to cultivators is really great. Even rice cultivation is restricted owing to the same trouble.

The soil generally is full of fine sand and is therefore very porous. There is considerable seepage due to capillary action through this sand all along the Rohri canal. Nearly 7,000 acres of the State lands have been water-logged and deserted in the different Talukas. The soil in Lukman, for example, used to yield excellent opium poppies but now it is badly covered with Kalar, as the water gets evaporated. In the Khairpur Taluka 6,806 acres of good land could not be cultivated in 1933-34.⁵¹

A great peculiarity of the new irrigation after the Barrage is that very little silt is carried by the water courses on the left bank of the Indus. The silt carried by the Rohri canal is too little to render its banks and floor impervious. This helps seepage.

What then must be the remedies?

Several suggestions have been offered. Pumping out of the extra water from the fields into the canals by means of drains has already been introduced. A suggestion from the Agricultural Department is to try leeching for the Kalar lands full of alkali salts. But the fear is that the ground slope, being very gentle, there is little chance for the extra water to be drained off easily.

⁵¹ Administration Report of the Khairpur State, 1934 P.11.

Deeper and more intensive ploughing might be effective in getting rid of some Kalar, and the suggestion of having a rotation of crops is worth trying in Kalar areas.

It is also possible that as time goes on, more and more silt will be brought in by the canals and then their sides may get impervious. By planting grass along the banks of the canals, leakage can also be prevented, though not without affecting the velocity of water running through them.

But if the root cause of the whole trouble is the height of the Rohri canal above the general level of the State lands, the only possible remedy would be to reduce the 8 ft. — fall at Tando Musti Khan or to stop irrigation altogether and dig tube wells in the fields themselves for water supply by means of electric power produced from the Fall.

Human Habitations.

The loss to the inhabitants as regards their dwelling places is also great on account of seepage and water-logging. Nearly 15 square miles of land covering some 45 villages have been rendered unfit for habitation.⁵² The walls of houses usually are of mud. Even the houses in the chief town of Khairpur are '*kutchha*' mud ones, and a number of State buildings including the Faiz Mahal are affected. Malaria is common.

It is now possible to rebuild the towns of Lukman and Khairpur with houses made of *cement concrete*, so that even if they have a tendency to sink, they may do so evenly.

The State has created a special Seepage Subdivision in order to help the distressed people to seek relief and to get their properties assessed by experts.

All this means another opportunity given to the State to rebuild its towns and villages on more solid foundations and on sanitary principles and to mobilize the resources of the State for better and healthier quarters.

Population.

It is difficult from the scanty records of the State to estimate the movements of population from year to year, but there is no doubt that it is on the increase and the influx of people towards the canal extensions and fresh farms is steady.

There is a distinct movement of population along the Rohri canal and the distressed people have been moving on to drier quarters in the interior.

⁵² Administration Report of the Khairpur State. 1934 P. 29.

The possibility of colonizing the Eastern Nara valley lands, is great. The movement requires skilled labor and capital to the infinite advantage to the State.

The work of remodeling some of the old *Wahs* of the State has been contemplated. This means more lands to be brought under cultivation and more villages to be built on them.

Trade and industry require reorganization. The sales of Kharo chaniho and Fuller's earth can be increased and the cottage industries of weaving, dyeing and carpet making properly revived.

Climate.

And lastly the question remains as to whether the Barrage and the vast extension of irrigation in Sindh can produce any effect on the climate of the whole region of Sindh.

Already the rainfall in many parts of Sindh has shown a definite increase for the past few years. The average rainfall recorded for the whole State in 1933-34 was 6.1% against 3.50% the normal for 13 years. It may be a part of the periodic rise and fall of the rainfall curve, but the cycle has not been properly established and the irregularity is very great. A writer in the *Times of India* recently suggested that "a definite reorientation of climatic conditions is in course of evolution—hence a wetter Sindh."⁵³ But it is too early and too difficult to opine on such a matter as the climate of the province. It will take the meteorologists of India long to come to any definite conclusion. It may be that the increased distribution of water supply, canal construction and irrigation, evaporation, and growth of vegetation, particularly afforestation, may cause more precipitation, less aridity and greater prosperity for Sindh in general and the Khairpur State in particular.

⁵³ Times of India, February 1935.

XV. CONCLUSION.

Khairpur, originally possessing a most strategic frontier in the N.W. and a far vaster area of arable lands, can now be said to be a poverty-stricken State, but flanking the Indus and the Sukkur Barrage on one side, and enclosing a good part of the E. Nara on the other, it has immense possibilities of economic development through the irrigation of its native fields and farms. Its liabilities to the British government are great, to the extent of almost half a crore of rupees. On the other hand, it has claims on the Government of India for damages done to the State territories and properties through the same system of irrigation and canal works. It seems self-sufficient within the present boundaries in respect of water supply and cultivable fields. It needs more skilled labor and more capital to be invested. No less than 3,00,000 acres of land are yet lying uncultivated, to say nothing about the millions of acres of barren desert land in the Nara Taluka. Its soil can accept any crop—good wheat and the best of cotton can be grown and have already been tried.

The State is not aggressive but not entirely controlled by foreign influences. It can grow from within and develop its own trade and industries. Out of the annual income of nearly 20 lacs of rupees, it claims an export trade of about 6 lacs only. Expansion is greatly possible in this direction. Even in the days of a Separated Sindh, Khairpur will have to work out its own salvation, depending upon its own native products, its own facilities of trade and development of its economic minerals.

Its flat plains afford good chances for constructing canals of any size and any length and also roads for easy intercourse and communication. Where good roads cannot be made, numerous camel paths can maintain an easy influx, the main problem of population, *viz*, water supply, having been satisfactorily solved.

The people are healthy, hard working and contented. Generation after generation of cultivators, descendants of a virile race like the Sumras or Sammas, has held land tenure under the Mirs. Today they do not mind who governs the State. There is sufficient solar energy which they can absorb and grain plentiful to maintain themselves. Being too near the Iran plateau, the fertile valley of Sindh was destined to be invaded by the hill men, wandering in search of water and food, till at last the State of Khairpur was carved out and established firmly by the Baloch race, of towering personality whose descendants yet wear the ancestral Turban today. The Mahomedan conquerors of Sindh introduced the Islamic government as well as the Islamic faith in the State territory, four-fifths of the population being Mahomedan. Conversion of the people to this Faith could only stop at the barrier of the Thar desert

* * *

The geographical analysis given above is in no way a complete one. The State itself is undeveloped to a great extent and the main object of our inquiry has been to find out its future possibilities and potentialities, which would bring it in a line with other advanced. Native States in India. Suffice it to say, with the Sukkur Barrage and the State P. W. D. its future is assured.

BIBLIOGRAPHY.

1. Imperial Gazetteer of India, Volume. VIII W. Hunter, -1886.
2. Gazetteer of the Province of Sindh – A. W. Hughes, 1876.
3. Gazetteer of the Province of Sindh Vol. A – Aitkin, 1907. & Vol. B. 7 Parts – J.W. Smyth, 1919.
4. Selections from the Records of the Bombay Government No. XVII New Series 1855.
5. Treaties, Engagements and Sanads (India) Vol. VII, Bombay Presidency 4th Edition – Aitchison, 1909.
6. Geology of India (2nd Edition) (Geological Survey of India) – R. D. Oldham, 1893.
7. Geology of Western Sindh. (Memoirs of the Geological Survey of India Vol. XVII, Part I) – W.T. Blanford, 1879.
8. Alkanline Lakes and Soda Industries of Sindh (Memoirs of the Geological Survey of India, Vol. XLVII, Part 2) – G. Cotter, 1923.
9. On the Physical Geography of the Great Indian Desert. (Journal of the Asiatic Society of Bengal, XIV, Part 2. W. T. Blanford, 1876.
10. A Note on the Sib-soil Investigations made in the area commanded by the Lloyd Barrage Canals. (Bombay Engineering Congress Paper 136) – C. G. Hawes (Development and Research Department) 1932.
11. Tando Musti Khan Fall. (Bombay Engineering Congress-Paper, 123) – J.R. Colabawala, 1927.
12. Annual Reports of the Departments of Agriculture in Sindh, 1932,1933.
13. *Reyasat-e-Khairpur* (In Sindhi) by Mirza Kalichbeg (Fait Press Khairpur) 1924.
14. Administration Reports of the Khairpur State 1904-1934.