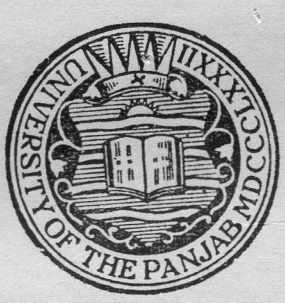
PAKISTAN GEOGRAPHICAL REVIEW



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REGIONAL BALANCE IN PAKISTAN

BY

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Pakistan consists of two great tracts of land on the flanks of the sub-continent of Indo-Pakistan, commonly known as West Pakistan and East Pakistan (East Bengal), the former includes the whole of the Indus Plain with bordering mountains and the plateau of Baluchistan, comprising an area of 310, 236 sq. miles, almost equal to that of Italy, Austria, Hungary and Belgium put together, while the latter consists mainly of the combined deltas of the Ganges (Padma), the Brahamputra (Jamuna) and the Meghna and has an area of 54, 501 sq. miles, greater than that of Czechoslovakia or Greece. These two wings present a great diversity of natural environment which has led to a very different type of human and economic probloms in the two regions. At the same time both these regions taken together provide a great balance to our economy and socio-political relations.

Position.

West Pakistan is located between 23.45° and 37° N and 61° and 74° E while East Pakistan lies between 21° and 26.3° N and 88.5° and 92.°E. Thus while West Pakistan stretches up into much higher latitudes East Pakistan extends down to lower and warmer latitudes. The effect of the latitudinal position is intensified by the shape of the two regions and the alignment of the bordering mountains. In East Pakistan the east-west running Assam hills in the north at a distance of less than 200 miles from the Bay and the north-south Lushai-Chittagong hills in the east in the face of the inflowing winds make this region quite warm and moist with conditions resembling those of moist tropical regions. In contrast to this, the great elongation, north and south, with a belt of high mountains of varying width in the north and north-west and a narrow front of the lowland on the Arabian Sea make the land influence to be more prominent in West Pakistan. In other words while East Pakistan is distinctly oceanic in character, West Pakistan is markedly continental.

Vicinal Relations.

The geographical position of the two regions makes the foreign policy of Pakistan and her international relations very broad based. West Pakistan lies on the eastern end of the bloc of the Muslim countries which stretches upto the Atlantic. As such, she has an abiding interest in the Near and Middle Eastern and Mediterranean problems. Common frontiers with Russia and China through Kashmir give an added importance to this wing, even though the contact is not effective owing to mountain ramparts. On account of its Eastern wing, Pakistan takes interest in the policies of the Far-East and extends her relations across the Phillippines and Indonesia to Australia and Newzeland.

Relief.

West Pakistan is diversified in relief. About half the area consists of a plain of varying fertility in the provinces of Punjab, Sind and parts of Baluchistan and N.W.F.P. Of the remaining half there is a wide belt of mountain region in the north and north-west in Kashmir and N.W.F.P. These latter mountains fan out westward on the plateau in the interior of Baluchistan. They present a varied landscape according to their position and the amount of rainfall, wet and forest clad along the border of the plains in the north and dry in the far north and in the west.

In contrast, East Bengal, excluding a small area of about 7,500 sq. miles in the Chittagong Hill Tract and the district in the south-east, consists of a humid fertile plain. By far the larger part of it consists of the delta and the flood plains of numerous rivers over which fertile silt is renewed every year. Regular annual renewal of silt over such a large area makes it agriculturally so productive without expenses on manures. There is no area of equal size in the world where nature has been so bountiful.

Hydrography.

West Pakistan is a land of a few big rivers which are spread out in the northern mountains and the upper part of the Punjab plains but converge into a single stream in the lower part of the plain. In the rest of the country the rivers are small, few and distantly spaced, and carry very uneven and unreliable supplies of water. There are numerous 'nullahs' in the sub-montane region which are suddenly swollen after rains and quickly get dry when the rain stops. During the rainy monsoon season some of the principal rivers,

Indus, Jhelum, Chenab, Ravi, Sutlej, often rise into disasterous floods, inundating large areas, spoiling Kharif crops and driving out the village, population. Huge quantities of water flowing down during short periods in a region of quite low rainfall creates a hydrological problem very different from that of East Pakistan. Here the main problem is of flood control and the proper utilisation of the enormous amount of water available during short periods. The rivers are to be dammed for irrigation and for the generation of hydro-electricity. Reservoirs of water are to be created in various parts. Flood waters are to be deviated through escapes to distant areas. As a matter of future planning it may be desirable to create artificial lakes in areas which are at present lying waste. At the International Symposium on Scientific Land Utilization held at Peshawar in 1952 the writer suggested the diversion of a part of the flood water of the Indus into an elongated natural depression which extends from Khairpur to Umarkot in Sind for a distance of about 150 miles. Incidentally this depression lies in a very arid region which is at present lying almost waste. Another long depression exists to the west of the Indus from Jacobabad to the Manchhar Lake. This lake could be enlarged and assured of a good supply of water by connecting it with the Indus. Immense quantities of water which at present go waste in the sub-montane strips in West Pakistan could be utilised by damming those mountain streams at suitable places. Another hydrological problem in west Pakistan is the exploitation of underground resources by the construction of tube-wells. Such wells may also help in the amelioration of the condition of water-logged areas in the canal zone where water-table has risen as a result of the seepage from canals. In short here the problem is of making a judicious use of water supply irregularly available on the surface or permanently found under the ground.

Huge mountains lie in the north which are covered with snow and many glaciers descend down to the valleys. It is estimated that about 20,000 sq. miles lie permanently under snow in the catchments of the Indus, Chenab, Jhelum, Ravi and Sutlej. Precipitation in winter is mainly in the form of snow which accumulates in great thickness. At Skardu snow is common from the middle of December till the middle of March. Glacial water is the main source of rivers. It may be of interest to mention that in some districts here water is preserved by being stored in the bags between alternate layers of straw, earth and pebbles, the water freezing in winter and melting in the following summer to be utilised for agricultural or domestic purposes. Hydrological

studies of a comprehensive nature are, therefore, the main requirements of this mountainous region.

East Pakistan is a land of innumerable active and dying rivers which are swoolen to flood hundreds of square miles in the rainy season. Besides these there are numberous lakes, bhils or haors spread through the country which shrink and expand according as the season is dry or wet. Vast areas are under swamps and marshes. The main hydrological problem here is a judicious use of the enormous quantities of water available and the drainage of the surplus water. Flooding and inundation is on such a wide scale that the training of rivers is almost impossible. While occasional floods in West Pakistan are quite destructive, those in East Pakistan constitute a regular feature of the normal cycle of life. The silt left every year by them is a source of great richness to the land. While enormous areas in West Pakistan are lying waste for want of water, large parts in East Pakistan are practically useless on account of the abundance of water. The whole landscope in winter is bedecked with lakes and streams alternating with raised-up patches of land. Lift-irrigation from these abundant water surfaces during the dry winter is the chief source of water-supply.

The coastal areas abound in islands and saline marshes. Protection from the tidal salt-water flooding the neighbouring areas is another hydrological problems.

Climate.

West and East Pakistan in between them provide a great range of climate from very wet Tropical of south Chittagong to the most arid of the Kharan desert and from some of the hottest in the world of the Jacobabad-Sibi area to snowy cold of Ladakh and Baltistan. While Tropical humid equable climate with plenty of rain and flood water is the keynote of the natural environment of East Pakistan, temperate dry continental with general paucity of rainfall is the principal feature of the climate of West Pakistan. The climates of the two wings are so coplementary as to provide a great variety of crops and a well-balanced agricultural economy.

(*a*) *Temperatures* :—There is a great variation in mean monthly temperature in various parts of West Pakistan. On the plains the mean minimum temperatures vary from about 40°F to 57°F in January and from 79°F to 87°F in July. The mean maximum temperatures vary from 63° to 78°F in January and from 90°F to 114°F in June, generally the hottest month. Excluding a

small coastal area in general there is a great seasonal contrast. The mean annual temperatures in West Pakistan are, therefore, of little value. The climate of Karachi and the coast is quite equable, with higher humidity and low cloudiness. The temperatures are never very high or low. At Karachi the mean minimum temperature for January is 57.4°F and the minimum for June is 82.3°F. Jacobabad-Sibi region has some of the highest temperatures in the world. The mean maximum temperature at Jacobabad for June, the hottest month, is 113.9°F while the mean minimum for the same month is 84.9°F. The absolute maximum of this station is 126°F. Over a large part in the plains mean daily maxima of 110°F or 112°F are common in the hottest months. On the other hand in January, the coldest month, over a very large area the temperature varies between 50°F and 65°F. In the northern mountain region mean monthly temperature remains below the freezing point for several months, and in some valleys as in Ladakh even the maximum temperature for January is below the freezing point (Leh 29.4°F).

In contrast, the temperatures in East Pakistan are never very high in summer and there is no part where winters can be described as cold. The annual range of temperature is low and varies from about 14.5° F at Chittagong and Noakhali to about 20°F at Dinajpur. The mean maximum temperatures vary from 78.4° F to 75.4° F in January and from 85.9° F to 89.2° F in July. The mean minimum temperatures vary from 56.2°F to 49.6°F in January, and from 77.9° F to 78.9° F in July. The mean annual temperature varies between 75°F and 80°F. It will thus be seen that East Pakistan is generally much warmer than West Pakistan in winter and it is also not so hot in summer though the season lasts longer. The two wings therefore provide a great variation in temperature from season to season, from almost equatorial conditions in the trip of the Arakan coast to cold temporate in the north of West Pakistan.

West Pakistan.

Station	*Mean Minimum*		*Mean Maximum*		*Mean Monthly*		*Mean annual.*
	Jan.	*June*	*Jan.*	*June*	*Jan.*	*June*	
Karachi ...	57.4	82.3	75.5	90.4	66.4	86.3	77.8
Lahore ...	40.1	79.0	68.0	105.5	54.0	92.4	75.1
Peshawar ...	40.4	77.2	63.0	105.0	51.7	91.1	72.7
Rawalpindi ...	37.9	75.9	62.3	103.5	50.1	89.7	70.9
Gilgit ...	32.0	66.3	46.3	91.3	39.1	78.8	62.1
Leh ...	8.0	44.3	29.4	71.3	18.7	57.8	42.3
Quetta ...	27.6	58.7	50.2	91.6	38.9	75.1	58.9
East Pakistan.							
Chittagong ...	55.0	76.8	78.8	86.9	66.9	81.8	77.2
Noakhali ...	57.5	78.14	78.1	87.0	67.8	82.7	78.2
Narayanganj ...	55.5	78.1	77.9	89.2	66.7	83.6	78.5
Dinajpur ...	49.6	77.3	75.4	89.5	62.5	83.4	76.6
Srimangal ...	47.5	75.5	79.5	89.9	63.5	82.7	76.5

Rainfall.

In West Pakistan there is a general deficiency of rainfall. It varies from 5″ in upper Sind to about 30″—35″ in the sub-montane area. In Baluchistan the mean annual rainfall is 8.1″ diminishing to less than 2 inches in the desert of Kharan. Only on the southern flanks of the Himalayas it exceeds 50″. In the northern mountain region, in the lee of the Great Himalayas the rainfall decreases to about 6 inches in Gilgit and Baltistan. In the western hills the amount is comparatively greater and varies from 10″ to 30″.

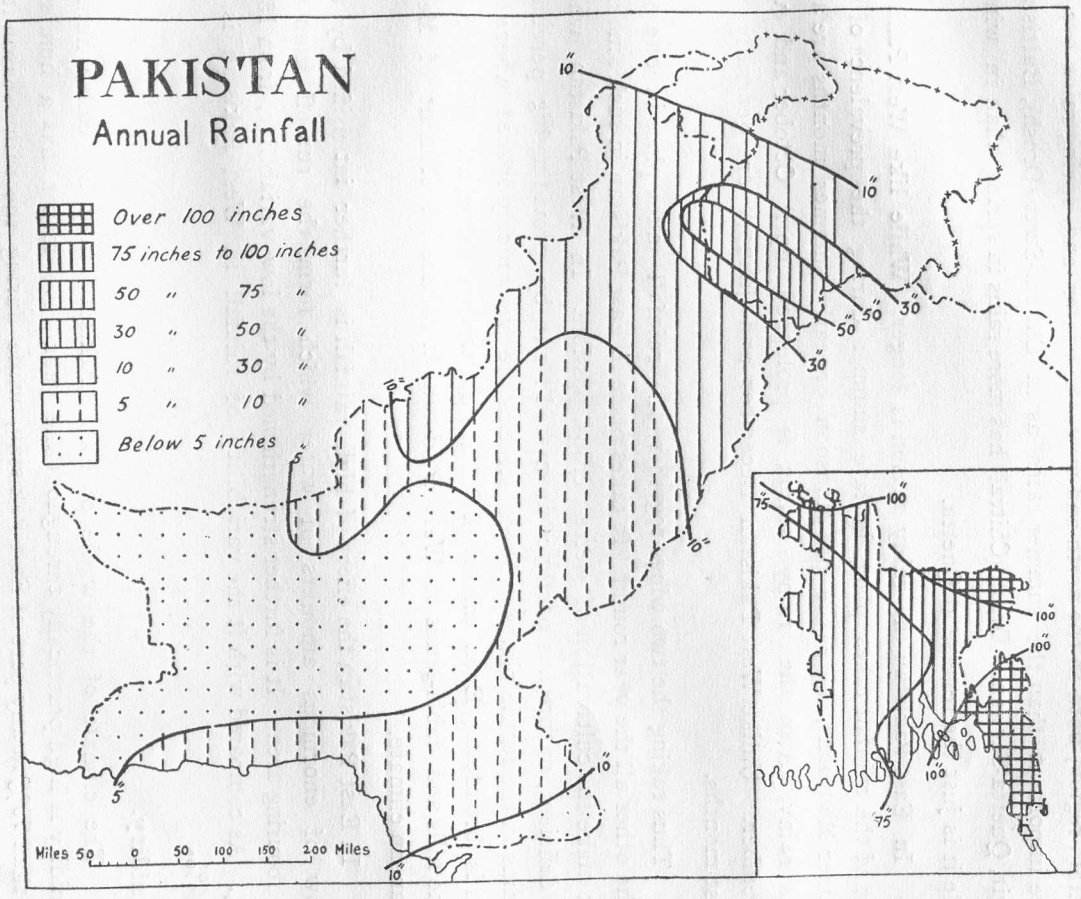
A large portion of the precipitation in the mountainous region is in the form of snow which is an important element in the economy of these regions. The water derived from melting snow in summer is of great use in this season as it keeps the Karezes (sub-terranean canals) running. Without this water they should have been quite dry.

In contrast, practically nowhere in East Pakistan the rainfall is less than 50″ and is generally over 70″. In the coastal belt and the sub-Himalayan areas it exceeds 100″. In the sub-montane of the Assam hills it averages between 200″ and 250″. The lowest annual rainfall is 47.19″ at Lalpur in the district of Rajshahi and the highest is 255.76″ at Lallakhel in the district of Sylhet. It will be seen that while West Pakistan is dry, the whole of East Pakistan may be termed wet, its lowest rainfall means almost correspondence with the highest means in West Pakistan.

RAINFALL IN INCHES

West Pakistan.

Station	*Winter*	*Spring early Summer*	*Late summer*	*Autumn*	*Annual*
	Dec—Febr.	*March—May*	*June—Sept.*	*Oct—Nov.*	
Karachi ...	1.1	.50	6.00	.1	7.7
Multan ...	.99	1.00	4.92	.14	7.05
Sia kot ...	4.35	3.5	23.47	.51	31.83
Peshawar ...	3.64	4.97	4.41	.54	13.56
Gilgit ...	.62	2.56	1.71	.29	5.18
Quetta ...	4.93	3.11	1.00	.4	9.44
Nokkundi ...	1.43	.49	0.0	.03	1.95
East Pakistan					
Cox's Bazar ...	1.59	18.43	109.66	10.42	140.10
Noakhali ...	1.50	19.29	84.55	9.66	115.00
Narayanganj ...	1.76	17.43	48.38	6.22	73.79
Sylhet ...	2.48	36.75	87.40	8.82	135.45
Dinajpur ...	1.03	10.17	55.87	5.19	72.26
Jessore ...	1.85	13.58	43.96	5.54	64.93


PAKISTAN
Annual Rainfall
Over 100 inches
75 inches to 100 inches
50 " 75 "
30 " 50 "
10 " 30 "
5 " 10 "
Below 5 inches
Miles 50 0 50 100 150 200 Miles

There is a great difference in West and East Pakistan not only in the annual amounts but also in the periodicity of rainfall. Over the plain of West Pakistan and parts of the neighbouring highlands most of the rainfall takes place in late summer and has a secondary winter or spring maximum, the latter being very useful for the unirrigated Rabi crops like Wheat. In many parts of the montain region, both in the north and west, the winter and spring rains become more important than the summer rains as in Chitral-Swat (Drosh), Baltistan, Gilgit, Quetta-Sarwan. Drosh (Chitral) has more rains in spring than in winter while it is just the reverse at Quetta.

In East Pakistan the rainy season is longer. While like West Pakistan most of the rainfall takes place in late summer during the prevalence of the summer Monsoons, here the pre-Monsoon or early summer months are also quite rainy. Also the rainy season is prolonged uptil October and even November. Unlike West Pakistan December and January are generally the driest months.

Thus taking the two wings together, the rainfall takes place in one part or the other all the year round. It takes place in East Pakistan in such amounts that make the cultivation of wettest crops possible. In West Pakistan, where it is deficient, nature has partly compensated for it by providing big perennial streams in the fertile plains. These streams are very nicely spaced where the plain is broadest. Even minor plains are not without streams. Winter rains in the hills and table-lands of West Pakistan introduce an element of Mediterranean climate.

In East Pakistan the effect of high rainfall is further intensified by the inflow of enormous amounts of water which forms the run-off from the neighbouring area. It is further strengthened by the low variability, from 15 to 30%. As compared with it the variability of rainfall in West Pakistan is 40 to 80%.

Humidity.

The climate of the whole of East Pakistan may be called humid. Humidity is high practically throughout the year. No month has a humidity less than 70% in any part of East Pakistan, while during the rainy season it is generally over 80%.

In West Pakistrn the low rainfall, practically cloudless skies and high temperatures considerably reduce the humidity of the country. Only in the

coastal area round about Karachi humidity is high but it is confined to a small area and is much lower than is found in East Bengal. At Karachi the humidity is 50% throughout the year, being more than 60% during the day and 80% during the night in summer only.

Soils.

The soils of the two wings of Pakistan are also complementary in nature and reveal very diverse profiles. The soils of West Pakistan generally fall under the group of Pedocals. Though these soils are characteristic of a land with low and erratic rainfall, great extension of irrigation has made their extensive use possible. They are generally quite fertile. There are, however, certain areas which are suffering from injurious salts, a natural corollary of irrigation and dry climate.

Soils of East Pakistan belong to the other category Pedalfers. They are mostly Pedzolic or still new laterites. There are large swampy areas. The effect of leaching is to a great extent neutralised by the annual renewal of silt over vast areas at the time of floods. Again while soil erosion is a great menace in many parts of West Pakistan like that of the Potwar Plateau, there is no trouble of similar type in East Pakistan on account of the fact that the ground is generally moist and plant cover plentiful. But here we are faced with a different proposition. Rivers frequently eat away their banks and desert their channels. Land Utilisation problems here are, therefore, different from those in West Pakistan.

Vegetation.

The total estimated area of forests in Pakistan excluding the states is about 14,500 sq. miles which is about 6.4 percent of the total area of the country. Of this West Pakistan has only 1872 sq. miles under forests. It works out to be about 3.2 percent of its total area. This percentage rises to about 16.7 in East Pakistan. It will be seen that although both the western and eastern wings are deficient in forest resources, this deficiency is very great in the west. East Pakistan has valuable timber and fuel wood resources. Out of a total annual output of 92,57,782 c. ft. timber in Pakistan, East Pakistan contributes 79,24, 000 c. ft. In addition it produces 1,34,20,900 c. ft. of fuel wood out of a total of 3,14,30,460 c. ft. There is quite a good balance between timber and fuel wood. In West Pakistan the production of timber is very inadequate and excluding Sind, even

the fuel wood is available in very limited quantities. Softwood is mostly found in the northern mountain of the West while teak and Sal are available in East Pakistan together with bamboo for the manufacture of pulp and paper. Environment is quite suitable for the plantation of teak in the Chittagong Hill Tract. In West Pakistan forests are found only in the northern mountain region or along the rivers or by some canals.

However, there is a large area in Baluchistan and the adjoining part of Sind and N.W.F.P. which is under permanent pasture and supports various breeds of sheep and goats which not only supply meat for local consumption but also skins and wool for export. Dry mountain pasture of the west also carry quite a good number of sheep.

Agriculture.

With a great difference in hydrographic, climatic and edaphic conditions, the agricultural production of West and East Pakistan shows a marked diversity and is a matter of great advantage to the economy of the country. A great variety of crops is produced in between the dry continental climate of West Pakistan and humid wet tropical and largely oceanic climate of East Pakistan. The principal crops of West Pakistan include Wheat, Cotton and to a smaller extent gram, bajra, jowar and maize. The chief crops of East Pakistan are rice, jute and tea and a comparatively smaller extent tobacco, sugercane, rape and mustard & sesamum.

Acreage (thousand Acres) of crops and yield (thousand tons)

CROPS	West Pakistan.		East Pakistan.		Total			
	Acreage.	yield.	Acreage.	yield	Acreage.		yield	
	1950-51	1950-51	1950-51	1950-51	1950-51	1953-54	1950-51	1953-54
Wheat	10,738	3,933	94	20	10,832	10,400	3,953	3,560
[1]Cotton	2,956	1,272	55	18	3,011	2,928	1,290	1,442
Bajra	2,326	355	1	500	2,327	2,585	355	455
Jowar	1,264	238	1	500	1,265	1,054	238	280
Maize	929	365	13	3	942	1,067	368	437
Barley	489	146	82	15	571	613	161	156
Gram	2,613	696	200	47	2,813	2,767	743	645
Sugarcane	474	541	226	337	700	962	874	12,629
Rice	2,394	852	20,007	7,343	22,401	24,533	8,195	915
+Jute	———	———	1,250	4,452	1,250	760	4,452	2,503
=Tea	———	———	75	37,856	75	———	37,858	53,000
Rope and Mustard	1,138	189	488	89	1,626	1,631	278	272
Linceed	6	1	60	9	66	74	10	12

It will be seen that the distribution of principal crops in the two wings of Pakistan is of a complementary character. Out of a total 10,832 thousand acres under wheat, East Pakistan has only 94,000 acres. Cool early winter rains and dry and sunny ever summers with plenty of water available for irrigation provide the geographical background for the wheat crop of West Pakistan. It is the principal Rabi crop of the irrigated districts. Similarly cotton is the principal Kharif crop. In the irrigated districts the bulk of it is the improved American Cotton. It responds very well to a dry summer and judicious application of water. The physical environment of East Pakistan is too humid and wet for both these crops. Similarly more than 90% of maize is produced in the irrigated and well watered districts of Punjab and N.W.F.P.

Bajra, Jowar and gram do well in dry areas and sandy and comparatively infertile soils. They are therefore grown in the unirrigated districts of West Pakistan with low rainfall. The area under Jowar and Bajra in East Pakistan is practically negligible and that under gram is less than 10%.

East Pakistan has about 90% of the rice and all the acreage under jute. Jute is a very exhausting crop but the application of manures is uneconomic owing to its low price. It can stand floods, and is actually greedy for water right upto the time of harvest. Annual renewal of fertile silt on a very extensive scale, maintenance of high temperatures and good rainfall, therefore, contribute to the heavy concentration of this crop in East Bengal which has been producing about 65 to 80 p.c. of the worlds' jute. The main jute area is concentrated along the banks of the three principal rivers, Jamuna, Padma and Meghna on account of the availability of fresh water for steeping. Cheap and industrious labour, requiring hours of standing in water and unsusceptible to the stagnant smell produced in retting is another important factor.

Similarly, large area flooded every year, existence of numerous Bhils and swamps, warm winters and long summers with high average temperature and good rainfall extending over both early and late summer, provide a suitable environment in which rice replaces wheat as the principal foodgrain here. It is cultivated all over East Pakistan, excepting the saline coastal areas. Three crops are grown in a year, Aman (winter rice), Aus (autumn or summer rice) and Boro (spring rice). This crop is the mainstay of the people. It gives a higher return per acre for the dense population and its straw provides food for cattle. A small quantity of rice is also grown in West Pakistan where it is mainly distributed in the flooded riverain areas or depressed Barani or irrigated areas.

Jute is a regulated crop. Due to decrease in exports to India, the principal buyer, the acreage under jute has decreased from 2,058 thousand acres in 1947-48 to 1,250 thousand acres in 1950-51, and 760 thousand acres in 1953-54 and the yield from 68,42,605 bales in 1947-48 to 4,452,000 bales in 1950-51 and 250,3000 bales in 1953-54.

The area under rice has during the same period increased from 19,006,400 acres in 1947-48 to 20,007,000 acres in 1950-51 and 24,533,000 acres in 1953-54 and the yield from 6,736,200 tons to 7,343,000 tons 91,51,000 tons in 1953-54. This makes the province quite self-sufficient in food as its normal requirements are estimated at 72 lack tons.

Tea is another important crop of East Pakistan which is not produced in West Pakistan at all. In 1950-51, it covered an area of 75,000 acres and the production was 37,856,000 lbs. while in 1953-54 the production was estimated at 53 million lbs. By international agreement its acreage has been fixed at 83,700 acres. The hot wet and humid climate of the Sylhet district in the well-drained sub-montane of the heavily forested Assam Hills, with excellent deep soils rich in humous and iron are very favourable for tea. The slope is sufficient to give good drainage. Tea gardens are found not only on low hillocks or *tilas* but have also been extended to reclaimed marshlands though the product of the latter is comparatively inferior. The pre-Monsoon or early summer rains, often associated with Norwesters, promote the growth of new leaves. To a small extent tea is also grown in Chittagong on the low hills unfit for rice cultivation.

Besides these East Pakistan produces almost all the Pakistan's linseed and summer Til. It has an area of about 265,000 acres under betel-nut with an annual production of 9,700 tons. Rape and mustard, sugarcane and tobacco are the crops which are common to both East and West Pakistan, the first two being comparatively more important in West Pakistan and the third in East Pakistan.

Taking the two wings together Pakistan has a small surplus in food crops. There is an explortable surplus of about 300,000 tons of wheat and 150 to 200 tons of rice. Of the cash crops in 1950-51 there was a surplus of over 12 lakh bales of cotton and 5 million bales of Jute and 30 million lbs. of tea. These figures show that agriculturally Pakistan is a prosperous country and that this prosperity comes from the balance maintained in production in between the two wings.

Minerals.

A great variety of minerals are found in the mountain region bordering the Punjab plain more especially in the Salt Range, mountains of Chitral, Potwar Plateau and North Baluchistan, but the quantities so far known are generally small and difficult to work. The principal minerals which are being worked at present are (1) Rock-salt from the Salt Range at Khewra, Warcha, Kalabagh (Punjab) and Kohat. Its annual production is 7 million maunds. (2) Coal mined from the Salt range at Dandot and Makerwal (Punjab) from Sharigh, Khost, Sor Range, Machh, Harnai and Digari (Baluchistan) and Jhimpir-metting in Sind. The total production is very small, between 5 and 7 lakh tons. (3) Mineral oil produced in the Potwar Plateau, at Khewra, Balkassar, Dhulian and Joyamair. Exploratory drilling is being made at Sui in Bugti hills in West Pakistan and in Patiya (Chittagong). The annual production of crude Petroleum in 1953 was 15,41,2014 barrels. (4) Chromite largely mined from Hindu Bagh in the Zhob valley. Its annual output is about 20,000 tons. Large quantities of gypsum, limestone and sulphur are also found.

Some salt deposits are found in various parts of the plains. In Tharparkar almost inexhaustible quantities of salt deposits have been located. About 500 million maunds of salt is manufactured from sea water near Mauripur where low rainfall, plenty of sunshine and higher winds are all favourable. The works are located near the ports. Salt is easy to be exported to meet the requirements of East Pakistan where the humid climate and long rainy season are unfavourable for its manufacture for the greater part of the year.

East Pakistan consisting mostly of a newly formed plain has practically no minerals. Only near the northern border and in Chittagong hills, some deposits have been found of liginite and oil. Possibilities of oil exist in Patharia (Sylhet) and Patiya (Chittagong).

It will be seen that except for salt, both the wings have to depend upon imported minerals.

Industries :—

Pakistan is primarily an agricultural country. Its industries are mainly related to her agricultural products. Of the 1,432 manufacturing establishments in Pakistan in 1949, there were as many as 850 connected with the produce of the soil including 210 rice mills, 300 cotton ginning and pressing mills, 58 jute pressers and 110 tea manufacturing factories. The factories are very unevenly

distributed between East and West Pakistan. East Pakistan had only 374 factories out of the total of 1432. They are unevenly distributed not only between West and East Pakistan but also within the same region. In West Pakistan while factories relating to agriculture products are scattered over the rural areae, those relating to non-agricultural produce are mostly located at Karachi and Lahore. In East Pakistan they are mostly located in Narayanganj-Dacca region and Chittagong. Thus while the industrial position as a whole is very unsatisfactory, there is also lack of balance in its location. Things, however, are likely to improve when the Government policy about the decentralisation of industry is successfully pursued. This may be achieved by the development of hydro-electricity for power in various parts for which there are great opportunities both in West and East Pakistan.

Population :—

According to the provisional figures of the 1951 Census the total population of Pakistan is 75,842,000 with a density of 208 persons to the square mile. The population of East Pakistan is 42,063,000 with a density of 777 persons, while that of West Pakistan is 33,779,000 with a density of about 108.51 persons to the square mile. Thus, East Pakistan with only about 15 p.c. of the area has about 66 p.c. of the total population. This shows a great lack of balance in the population of the two regions. In East Pakistan the pressure of population on soil is great. About half of the holdings are hardly sufficient for the maintenance of the families which own them. In West Pakistan the situation is much better but there are large areas which are lying waste owing to aridity and other reasons and await reclamation.

While in East Pakistan the population is more evenly distributed it shows great variations in the various parts of West Pakistan. In Baluchistan states the density falls to 6.9 person per sq. mile and rises to 1387 in the federal area of Karachi. The old settled districts in the sub-montane region of the Himalayas and the irrigated areas of the plains are comparatively more densly populated.

LAND USE SURVEY OF WARAH AND KOT MANGAL SAIN

BY

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At a distance of about 1 mile S 5°E from the well known salt mining centre of Khewra are situated the twin villages of Warah Thal and Kot Mangal-Sain. The site is representative of a broard class of villages located along the line where plains and mountains meet. The position is at the same time advantageous and debilitating to the extent of being precarious. Being on the buffer zone between the contending interests of the Jhelum river regime and the zone of influence of the apparently stationary but in reality encroaching Salt-Range, the villages in certain respects take homage from both and in other respects are subjected to the adverse influences from one side or the other. Normally speaking the total populace obtains its living from the fertile soils of the flood plains of the Jhelum, which flows about 3 miles southwards from here, and at the same time utilizes the proximity to the mountains by working in the mines and the associated industries. Under other circumstances there are constant ravages from the mountain side in the form of the spread of its debris on the northern fields. The action of the hill torrents impair the fertility of the soil by mixing it with coarse gravel and pebbles of varying sizes. Another effect of rain water and runnels though not so much in causing sheet or gully erosion, is to be seen in the spread of a fine coating of salts dissolved in sufficient quantities in water draining downwards from the Salt-Range. The spread of salt really becomes a problem in the less rainy years than in the rainier ones. In years of small rainfall the amount and flow of rainfall is just active enough to transport salt from the slopes to the fringe of the riverain tract down below. When the rain is not very small in amount the salt contents are carried further downwards towards the river and the fields of the villages concerned receive just enough soil and salt as to be able to renovate the fields. It is, therefore, seen that the acreage of Kharaba or crop failure

very often synchronises and sympathises with the varying amount of rainfall from year to year being on the wrong side in years of scanty rainfall.

In the absence of any improved means of irrigation the scarcity of rainfall is in itself the most important cause of crop failure but the magnitude of failure is determined both by the less amount of rain received aud the encroachment of salinity in years of less than the average rainfall. (18″).

The physiography of the small piece of 1,238 acres of land is expected to be simple as it actually is. Still the small undulations on the difference of comparative levels is in this case of permanent importance not only in fixing the extents of Maira (or the upper land) and Barani-awal (the low lying tracts receiving rain water from the surroundings) but also in determining the very barrenness or usefulness of land. Two contours of 700′ and 750′ height are shown on map No. 1. The land below 700′ is shown in several shades denoting the classification of land, above it is shown blank indicating that it is impossible for agriculture. With the exception of two very small patches of land each covered by the 750′ contour, the general trend of contours is, roughly speaking from west to east with some noticeable adjustments in the trends. The adjustments are in the form of the tongues of higher land projecting downward and the small re-entrant like penetration of comparatively lower land upwards. Therefore the land above the 700′ contour is only rising northwards comparatively less gradually but is undulating in an east west direction as well Below 700′ contour the slope is gradual to the extent of being imperceptable. It is this flat country which is cultivable and most of it is under plough. The land to the north of it is, as a block, useless for agricultural purposes. The land of the villages, therefore, has two distinct faces, entirely different from each other, the one unproductive dreary and bleak, strewn with pebbles and boulders and coinciding with the fan like dispersal of mountain debris, and the other productive, green and smiling corresponding with the northern most limit of the flood plains of the Jhelum.

The co-existence of the villages viz. Warah-thal and Mangal-Sain at a distance of less than half a mile from each other, and located within the confines of a single unit as treated in the official documents, calls for some explanation. The possibility of over flow of life from one nucleus to another on account of surplus prosperity conducive to dispersal of population for want of space in the parent village of Warah is ruled out of order at the very outset. In fact the case is neither too much prosperity nor just the congestion of space but

actually the limitations of resources has been the impelling force behind the separatist move of a section of village population to a new abode which was away from the plains and was more near to the mountains As in some other cases, similarly in this, the mountains offered better prospects than the plains. The salt mines acted as a powerful magnet. Later the establishment of industries like the I.C.I. factory increased the functional importance of Kot Mangal Sain. It grew in size at the expense of the surrounding settlements living on the resources of soil which were meagre. The declining town of Pind Dadan Khan is also understood to have made its contribution towards the growth of the village.

The narrow ribbon like shape of the built up area along the two sides of the road and its comparatively new buildings with a total absence of old ones proves the infant character of the settlement. On the other hand its location on the fan like outgrowth of mountainous debris which is altogether barren goes to prove that majority of its inhabitants are workers in the mines and in the factory. This inference was fully substantiated by the results of personal investigations from as many people as could be contacted. The average daily income of an average family of five, is Rs. 3/-. A few people are engaged in the defence services of the country and equally few are running small shops in the village. In this village inspite of the small per capita income of the inhabitants people are not indebted, the reason being that there are no money lenders in the village. The absence of money lenders is specially noticed after the partition when Hindu Banias migrated to the other side of the border. There has since been no formation of capital and its concentration in a few hands. The inhabitants are poor but still many are better off as compared to the other village folks in the neighbourhood who are poorer still and whose only occupation is agriculture which is subjected to the law of diminishing returns than industry.

Along with these advantages of the site of Kot Mangal Sain it suffers at least from one serious disadvantage. It is that of the non-availability of drinking water. The water table is too low to allow the sinking of wells and there if a well is sunk at great cost, its water may be brackish. There is therefore not a single well in the neighbourhood. Water is brought from the I.C.I. factory in pitchers or in drums on reris, donkeys, etc.

The inhabitants of Warah village are partially labourers and partially agriculturists. The number of working agriculturists is 193 with about 792 dependents. The entire agricultural land belongs to the residents of Warah

and not of Mangal Sain. All the area covered in this land-use survey belongs to the Warah village except for the built up area of Kot Mangal Sain which is bout 30 acres only. The method of investigation was partially direct study of conditions on the spot and partially based on the study of official sources of information. This information is contained in four books named *Misle-Haqiyat*, *Jama Bandi*, *Khasra Gardawri* and *Lal-Kitab* and a village map giving the demarcation of fields and built up areas. Misle-Haqiyat and Jama-Bandi deal with the ownership of land, the first giving the details of ownership before 1940, the year of last settlement and the latter giving the changes which have taken place since then. For the purpose of land use, these are not of much avail as these only convey an idea about the sub-divisions and fragmentation of holdings. Khasra-Gardawri gives detail of farms. Lal-Kitab is the most informative of these all. It contains information about the usage to which land is put taking the village as a whole. It is split into two parts. The first part gives the classifications of land in different years under such headings as total area, area under forests, land other than forests divided under the subheads of (a) impossible (b) cultivable, and cultivated further subdivided into kinds of land, fallow, double cropped area etc. The second part gives details about the acreage sown to the various commodities in Kharif and Rabi in different kinds of land *e.g.* Chahi, Hail, Barani, Barani Awwal, Miara and Rakkar. Chahi means well-irrigated. Hail is the land adjoining the village and enriched by the village waste. Barani Awwal is flat low land receiving the rain water of the surrounding area. Maira is the upland receiving direct rainwater only and Rakkar is the stony and undulating land consisting of coarse material.

The classification of land in Warah village is as follows :—

Out of the total of 1,238 acres, 750 acres, as high a percentage as 61, is totally denied to agriculture and comes under the category of impossible for cultivation. About 488 acres 39% is under plough. Out of the cultivated land, Hail covers 6 acres, Chahi 18, Barani Awwal 223, Maira 232, and Rakkar 9, the respective percentages being 8.7%, 1.3, 45, 48-8 and 1.9. It is clear that Hail, the best land, is very small. Chahi being another prized kind of land is again very limited. The number of wells in the village is only three, one supplying the drinking water for the village folk, and the two irrigating the fields. The restriction on the number of wells is not imposed by the depth of the water table which is only 20 ft. here but by the fact that wells go out of usage after some time owing to the increased brackishness of water. Maira


MAP NO. 1.
CLASSIFICATION OF LAND
WARAH & MANGAL SAIN
MANGAL SAIN
WARAH
HAIL
CHAHI
BARANI
MAIRA
RAKKAR
BANJAR
BUILT AREA
WELL

accounts for the greatest acreage with barani following it. Within the cultivated area gravely patches are small.

The distribution of various types of lands on the map shows that the land unfit for the cultivation is mostly found in the north. It has been rendered useless by submontane deposits. Rakkar which also contains pieces of stones and pebbles is near it on its southern margin. Maira occupies the middle zone of the small acreage in south eastern corner. The plain area of the village is not without slight undulations although the slope is very gradual, the middle portion of the village land is slightly higher. Chahi and Hail instead of encompassing the village site as it usually happens, are found to its south, the northern area being useless. Barani Awwal predominates. It is found in two big blocks spreading east-west, one located to the south of the village site and the other covering the southern parts of the village area. A strip of Chahi land in the east almost connects the two blocks.

The total area sown for the 5 years ending 1953, is 408, out of a total of 481 being left for the period, 73 acres being left fallow. The percentage of fallow land, therefore comes to 15. Double cropping was practised on 17 acres on an average. It is about 3.5% of the cultivated land. Mostly the rich and well watered chahi land is double cropped with only small share of Barani Awwal. Map No. 2, showing the distribution of single cropped and double cropped land for the year 1952-53, portrays a slightly different picture. The difference lies in the extent of double cropped land which shows a departure from the average in a positive direction. The distribution of the double cropped land is still in keeping with the average conditions that it mostly coincides with chahi land. There is one patch of double cropped land in the middle of the map which is on Maira.

The average acreage under crops which were matured is only 379, out of a total of 424 including double cropped area and the land left fallow giving 54 acres of Kharaba crop failure. Though average percentage of Kharaba is calculated at about 13 which is high may be not too high in view of the general environmental conditions. On the other hand it rises, very considerably in bad years. For example in 1952-53 out of a total cropped area of 444 acres 119 acres turned to be Kharaba giving the percentage to be as high as 27. It is this phase of the agriculture of Warah which demands a a serious consideration. It is the out come of a least of variants which await fuller investigation and appropriate cure. A study of crop failures from year to year and its comparison with rainfall data show the relationship between crop susceptibilities and the vagaries of rainfall.

The following table gives the monthly annual raiafall figures of Pind-Dadan Khan, which is two miles south of Warah, along with the acreage of Kharaba in each agricultural year ending June, 31st.

Year.	*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Total rainfall for the Agricutural year.*	*Acreage of Kharaba*
1948 ...	0.4	3.12	1.29	0.43	0	0.04	9.37	8.00	2.29	0.13	0	0.39	23.97	0
1949 ...	0.18	1.19	1.35	0.06	0.13	0.88	5.87	2.53	1.85	0.09	0	0	16.72	60
1950 ...	2.28	0.57	1.89	0.43	1.12	0.20	5.64	8.59	0.50	0	0	0	20.42	21
1951 ...	0.68	0.07	1.67	1.17	0.95	1.15	2.97	11.35	0	0	0	0	18.34	38
1952 ...	0.68	1.03	1.24	0.45	0	1.48	2.08	3.48	0	0	0	0	...	119
1953 ...	1.78	0.30	0.30	0.29	0.29	1.59	4.40	1.90	1.45	0	0	0	10.19	

The variations in the amount of rainfall have a great bearing on the amount of Kharaba. Kharaba is less in the years 1948-49, 50-51 and 1951-52, when the rainfall received was adequate and well distributed for the crops amounting to 0,21 and 38 acres giving a positive correlation with the total rainfall of 23.97", 20.42" and 18.34" being least in 1948-49 a year of most abundant and well distributed rainfall.

Land going out of use for cultivation is connected with rainfall changes from year to year but the correlation effect of the accumulation of salts is more felt in some years than in others. The land is gradually being deteriorated but cultivation goes on with diminishing returns till a point is reached when it becomes untenable. This is borne out by figures under the head Digar-Banjar or other uncultivable waste, which spread over 80 acres in 1948-49 with 75 acres of Banjar Qadim (old uncultivable waste) and 5 acres as Banjar-Jadid (New uncultivabe waste). In the year 1949-50 it was reduced to 55 with 51 as Qadim and 4 as Jadid. This reduction is not understandable as it appears that there is something wrong with the 1948-49 figures. It then remains 55 acres, upto 1951-52. On the year 1952-53, there is a substantial increase from 55 acres to 133 acres with 78 acres as Banjar Jadid which is more than the total previous acreage of culturable waste. Perchance this is the year when the acreage of Kharaba also increased abnormally. The explanation may be sought in deficit rainfall in that year which resulted in the increase of the salt content in the soil rendering a part of the culturable waste unfit for cultivation and at the same time effecting the standing crop.

As usual, there are two main harvests in the year, Rabi and Kharif. Being a barani land Rabi is more important crop than Kharif. In the year 1952-53, the year of Survey, 285 acres of land were sown to Rabi crops and 225 to Kharif. Products of Rabi harvest are only three *viz*, wheat, barley and Tara Mira. Barley and Tara-Mira cover very small acreages, wheat accounts for 282 acres and barley and Tara Mira for 1 and 2 acres respectively. Almost the whole of chahi land is sown to wheat. Again 4 out of 6 acres of Hail is under wheat.

The greatest acreage of wheat is in Barani Awwal accounting for 53% of the acreage, Maira for 38.5 chahi for 7 and hail for 1.5% Neither wheat nor even barley is sown in Rakkar Land. Barley is mostly grown on Barani Awwal. Tara Mira is grown on both Barani and Maira. Map No. 3, bears out these relationships with an additional information that the wheat lands of the village are mostly spread in one big continuous block and two or three

small patches. The small area under barley is not far away from the village but Tara Mira farms are located at the farthest southern end of the village land probably showing the indifference of the cultivators towards an important produce.

Wide spread sowings of Rabi take place when the rainfall in autumn is abundant to supply the moisture for the germination of seeds. During the autumn of 1951 (August-September) the rainfall received amounted to 11.35" and the acreage put under Rabi increased to 360 acres. Similarly during the autumn of 1948, the amount of rainfall in August and September was 10.92 and the acreage under Rabi was above the average. In the years of scanty rainfall during autumn the acerage under Rabi crops decreases as in the case of 1950 and 1952 with 240 and 283 acres respectively. Fields of wheat are also high in accordance with a well distributed and fairy adequate winter rainfall. Yields were high 7-8 maunds per acre in 1950 as the amount of rainfall during November, December, January. February and March was about 5", while in the years 1951-52 and 53 yields have been quite low, 4-5 maunds per acre on the average.

Kharif, though less important than the Rabi crop in the area, includes a greater number of commodities *viz.* Jowar, Gowara, Cotton (Desi) Swank, Moth and Fodder crops. Out of the total Kharif crops Bajra accupies the first position covering 148 acres. Gowara comes next with 30 acres under it. Chari and Jowar are given 26 and 17 acres respectively. Cotton desi, Moth and Swank are grown in very small quantities on 1, 1 and 2 acres respectively. In this way 66% of the land in Kharif is sown to bajra, 13% to Gowara, 11% to chari and 7% to Jowar, others being negligible. Bajra, the most important product of Kharif is mostly raised on comparatively poor land of Maira covering 93 acres, more than 50% of its total, the still poorer land, Rakkar is almost wholly under Bajra, the only crop taken from this land in a year. Due to its acceptobility to the poorer type of land stony soils like Rakkar which otherwise would lie waste, can yield some crop. Some Bajra is raised on Barani Awwal, occupying about 32 acres.

Gowara and chari are mostly grown on Maira and Barani lands. Cotton requires comparatively better soil and irrigation facilities under such dry climatic conditions. There being no arrangements for irrigation except wells which are two in number and cater for very small areas, cotton inspite of its cash value is raised only on 1 acre of chahi land. Similarly there is a

total absence of rice, maize and sugarcane. Jowar being more water loving than Bajra, is also limited in acreage and is mostly grown on chahi and Barani land.

Map No. 4 shows that there is a good deal of dispersal of land under different crops. It appears that excepting Jowar, other crops are rather indifferent to the types of land. A comparison of maps No. 3 and 4 shows that Rabi and Kharif crops are grown on different lands. No such thing as scientific crop rotation is practised in the village. The application of manure to the land is negligible as due to the dearth of water supply fodder crops are not grown to any extent and there are hardly about 50 cattle in the whole of the village to supply the cow manure. Farmers being generally poor as well as lacking inertia do not manure their fields properly.

The average size of holdings in the case of the owner agriculturists, is 4.5 acres while the tenants' holding is less than half an acre, unlike the general conditions elsewhere in the Panjab. Variations do exist from the largest holding of about 27 acres to smallest in the village, being $\frac{1}{4}$ or about 5 marlas in the case of the tenants. Without turn of 5-6 maunds of wheat in good years and of 3-4 maunds in bad years a remarkable absence of cash crops and very little market gardening on Hail and chahi land only the average holding is obviously an uneconomic unit. It is but obvious that these tenants seek work in the mills besides tilling small patches of land. Some of the agricultural problems peculiar to the village are :

1. Spread of mountain debris. It can be arrested by throwing temporary bunds on favourable points in the course of torrents rather away from the foot of the hills as there the velocity of water may be too great for the loose bund and instead of checking the spread of water and the spread of its load it may itself be swept away. Such a loose bund will never be a complete barrier for a long period of time so as to allow the formation of the reservoir of water above it, thus increasing the danger of floods in cases of the usual freshets. It would rather serve to check the onflow of coarse debris on to the fields and divert the flood waters on to the waste land.

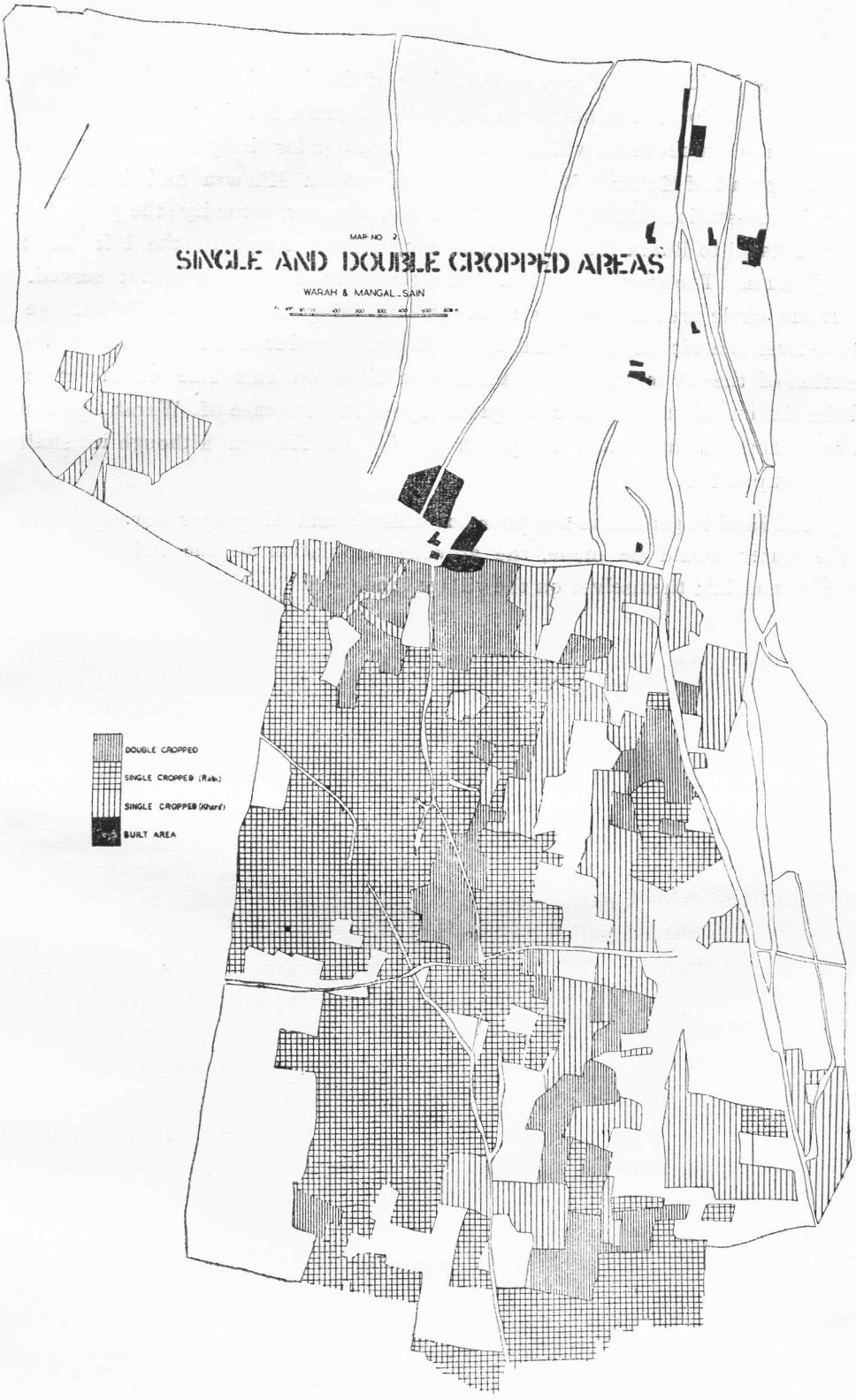
2. General aridity of climate and specially the variability of rainfall (winter rainfall specially) with almost no provision for irrigation.

3. Spread of Kallar with the resultant increase in Banjar Jadid. One coating of white efflorescene on the surface is a general menace to the lands of the district lying almost midway between the foothills and the

MAP NO 2

SINGLE AND DOUBLE CROPPED AREAS

WARAH & MANGAL SAIN



stream of the Jhelum. In Warah on the fringe of the riverain tract, the problem is actually less serious. The best solution for the last mentioned problem lies in the construction of tube-wells which may supply water for irrigation and help to check the spread of Kallar. Malakwal is 12 miles from Khewra and is a step down grid sub-station (132 kw) of the Rasul hydel power, secondly the proposed line from Rasul to Bhera Kalra, Shahpur etc, almost clings to the left bank of the Jhelum. The tract of land on the right bank of the river is not served. In fact the whole area of the district of Jhelum lying between the Salt-Range and the river is a victim to the Kallar which can be reduced effectively by the extention of the hydro-electric transmission lines on this side of the river and the sinking of tube-wells consequent upon it. In case of Warah, power can be obtained from the thermal power station of Khewra although it shall be more expensive.

The land in general is not poor but thirsty and if proper arrangements for the water would be made, the growing population of the twin villages may accommodate themselves on the village land.

THE ECONOMICS OF POWER CULTIVATION FOR WEST PAKISTAN

BY

SIR WILLIAM ROBERTS, C.I.E.

Present Position.—West Pakistan had probably less than 2000 Tractors on 31st December, 1951 and of these 1500 have been purchased since partition. The country is purchasing roughly one tractor a day now.

Culturable Area.—West Pakistan is cultivating about 26 million acres per annum mostly by irrigation. There is an enormous area which is cultivable but is now lying waste owing to lack of water and of suitable means of cultivation estimated at 75 million acres as follows :—

		Cultivated.	*Uncultivated.*
N.W.F.P.	...	25,00,000	59,00,000
Punjab	...	1,71,00,000	2,00,00,000
Bahawalpur	...	20,00,000	1,06,00,000
Sind	...	57 00,000	2,44,00,000
Baluchistan	...	4,00,000	3,45,00,000
Other States tribal areas figures not available.			
Total	...	2,74,00,000	9,55,00,000

Area under Fodder.—In the Canal Colonies of the Punjab and Bahawalpur where cultivation is from 90% to 110% (as in Lyallpur on the Lower Chanab Canal) the area grown with fodder for working animal averages 15% to 18%. The best land is generally put under fodder as the tenant does not have to share the whole of this with the Landlord and he also likes to manure such areas with whatever farm yard manure he can spare. In addition the cattle eat most of the wheat bhusa and gram bhusa or straw and also some of the gram pulse and possibly some cotton seed cake. Under complete mechanisation assuming 300 acres is controlled by a Tractor of 25 H.P. to 35 H P. there would be neet for a pair of cattle per 100 acres only instead of 8 pairs per 100 acres as at present. It it safe therefore to state that 15% of the cropped area would be free for wheat, gram, oilseeds and cotton under a mechanised system of farming.

Cost of Tractor Cultivation.—It is reckoned that cultivating with a Tractor using a Cultivators or Disc plough and doing the work better than a pair of bullocks would be about Rs. 5 per acre whereas bullock cultivation would cost at least Rs. 8. If slow speed Light Diesel Tractors are used the cost would be under Rs. 3 per acre. There is no doubt Tractor Cultivation is cheaper than bullock cultivation so long as wheat prices are over Rs. 5 and cotton over Rs. 15 per maund.

Displacement of Labour.—It is reckoned that on a unit of 300 acres with Tractor Cultivation we would require at most 12 men instead of 36 employed with bullock cultivation. This means a very serious displacement of labour or tenants and hence the use of Tractors on settled areas must be very gradual. The excess labour can gradually be absorbed by industrialisation, but this problem is a serious one.

Mechanisation by Co-operative Societies.—It is sometimes argued that in settled areas the best way of mechanising is through a Co-operative Society of Farmers. If 20 tenants owning of cultivating between them a unit of 300 acres decide to co-operate, they can keep a 25 H.P. to 35 H.P. Tractor fully occupied, but there will be no work for at least 66% of them as 33% can easily do all that is necessary except at harvest time and cotton picking time when more temporary labour is required. Only one out of every eight pairs of bullocks will need to be kept, so excepting for milking cows or buffaloes very little fodder is required—say at most 20% of the cropped area. Thus the increased cropping under cash and human food will be $100/85 \times 13 = 15{\cdot}3\%$ increase. It may be pointed out that in other mechanised countries e.g. in U. K. the horse is completely eliminated. In the early stages of mechanisation in Pakistan it is advisable to keep one pair of cattle per 100 acres for miscellaneous levelling, sowing small vegetable plots and other miscellaneous works.

Other advantages of mechanization.

1. Saving of water in irrigation. As in a block of 300 acres the cotton crop will be generally in large blocks the irrigation water will be running in channels in the crop and losses by percolation are saved.

2. The cultivation is better than that done by bullocks and occasional deep ploughings even once in 2 or 3 years gradually improve fertility.

3. Operations can be done in time. It is possible to work a Tractor 24 hours a day if necessary. In the case of wheat harvesting this often leads to saving of grain from shedding.

4. Weed control is better. Persistent weeds such as Dabh can be more easily controlled with a Tractor than with bullock culture.

5. Spraying is more feasible with Tractors and losses from white fly and Jossids in cotton can thus be reduced.

6. Surplus water in April and May can be utilized. At present water is largely wasted between end of March and end of May in the Punjab and from 15th March to 15th May in Sind. The harvest is then on and the cultivator is busy. With the Tractor however it is possible to sow green leguminous manure crops such as Guara Sann Hemp etc., which increase fertility if ploughed in later.

Erosion.—Very large areas in Rawalpindi, Attock, Hazara, Gujrat and many other Districts are suffering from erosion through sudden floods from Hill Streams. Altogether about 2 million acres are affected in this tract alone. The damming of streams by Track Diesel Tractors and the cultivation of extensive unirrigated areas is very much cheaper by Light Diesel Tractors than by Bullock and human labour. The whole of Pakistan would benefit from large scale work of this nature. This development would create openings for labour.

New Canals.—In the Thal and in Lower Sind Barrage if land was given out for tractor cultivation the area could be developed very quickly and costs to Government would be much less than by ordinary colonization. This also will create quickly much scope for new labour. Such mechanization on say 500000 acres in Thal and one million acres in Sind Lower Barrage would require 4500 Tractors and would quickly add to the resources of West Pakistan.

As the basis of this paper is related to actual comparative costs of Tractor and Bullock cultivation some detailed calculations are given below:

Cost of Mechanical Cultivation as compared to Bullock Power.—The following 3 Tractors have been exhaustively compared:

(*a*)

Tractor.	*No. of Cylinders.*	*R.P.M.*	*Drawbar H.P.*	*Fuel.*
A	2	900	34	Power Kerosine.
B	4	1350	33	High Speed Diesel.
C	1	540	35	Light Diesel (Crude Oil).

Note:—Powerine costs 1/10 per gallon, High Diesel 1/2 & Light Diesel (Crude Oil) -/8/-.

It will be noticed that the H.P. of these three is nearly equal.

(b)	*Fuels, lubricants, repair spares and depreciation.*	*Labour and overheads working on average 80 hrs. expenses Rs. 200 p.m.*	*Total.*
A	Rs. 4 11 6	Rs. 2 8 0	Rs. 7 3 6
B	Rs. 4 6 5	Rs. 2 8 0	Rs. 6 14 5
C	Rs. 2 7 0	Rs. 2 8 0	Rs. 4 15 0

Depreciation of implements.

Three types of cultivation is done *viz.*

(c) (*a*) Harrowing 3″ similar to bullock ploughing.
(*b*) Disc Tiller ploughing 5″ or 6″.
(*c*) Cultivator 5″ to 7″.

Depreciation : Harrow -/6/- per hour.
Disc Tiller 1/-/- ,, ,,
Cultivator -/6/- ,, ,,

The working cost per hour of these Tractors will be :

(d)		*A.*	*B.*	*C.*
1.	With Harrow ...	Rs. 7 9 6	Rs. 7 4 6	Rs. 5 5 0
2.	With Cultivator ..	Rs. 7 9 6	Rs. 7 4 6	Rs. 5 5 0
3.	Disc Tiller ...	Rs. 8 3 6	Rs. 7 14 6	Rs. 5 15 0

The above represents full costs per hour assuming 8,000 to 10,000 hours life.

(e) The output per hour is as follows :—

(*a*) Harrow ... 2 acres per hour.
(*b*) Cultivator ... 1.2 ,, ,, ,,
(*c*) Disc Tiller ... 1.1 ,, ,, ,,

(f) The cost per acre is approximately as follows :—

Implement.	*A (Powerine).*	*B (High Speed Diesel).*	*C (Low speed Diesel).*	*H.P.*
Harrow ...	Rs. 3 12 9	Rs. 3 10 3	Rs. 2 10 6	34
Cultivator ...	Rs. 6 5 3	Rs. 6 0 0	Rs. 4 7 0	33
Disc Tiller ...	Rs. 7 8 0	Rs. 7 3 3	Rs. 5 6 4	35

Cost of bullock cultivation.

One pair of bullocks for 2 days @ Rs. 2/8/- ...	Rs. 5 0 0
One labourer @ Rs. 1/4/- ...	Rs. 2 8 0
Depreciation and interest ...	Rs. 0 8 0
Total ...	Rs. 8 0 0

Many claim bullock cultivation costs Rs. 9 or more per acre in West Pakistan.

It will be seen from this comparison that Tractor cultivation costs less than half bullock cultivation when the Harrow is compared with bullock ploughing. It may be noted also that the Crude Oil Tractor is the cheapest in operating costs. Cultivation with Disc Tiller or Cultivator is much superior to

bullock cultivation and costs are not comparable. While the calculations for Tractor work can be regarded as accurate, there is room for argument regarding the actual cost of bullock cultivation. Another way of looking at it is as follows: Assuming 12½ acres of irrigated land per pair of bullocks and that five operations per acre will represent the total cultivation this means 62.5 acres ploughed or cultivated or sown per pair. It is sometimes claimed a pair of bullocks will plough an acre a day—if so the animals are working one day in six only. It is here assumed ½ an acre a day is normal and one day in three of cultivation. One acre of Kharif fodder and one acre of Rabi will be consumed by the cattle and this @ Rs. 20 a Kanal = Rs. 320 per pair. Add carting and labour in cutting and in feeding the animals we can add -/8/- per day--or Rs. 175 per annum. Wheat Bhusa—50 mounds @ Re. 1 & 10 mds Gram bhusa @ -/8/- Rs. 55. Concentrates estimated @ 20 seers per month @ 7/-/- a maund costs Rs. 42. The total comes to Rs. 550 which if debited to cultivation only comes to approximately Rs. 9 per acre. The cattle, however, do some carting of grain from the Threshing floor to the village and some other occasional jobs, so the figure of Rs. 8 per acre calculated above is not far wrong.

There is no doubt that mechanisation would increase the food supply and cash crops by at least 15%. This is an automatic increase quite apart from better yields as pointed out above.

Cost of mechanisation.—Taking a unit of 300 acres for a Powerine Tractor of 25 H.P. to 35 H.P. the total cost of mechanisation will be about Rs. 21,000 or Rs. 70 per acre. Recurring expenditure will be round Rs. 7,000 per annum.

Use of Powerine Tractors in uncultivated Areas.—The vast areas now uncultivated in West Pakistan representing as it does at least 3 times the cultivated area should not be neglected. In most of this area the rainfall is only 5″ per annum but even so it carries some natural bushes and grass which flourish after rain and give considerable grazing and fuel. With a fast moving Powerine Tractor it would be bossible to greatly increase the number of bushes and grasses by quick cultivation and showing of seed. Plants suited to arid conditions are available in other parts of the world and a systematic effort by Government could do an enormous amount in increasing our resources for feeding of sheep, goats and camels.

References :—(1) Paper by Author at Pakistan Science Congress 1950.

(2) Tests of Tractors at Isakhel Estate, Kotsamaba (Bahawalpur State) through courtesay of Sirdar Ghazanfarullah Khan.

INDUSTRIES IN THE MIDDLE EAST*

BY

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Industry has acquired an overwhelming importance in the world of today. Industrial development depends on the resources of a country in power, raw materials, means of communication and not the least on the out look of its inhabitants in the matter of education, labour and capital. With the rapid reorientation of the politics of the Middle Eastern countries greater attention is being paid to the utilisation of their natural resources for the purpose of industrialisation and a better economic set up. Still, the progress made by these conntries during the last thirty years is not much as is evident from the fact that mearly 10% to 15% of the population derives its livlihood from industry and of this total a considerable proportion is engaged in cottage industries. This slow progress is due to :—

I. Scarcity of fuel.

Deficiency of power and especially the paucity of coal is a serious hindrance. Turkey and West Pakistan possess a small quantity of coal which is poor in quality and uneconomical in use. Turkish coal, 26,23,315 tons, found in Eregli-Zonguldak-Amarsa region is of bituminous and sub-bituminous quality but lack of labour, poor communications and fragility of the material are the factors unfavourable for its proper exploitation. The last factor is a serious handicap. It results in considerable waste. Out of a total production of 38,31,000 tons only 25,26,000 tons is saleable. Plans are under consideration to improve this state of affairs. At Kutahya lignite deposits occur, which the Turkish Government has begun to utilize for generating electricity. West Pakistan coal from Dandot is Sub-bituminous in quality but the output is decreasing. Baluchistan has small deposits scattered over a large area but they contain a considerable admixture of phosphates, moisture and some volatile substances. Total annual production is 266,115 tons. Iran produces some

*In this article West Pakistan is considered to have been included in the Middle East.

150,000 tons of coal per year mined under Government Control. Total production of both the countries (Iran and West Pakistan) is decreasing.

As regards production of petroleum, Middle East comes next to U.S.A. but most of this fluid wealth is exported as it is exploited by foreign nations with foreign capital. Only 1-3% is consumed locally, mostly in motor communication. It is only Egyptian oil from Ras Gharib fields that is retained within the country to satisfy 40% of its needs. Syria, Lebanon and Palestine use Iraq oil for the electrification of important cities.

Development of electric energy is impeded by a great deficiency of technical labour and capital. In the absence of heavy industry, electrical machinary (generators, turbines etc.) has to be imported. Hydro-electric power is little developed because of lack of fuel and water for cooling purposes. Even in thermal plants copious quantities of water are essential for the generation of electricity. Turkey has been able to develop nearly 35% of her potential hydro-electric power. There are six projects each with an installed capacity of 4000-7000 K.W. They are scattered in the marginal areas of the Anatolian plateau. They are :

(1) Sizir Project in Sivas and Kayseri area.
(2) Tortum Project in Erzerum.
(3) Golcuk Project in Elazic mines.
(4) Goksu Project in Konya.
(5) Degirmendere Project in Teabzon.
(6) Kadincik Project in Taurus and Adana.

There are three multi-purpose projects connected with irrigational and flood control works located at Sariyar, Gediz and Büyük Menderes.

Iraq has not tapped her resources of hydro-elctric power in Tigris and Euphrates. She relies on cheaper means, that is, oil and gas. Thermal diesal plants have been installed in Baghdad and Basra with an annual capacity of 51,000 K.W. The Iraq Petroleum Company has a plant at Kirkuk generating 14,000 K.W. of energy. There are also small plants in various other places.

In West Pakistan there are five hydro-elctric projects

(1) Malakand producing 20,000 K.W. per year.
(2) Warsak producing 90,000 K.W. per year.
(3) Dargai producing 15,000 K.W. per year.
(4) Renala Khurd N. A.
(5) Rasul producing 36,000 K.W. per year.

Fifteen thermal and two diesel plants. Total production is 70,000 K.W. against an estimated maximum production of 5-6 million K.W.

The Nile waters at Aswan Dam have been utilized for hydro-electric power in Egypt and middle Jordan waters in Palestine. In lower Jordan production of thermo-electric currents from solar heat is another source of power.

II. Nature of Raw Materials.

There is an absence of raw materials for heavy industry except in Turkey, which possesses workable iron deposits at Camdag Torbali and Divisik and newly investigated reserves at Farasak, Hasan Celebi Elbistan and Cagalayik with a total production of 144,909 metric tons at present. Turkey ranks second in the production of chromium 117,975 metric tons per year. Deficiency of iron ore is serious enough to retard the growth of subsidiary industries. Housing material and mineral salts are found every where in abundance. Limestone, gypsum as well as sulphur, phosphates, sodium salts, zinc, lead, asbestos and other minerals are available. It promises a bright future for the cement and chemical industries.

Pastoral and agricultural raw materials are available in surplus quantities *e.g.*, mohair and merino wool of Turkey, cotton of Egypt, West Pakistan, Iraq and Turkey and Silk (in small quantities) of Mazandran in Iran. Hence there is a good scope for textile industry and efforts in this field have been crowned with some success. The middle East may well compete with other countries in textile goods in home as well as foreign markets.

III. Labour.

Compared with their potential resources of industrial raw materials, the Middle Eastern countries are under populated. The standard of living being low, labour is cheap but due to illiteracy it is suitable only for cottage industry. Factory industry lacks technical and high engineering skill and the school curricula lay little emphasis on practical training.

IV. Capital.

Capital is pons asinorum for the Middle East. There has never been an effort for raising it. The tragedy is best seen in the oil exploitation of Iraq, Iran and West Pakistan. To overcome this handicap, Turkey and Iran have

embarked on a policy of state capitalism and in other countries special concessions have been given by the states to private enterprise. Yet conditions are hanging in the balance.

V. Means of communications.

Means of communications are limited and under developed. In Afghanistan, Iran and Turkey topography is a great hindrance. In West Pakistan, Iraq and Egypt, fuel deficiency impedes further rail and road construction. The mileage in various countries is as follows :

Country	*Railways*	*Roads*
Turkey	4,748	25,543
West Pakistan	5,362	566,000
Egypt	5,235	———
Iran	1,748	17,000
Iraq	1,555	4,000

West Pakistan and Turkey have the largest rail and road mileage. Even in those countries mining centres are far apart which raises the cost of mineral production for industrial centres.

With such limitations industry in the Middle Eastern countries attain a modest success in home markets but machinery and certain other capital goods will have to be imported from abroad. Certain raw materials for localized cottage industry may also have to be imported for years to come.

Now we may discuss industry under two headings :

1. Factory Industry.
2. Cottage Industry.

FACTORY INDUSTRY

There are five major types.

1. Iron and steel industry.
2. Textile industry.
3. Cement industry.
4. Chemical industry.
5. Universal type of industry.

Iron and Steel Industry.

It has been seen that among all the Middle Eastern countries it is only Turkey where raw material for iron and steel industry is favourably found. In

1943, the state installed an iron and steel plant including 42 coke ovens at Karabuk with 30,000 tons' annual capacity, one open hearth furnace having an annual production of 150,000 tons ingots, three rolling mills and one plate mill, the annual capacity being 110,000 tons of steel. The five year plan inaugurated in 1946, aimed at increasing the output. One new open hearth and one electric furnace have been built along with an iron foundry and forge shop. Total output is 59,332 metric tons of pig iron, 90,786 metric tons of steel, 78,446 tons of rolled steel products, 8,592 tons of pipes and 314,762 tons of coke. Based upon this iron and steel, there are subsidiary industries preparing agricultural machinery, automobiles and aircrafts. As the total production is small, most of the machinery is imported.

Light engineering and metallurgical industries have been developed in Egypt Iran, Turkey and West Pakistan with a view to produce light armaments. It is significant that the largest single industrial plan in Iran, after the Anglo-Iranian oil installation, is the state Arsonal. A similar trend exists in other countries. Local industries are confined to breach loading guns, machine guns and amunition. Heavy armaments like tanks, bombers and fighter aircrafts and naval equipments have to be purchased from abroad.

Turkey leads in the number of metallurgical and light engineering industries. They are private owned and produce iron and steel wires, tools, stones and an indeterminate quantity of other products. In Iran is a blast furnace in the province of Mazandran, but it is not working to its full capacity. With imported iron bars and steel plates some light engineering works are being carried on. Iraq is now producing 5,000 tons of steel scrap per year. It is proposed that a small hand operated mill and an electric melting furnace should be set up to convert this scrap into bars, window shapes etc. which are in great demand. The site recommended is Baghdad so that the power problem may be solved. In West Pakistan iron and steel works are centred in Lahore and Karachi. There are two electric furnaces in Lahore producing 300,000 tons of steel which is imported semifinished. There are 29 rolling mills with a total capacity of 70,000 tons per annum, 35 foundries and 53 small engineering plants. Moghalpura Railway workshop is the most important concern. Two small mills are under construction in Karachi. In Palestine there is a railway repair shop and small-scale production of spare parts of electric batteries and household implements. In view of the difficulty of obtaining cast steel replacement parts, Cairo Tramway Company constructed a steel furnace electrically operated and produces 20 tons per month of steel castings.

Textiles

Textiles may be called the most ancient industry in the Middle East. The comparatively important position of textiles is due to two reasons ; firstly availability of raw materials and scondly a large home market. At present a large number of mills are engaged in ginning and spinning processes. Weaving is hindered by lack of machinery and technical skill. Under present economic development schemes textiles are being given due attention.

Turkey has made a judicious use of available resources. At present there is no need for further expansion, except in production of low priced staple and basic materials. There are 12 cotton mille five state owned ; 11 woolen mills, 5 state owned ; and two silk mills. Private mills are confined to cotton growing areas *e.g.* Izmir, Adana Tarsus, Mersin and Istambul. State owned factories are situated farther inland at Kayseri, Nazilli, Eregli Malatya and Bakirkoy. Bursa, Izmir and Istambul are the chief wollen manufacturing centres. Bursa is also noted for mohair and silk weaving, Small silk factories are also found at Istambul and Izmir. Total production is 241,758,241 yards of cotton cloth and 7,692,307 yards of woollen. It is enough to meet the local demand except in big cities where cloth of high value is to be imported.

Another country approaching self sufficiency is Egypt, though substantial quantities of yarn and thread are still imported comprising 20% of total imports of the country. Cotton goods are specially fine textured. Before the Second World War Egygt took to silk and rayon weaving. War resulted in the closing of the Mediterranean and supplies of silk and rayon were stopped. This put an end to the wave of prosperity. Factories returned to fine cotton goods. Imports were renewed in 1945, and a revival took place in 1946. Total output is 400 tons against a capacity of 2,000 tons. Flax is grown within the country, consequently linen thread and cloth are home products. A maxture of cotton and linen is also produced. In 1953, a jute mill was erected, designed to produce 3,000 tons of hessian and sackings per year. In 1946-47 supplies of jute ran short. It is now working to its full capacity but is chiefly engaged in manufacturing simple articles like ropes, twines etc. A small quantity of sisal is also used. Woollen goods are manufactured on a considerable scale but the inferior quality of Egyptian wool is a handicap.

Iranian textiles mean 70% of spinning work and only 30% weaving. In 1925, the state decided to supply electric power to important areas with large scale cottage industries, so that a change into factory industry may be possible.

It really helped various towns to start ginning and spinning and latter on weaving. The largest cotton mill is at Shahi having 12,000 spindles. Others are at Yezd, Isfahan, Meshed, Bandar Abbas, Semnaus, Kerman, Tabriz and Tehran. Total number of mills is 29. producing 4500 tons of yarn and 5. million yards of cloth annually. Textile expansion plans have been devised under which more mills will be installed at Narrafi and Sanayee. There are 9 woollen mills at Tabriz, Qazvin, Yezd and Isfahan, where 100 tons of yarn and 150,000 blankets and $1\frac{1}{3}$ million yards of cloth are prepared. In the province of Mazandran there is silk rearing with a state owned silk factory at Chalous and a private owned at Resht, with 8,000 spindles and 224 loom. Some jute is grown on the Caspian sea coast and Resht and Shahi have small jute mills.

In 1947, West Pakistan had only 3 cotton weaving factories in Lahore, Okara and Lyallpur. With the growing demand for cotton cloth and limited scope for cotton export more and more weaving mills are going to be established. Four new mills have already been erected, two in Karachi, one in Multan and one in Lyallpur. Six more mills are planned to be started in the near future. Total number of ginning and pressing mills is 322 and of spinning and weaving factories 21. Artificial silk is imported and at Karachi there have been installed three silk textile mills. There is much scope for further expansion in cotton as well as woollen textiles.

In Iraq a cotton spinning and weaving mill was started in 1947, near Baghdad with a plan of 5,000 spindles and 84 automatic looms. A second scheme enlarged the capacity of the mill to 22,000 spindles and 500 looms. There is every liklihood of the mill producing 6,000,000 lbs. of yarn annually. Another factory is being built at Mosul with 584 looms which will produce 15 millions square yards of cotton and rayon cloth per year. This amount is $\frac{1}{4}$ of Iraq's normal annual requirements. Improvements in texture is being sought. Fine shirting and poplin will be produced and in a few years the capacity of the mill will be doubled.

The woollen industry in Iraq is older than the cotton industry but so far only yarn is being spun for use in hand loom weaving and knitting. This plant is equipped to make a broad range of five fabrics. There are smaller mills capable of meeting all the requirements of the country but the present production is 50,000 kilos of yarn. It prepares 500,000 meters of cloth.

Under the Ottoman rule, Syria, was the most industrialised region of the Middle East. Today it is an important centre of handicraft industry.

On the whole factories are few in the Levant coastal countries. A big mill has been established in Tripoli (Syria) and is producing medium quality cloth. There is a silk reeling and weaving mill at Beirut (Labanon). Homs and Hama produce cotton and silk mixture cloth after Arab fashion. Modern cloth for everyday use is improted. In Palestine Jewish textile mills have been established at Haifa and Tel-Aviv. An Arab mill has also been erected at Gaza. None of them has more than 50 looms.

CEMENT INDUSTRY

In all the Middle-East countries, there is an abundance of limestone, marl and gypsum-raw materials for cement manufacture. Except Afghanistan, Jordan and Arabia, all other countries prepare cement for home needs. Turkey Egypt and West Pakistan are almost self sufficient in this respect. Expansioan in this industry is a results of political events and social uplift e.g. Egypt had boom year in cement industry in 1946 to meet the demand of the allied military authorities. Its output rose from 350,000 tons in 1939 to 590,000 tons in 1946. Present annual production is 650,000 tons of which small quantities are exported to Sudan.

Turkey has five factories each producing 400,000 tons. In these mills Government share is 28%, one rest have private. Iran has one factory at Tehran which is state owned. Peak production was in 1946-200 tons per day. West Pakistan has three factories at Wah, Dandot and Karachi and total production is 1300,000 tons of cement and cement products. There is a newly installed cement factory in Iraq, sponsored by the Industrial Bank. In 1952, its capacity had been doubled for home needs. Syria, Lebanon and Palestine have only cement tile and brick kilns though cement factories are being planned.

CHEMICAL INDUSTRIES

The industry requires high technical ability, which is generally lacking in the Middle East. Consequently, inspite of the fact that mineral salts are found, development is restricted as it also needs complementary development in other industries, creating a demand for chmical products. As these countries are primarily agricultural a major part of this industry is engaged in the preparation of fartilizers, production of course is limited because of the fact that agriculture is neither modern nor mechanized. Turkey having taken to industrialization earlier leads in the production of chemicals. Some 18,000 tons of sulphuric acid 16,000 tons of fertilizers, 4,448 tons of super-phosphates and

7,370 tons of cellulose are produced. Another favoured site for this industry is Karbuk and its suburbs because of the vicinity to power and raw materials. Iran ranks second. She prepares sulphuric acid hydrochloric acid, calcium sulphate and carbonates. In 1943; a plant was erected to prepare potassium-bicarbonate naphthaline and caustic soda. Oil by--products constitute a considerable proportion. Iraq chemical industries depend upon natural gas produced in conjunction with oil. This contains hydrogen, sulphide, hydro carbon and methane. Waste gas and gypsum could be utilized for the preparation of ammonium sulphate, a valuable fertilizer. Besides this there is a considerable preparation of nitrates. Geophysical surveys give indications of a large salt dome near Basra. West Pakistan is trying to start chemical industries to prepare fertilizers, dyeing and tanning chemicals. Plenty of salt (sodium chloride) is mined at Khewra. There are three sea salt preparing factories at Karachi. Salt preparation is also done from Sea water in Palestine.

UNIVERSAL TYPE OF INDUSTRIES.

To this type belong industries of two categories. The first group is engaged in the preparation of food stuffs, sugar refining, flour milling, fruit canning, vegetable oil extraction, tobacco and cigarette making, wine and alchohol distillation and the other includes paper manufacturing, glass ware, matches, leather tanning, pottery etc. Progress depends on the requirement of the country and availibility of raw materials. They are best developed in Arabia, Afghanistan, Jordan Turkey and West Pakistan.

From among the first group sugar refining is of great importance. West Pakistan and Egypt produce cane-sugar while Turkey, Iran, and the Levant prepare beet-sugar. The Mardan sugar factory (in West Pakistan) is one of the largest in Asia. Rahwali in Gujranwala district, Panjab (W. Pakistan) also produces a small amount hardly sufficient for the said district. Egypt prepares 180,000 tons of sugar annually and exports surplus to Sudan.

As regards beet-sugar Turkey leads with a production of 120,000 tons of refined and 6,000 tons of unrefined products. In 1895 a Belgian company started 9 sugar mills in Iran but it should not stand the competition of Russia. In 1930 the state assumed control. The first mill was erected in Kabrizak 10 miles south of Tehran. Now there are 8 sugar mills producing 240,000 tons of sugar. There has been an attempt to introduce the production of sugar cane into the country.

In tobacco products and cigarette making Turkey comes first, Egypt, Iraq and Iran also have cigarette factories depending upon imported Turkish tobacco.

As regards flourmilling West Pakistan takes the lead. In fruit canning Palestine and Turkey occupy important places. Alchoholic beverages are prepared in Egypt, Turkey, Iraq, Iran and Palestine. There are distilleries at Alexandria, Izmir and Baghdad. In the Levant distillation of Arab, a local beverage—is an important industry.

Large imports of paper have a marked adverse effect on national economy because the consumption of paper is increasing rapidly. Izmir in Turkey has a big mill producing 22,000 tons of paper and cardboard but large quantities have to be imported. Within a few years, West Pakistan and Iran will have their own paper mills. In west Pakistan there will be one paper mill at Nowshera and one cardboard mill at Rahwali.

Leather tanning is not very important but leather goods are prepared on a large scale. Egypt has two tanneries and makes leather goods both by machine and hand, being self sufficient in this respect. Principal machine made articles are boots and shoes, the rest of a great variety and beauty are hand made. Factories in Egypt are four, in Turkey two and one in West Pakistan.

Matches are also produced in quantities sufficient for home needs, Turkey having nine, Egypt seven, Iran six west Pakistan two. West Pakistan has to supplement its production by imported matches to a certain extent. Glass work and pottery both have a bright future. Turkey ranks high in bloom glass work and decorative pottery. Attempts to develop this industry are being made in other countries.

The Cottage Industry[1]

Chronic lack of fuel, meagre raw materials and under developed means of communication have been responsible for the persistance of cottage industry. They were carried on in or near the important towns and maintained by single owner with the assistance of their kinsfolk. In ancient times it was patronized by assistance of their kinsfolk. In ancient times it was patronized by Ottoman, Sarrain and Kuznat gentry. However under the pressure of competition with cheaper, machine made foreign goods,handcrafts have not only deteriorated in quantity but in quality as well. The Middle

1. Cottage industry is a small scale industry and it is not a limited concern.

East is passing through a transitional period of industrial development. Cottage Industry is being replaced by factory industry with the consequent worsening of labour conditions. In spite of the pigment state of affairs Cottage industry can afford to survive due to those very facts which hinder the development of factory industry.

At present cottage industries are :—

(1) Textile goods.
(2) Metal work.
(3) Leather piece goods.
(4) Wood work (sports goods etc.)

Textile goods.

Textiles consist of carpets of exquisite designs, fine cloth both cotton and woollen woven with gold and silver issues and a large quantity of coarse cloth woven in hand looms after native country styles and demand.

Carpet industry is of world wide fame in Iran. They are used for wall decoration and covering of Divans etc. Turkey, Iraq, Afghanistan and West Punjab started carpet making but instead of silk and cotton, wool and cotton fibres are used hence this stuff is no match for persian carpets. Afghan and Arabian rugs are woven wollen materials stripped in various colours. West Pakistan is noted for Khaddi cloth of a great variety quality and being improved to a greater extent.

Another aspect of textile craftsmanship is the needlework and embroidary lace making and drawn thread work on silk and linnen requiring great skill prepared and sold to travellers and pilgrims. Important centres are Nazareth, Beirut, Aleppo and Damascus, where population is great and means of subsistence restricted.

Metal Work.

Based upon the small quantities of various metals like copper silver and gold, metal work in the Middle East is as ancient as her civilization. Copper and iron are smelted in small ovens in private shops and gold and silver inlay or die work is done. During Middle Ages Damascus steel inlay work had acquired a work reputatation. Partly because small mines have been exhausted and partly due to the decreasing demand for fancy articles this industry is dying out. According to the present trends small iron and

steel products like locks and other similar trinkets are prepared. There has been an appreciable and successful effort for the making of fodder cutters and tractors in west Pakistan in Multan.[1] Gujranwala and Wazirabad have good reputation in the making of cutlary.

Leather Piece Goods.

Most of the hides and skins from all the Middle Eastern countries are exported. A small quantity of tanned leather is produced at home. Good quality leather is imported but leather piece goods ranging from a simple whip and shoe to boxes and Ward-robes are prepared on a large scale in big cities. Fine painting and die work on leather is most beautifully done in Egypt.

Wood work.

Making of furniture is common in big cities Fine wood carving is done in West Pakistan and Iran. Boxes of ornamental purpose, dry fruit plates, book shelves, table lamps of beautiful design are made. In Sialkot (West Pakistan) mulbury wood is used in the making of sports good. An annual export of worth Rs. 7600 has won a name in the world for Pakistan.

Fisheries.

In spite of a long coastline, no great importance is given to fishing any where. Small quantities of fish are caught and 47% of the total catch is from rivers and lake waters. This is due to a harbourless coast and sparse sea—side settlements. In general sea fisheries are hindered by different factors in different seas.

The Black Sea.

This is heavily charged with sulphurated hydrogen below 250′ and so fish are restricted to upper levels. During winters they migrate to the calmer Aegean and Mediterranean seas and are caught in large numbers on the Bosphorus, Sea of Marmora and Dardanelles. One fourth of this catch is sold in Istambol and the rest in inland markets.

The Mediterranean Sea.

Due to a scarcity of suitable nutrinents, the number of fish is still low. Near the mouth of Nile the fresh water brings calcium salts, which account for better conditions in the south east. In late summer and autumn, when the

1. 20 horse power motor is imported the rest of the parts are prepared in Qasimpur colony, Multan.

Nile is in flood Sardines are caught in large numbers. Along the Levant coast Sardine, mackerel and Mullet are found. Northwards the supply of fish decreases but there is sponge industry under Government control.

The Red Sea.

As the coastal region of the Red Sea is very sparsely populated, there is no fishing. Transport for the labour to move sea-ward and fish to be carried inland is a problem. Along the Egyptian coast shark and trochas shell are caught.

The Indian Ocean.

Along the southern coast of Arabia fishing is the principal activity. In the words of warthington, "Sea is equally or more productive than land." The summer catch is of shark and the winter of Sardine. Fish is dried and carried inland by means of canals.

Arrabian Sea

The west Pakistan fish catch from the Arabian sea is high. There is a great variety of fish which however is mostly consumed locally. It is proposed to convert a part of the catch into oil and fertilizers.

The Persian Gulf.

The Tigris and Euphrates discharge a huge amount of fish food into the Persian Gulf. Mesopotamian catch is locally consumed. Fishing on a commercial scale is carried on in lower Persian Gulf and the Gulf of Oman. There is a canning factory at Bandar-Abbas but it is not working to its full capacity.

The Caspian Sea.

Fishing in this sea is concentrated with the production of Caviare from the roes of the sturgeon. The industry is carried on by Russians, though Iran receives a small royalty. Production has recently fallen by 53%.

Inland fishing.

This is relatively important due to a concentration of population along rivers. The Nile, Tigris, Euphrates, Indus and its tributaries yield a variety of fish, but since increase in the number of canals for irrigation has brought about a shortage in water supply of rivers, the catch is not reliable. It is more of a hobby than a trade. In Egypt the delta lakes employ some 2,000 men. To sum up the resources of the Middle East are comparatively small and progress is slow.

SUKKUR AND ITS ENVIRONS—A GEOGRAPHICAL STUDY

BY

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The town of Sukkur on the western bank of the river Indus is one of the best examples of the class of towns that develop on a river bank. In its siting and development the Indus has played an important role. Besides the navigational and irrigation facilities, resulting in the development of the agriculture of the district of the same name, the topographical features of the area are also responsible for the growth and development of Sukkur.

Location and Size :

The town of Sukkur is situated in an irrigated tract at the headworks of the Sukkur Barrage canals. It lies at the junction of many inland highways running from different parts of the Sind region and the adjoining provinces of Baluchistan and the Punjab. All the factors enumerated above made this town a 'mandi' or a market town practica ly from its very beginning.

The town of Sukkur is about three miles in length and about two miles in breadth, that is, approximately 6 sq. miles of open land. The total assessment of the occupied area made from village registers is as follows :—

Sukkur Purana (Old Sukkur)	...	2,805 acres
Sukkur Nawo and Chhipri (New Sukkur)	...	1,206 acres
Total :		4,011 acres

The eastern limits of the town are marked by the river Indus which separates it from Rohri. There are two units or blocks, called Old and New Sukkur, separated from one another by the railway embankment. New Sukkur and the newly built area of Civil Lines have been erected on and about a cluster of low hills which are in continuation of the chain that runs from Rohri

southward for nearly fifty miles on the right bank of the river Indus. The island of Bukkur in the middle of the river between Sukkur and Rohri is a link in that chain.

Physiographic Aspect:

Geologically, the Sukkur-Rohri area falls within the upper part of Sind consisting of the flat alluvial plain but with a few isolated ridges *viz.*, the Sukkur and Rohri hills. The foundation of Sukkur itself has been laid in an area, which consists of a broad alluvial plain on both sides of the river, interrupted near Sukkur and Rohri by the limestone ridges. The island of Bukkur, lying in the middle of the river between these two towns, is composed of the Kirthar series, a white and yellowish Nummulitic lime-stone. The foundation of the town has, thus, been laid in a rocky area, where there is still much room for further extension in the north and north west respectively.

The hills of Sukkur and Rohri rise about 150 feet from the plain in the immediate neighbourhood of the Indus. This rocky pocket of the Sukkur-Rohri hills is intersected by the main stream, which has cut its way through these lime-stone rocks in between the towns of Sukkur and Rohri instead of cutting its course through the alluvial plain to the east or west of these hills. The central portion of the plain in upper Sind, in which the Sukkur-Rohri area lies and which is traversed by the present course of the river Indus, is higher than the areas lying eastwards and westwards. Beyond this rocky pocket, a belt of marsh extends from north to south at some distence from each bank of the river. The river on Sukkur and Rohri point is actually flowing on an elevated ridge formed by itself and the river bank is only fixed at Sukkur-Rohri in the North of Sind.

The siting of these towns in the past and for the construction of Barrage have obviously been selected for their topographical stability. Physiographically, the Sukkur area as a whole may, thus, be described as a flat table land, chiefly overlain with alluvium, with a few isolated ridges standing in this plain otherwise quite level. Due to this outstanding topographical feature this area presents better prospects for establishing a stable town in the upper Sind along the banks of the river Indus where there is always a danger of devastating floods and where river 'bunds' are occasionally breached during the rainy season.

In general, the climatic conditions of Sukkur and its neighbourhood are similar to those which prevail throughout the upper Sind. The air is generally

dry. Railfall at Sukkur is less than 4″; and the temperatures are high. Although the air is very dry and hot in summer yet it is not so distressing as elsewhere in the north. The nights are generally cooler. The climate almost resembles that of the semi-desert type. During summer dust storms are very common every evening.

The weather conditions during December, January and February are typically cold and bracing. From April to June, and some times in July, hot dry winds blow from the North-east and South-east. During May and June, the scorching heat of the sun and wind is intolerable. The temperature in the shade goes upto 112°F. The humidity mounts to 80 p.c. Dampness makes the climate sticky and disagreeable.

In this irrigated tract the town of Sukkur is subject to much water logging which results in mosquito breeding. For this reason malaria is the main disease affecting the population during the winter season. During June, July, August, and September high humidity, bad sanitary conditions of the larger part of the town and the unsatisfactory diets of the major section of the population often result in the outbreak of cholera, small pox and diarrhoea in the town. The outbreak of such an epidemic is always local and always starts from the section of the town where the poor or working class population is housed. The majority of the cases are always in those localities which may be called the slums of the town. The dirt and the refuse of the houses contaminate the atmosphere and are mainly responsible for the spread of such diseases in the town. For the above reason the epidemic germs breed in abundance and make the winter and rainy season generally unhealthy.

The natural vegetation of Sind, as a whole, is very poor and the greater part of the region has herbaceous vegetation; along the banks of the river Indus thickets of shrubs and a few trees of arid and semi-arid or tropical type are found. In the rainless, arid and hot tract of the Sukkur area, due to the loamy nature of the soil and the quantity of fresh water available, *babul* (Acacia arabica) *shishum* (dalborgia) *bhan* or white poplar, tammarind as well as grasses of various descriptions grow well. A mixed forest belt spreads over a narrow strip of land, 25×2 miles, all along the banks of the Indus from the towns of Ghotki and Shikarpur upto Sukkur and even further below. This belt is of riverain forests which depend upon the flood water of the river for their growth. The total forest stratches over about 5 sq. miles of land in the Sukkur area of which 80% is riverain and 20% inland forests. According to the

estimates of the Forest Department, Kandi occupies 40% of the total area while Babul and Lai and Bhan cover 30%. Wherever in the area the forests have been cleared this tract of plain land, which is loamy and fertile, productive and rich in vegetation and which is being irrigated with the help of canals, has been converted into good arable land. In the area besides the usual crops, in many neighbouring villages of the town grow vegetables in common use such as cabbages, cauliflower, turnips, green peas, onion, garlick, root vegetables and other greens. In the neighbourhood of the town fruit gardens are found almost everywhere. Mangoes, lime, berries are the common fruits of the area. Date palms flourish at Sukkur and Rohri along the banks of the river.

HISTORICAL GROWTH OF THE TOWN

Historical evidence regarding the origin and early settlement of Sukkur is lost in obscurity yet its past history is very closely connected with other ruins of the area, which now form a part of Sukkur and its environs. Aror, a ruin nearly 3½ miles to the south east of the town of Rohri, was the first historical town of the area, and used to serve the purpose of a capital of a Hindu Raja. After the desertion of Aror, the population appears to have migrated to Bukkur and Rohri. As the island of Bukkur has its own military and stratigic importance, it has served as an important station in both Hindu and Arab days. It seems probable that after the ruining of Aror, Bukkur was selected as capital and it was fortified. Simultaneously with the fortification of the island, the small village might have grown up as an annexe to the Bukkur fort, and the miscellaneous population may have been asked to settle there under the royal protection and patronage. For this reason the small village did not attract the notice of historians. The old village of Sukkur lies about a mile away from the island on rocky ground where there is no fear of any flood. In the neighbourhood of the island, the river flows slightly higher than the actual ground level, and as there was no *'bund'* to protect the area from the flood waters of the river, people naturally selected the higher spot, for erecting a village.

In 1839, the town of Sukkur was captured by the British forces and was used as a base. In 1842, the town was made over to the British Government in perpetuity. A description of Sukkur in those days has been given by Rev. T.N. Allen, who found that the rocky portion of the area was surmounted by officers' houses which were flat roofed and were built of sun-dried bricks. In the centre stood the dome of a tomb. The best buildings were the shops

of Parsi merchants and the houses of conductors in commissariat department. The old Sukkur was just a heap of ruins. A good number of the houses in the town belonged to the merchant community.

The new town of Sukkur was established in the year 1839 after the conquest of Upper Sind by the British Government and the new town was sited nearly a mile away from the old, just at the bank of the river on a rocky ground but was connected to it by a metalled road; the intervening space being covered by Government buildings. With the establishment of a military station here old Sukkur also showed signs of revival and there was an influx of merchants and traders, who opened shops all along the Bunder Road, which runs parallel to the bank of the river. A number of barracks were also built for the soldiers between old and New Sukkur. Sir Charles Napier afterwards abandoned Sukkur as a military station. Since then it has been prospering as a market town.

In appearance Sukkur is a place of contrast. As seen from the railway station, a little plain in which the station stands, it resembles a vast quarry. The station area is bounded by a semi-circle of lime-stone hills, but crowned every where with dull grey quadrilateral houses on the flat tops of which stand parallel rows of pillars bearing light roofs Behind these houses, on a rocky top, the tall sugar-loaf tower of Mir Masum Shah stands up against the sky. Metalled roads giving off a strong glare slope up the faces of the hills to a plateau where the civil lines appear clean and trim, though frequently diversified with ruined tombs. A certain amount of vegetation and a few gardens are also seen in this area. As soon as the top of the ridge on the further side of this plateau is reached and one descends the other side, there stands packed close Sukkur with narrow streets on a level plain, running parallel to the river Indus. This is the ugliest part of the city. A little farther in the southwestern corner of the town, close to the head-works of the Barrage, lies the Barrage township, a colony of the employees of the Irrigation Department, which came into existence after the completion of the Sukkur Barrage. The area in between the Barrage township and New Sukkur has been covered with a few 'Kachcha' houses, a dairy farm and a garden lying adjacent to the township. The Sukkur river-flat is all faced with stone piers and 'ghats' at which cargo boats load and unload. Piles of wood, wheat and other grains lie in the shade of banian trees. Beyond these piers is the yard where the country

boats are built. The whole length of the Bunder Road is one of steady activity. Behind the shops and ware-houses which face the river bank lies the new town curling round the hills with its high flat-topped houses packed close together. Beyond it on the north-western extrimity of the town is an area where a few factories, the railway work-shop, power house, water-works and large railway colony are established.

POPULATION

So far as the population of this town is concerned hardly any thing can be ascertained earlier than 1872, as no records are available. The first official census of the town was made in the year 1872 and its population was estimated at 13,318 persons.

The following table gives the estimated figures of population from 1872 to 1951.

1872	1881	1891	1901	1911	1921	1931	1941	1951
13,318	27,389	29,302	31,318	35,294	42,759	69,277	66,649	77,026

From the above table it is clear that the population of the town increased nearly by six times within 80 years. The increase in the first twenty years from the date of the first census is evidently connected with the opening of the railway from Kotri to Sukkur and from Rohri to Khanpur in the year 1878; the construction of the Lansdown Bridge in the year 1889, which connected the town with several other important towns of Northern India. Railways gave a good chance for many traders to come and settle here. The policy of the early administration was also to develop Sukkur as a market town. In the next thirty years the increase is connected to many economic events of the region, when the opening of the Railway work-shop and a few industries threw open jobs to the un-skilled population. Secondly, the improvement on the old canal system increased the agricultural productivity, and in 1921 it was a fairly important market town in Northern India and the majority of the population was engaged in the grain trade. In 1931 the population of the town increased by five times due to the construction of the Barrage, which employed thousands of workers. Latter on the Barrage town-ship was also added, which is in fact a colony of the employees of the Irrigation Department. In 1941 the population for the first time showed a decline, which was due to a large fall in the number of people working as ordinary labourers who had to leave, when the Barrage was completed. The increase shown in 1951, is due to the great

influx of Muslims from India who have settled down in Sukkur. It is difficult to say whether there will be any further increase in population, without any expansion of the town, or in its industries. The population of the town has increased to such an extent that under the present state of affairs it could not easily provide accommodation or employment for an increased population until expansion takes place in its economic resources and its built up area.

WATER SUPPLY AND SEWAGE DISPOSAL

An important problem of the town dwellers was solved in the year 1895, when the water works was started in the town. This water works lies on the bank of the river Indus near the island of Bukkur. In its early stages water was drawn from sunken wells, which were beneath the bank. It is now pumped directly from the river. In order to remove the silt with whict the river water is laden, the water is collected in the big collecting reservoirs, where much of the silt settles at the bottom. From these reservoirs the water is carried to the filteration plant and finally it is collected into masonary reservoirs from where it is pumped into different tanks. The total capacity of all the six tanks is estimated at about 1,049,583 gallons. Later on, it is served through pipe lines to the town. There are 5 main supply lines, running from these tanks to the different parts of the town. The plant, being a small one, is not sufficient to meet the town's entire requirements of fresh water. The average amount of water at present supplied comes to 2,400,000 gallons a day. The supply is calculated to be 30 gallons per head daily. The water supply which is derived from the Sukkur Water Works is of a high standard of purity. The water is sedimented, filtered, and chlorinated with bleaching powder. Patterson's Rapid Filters are in use.

There are open and shallow drains generally running on either side of the roads which carry the sewage water into the main drain. There is also one small sanitary works, which is quite insufficient for the task of water drainage for the town. The open and shallow drains create insanitary conditions and for this reasons many parts of the town are very dirty.

TRADE

The town of Sukkur, being situated in a very favourable position, has attained the status of a 'mandi' or market town in the upper Sind. Being located on the Indus and at the junction of the railways, it gathers up a greater portion of the trade of the region than any other town in Sind except Hyderabad

and Karachi. Before the opening of the railway line and the construction of the Lansdown Bridge many steamers and boats used to ply on the river and the town was the chief inland river port for traffic by the Indus Steam Flotilla and native boats between the Punjab and Sind. After the construction of bridges, although the river traffic has diminished considerably, the prosperity and commercial importance of the town still mainly depends upon its river traffic with the Punjab. Even today, a large number of country crafts are used for this purpose.

Wheat is the most important commodity which is brought for transaction in this 'mandi'. The greater bulk of the crop produced in Upper Sind is brought to this town either by rail or by road and river. For road and rail borne traffic Sukkur is the natural market for the Upper part of the lower Indus Basin as it is connected by metalled roads with Larkana, the Upper Sind and the Sukkur Districts. For this reason most of the crops harvested in the Sukkur and Upper Sind districts are stored first at Sukkur and then transported by rail to other parts.

Besides the agricultural products, 'deodar' wood is an imported commodity which is floated down the river in great bulk from the Punjab. A considerable quantity of it is consumed locally.

INDUSTRIES

Little can be said about the industrial aspect of the town in the past except that only cottage industries were established at that time. The common indispensible artisans found in the town were the black-smiths, shoe makers, carpenters, jewellers, weavers and potters. The skilled carpenters, weavers and jewellers turned out excellent articles for practical use. There were, and still are, workers in fine arts for which Sind has been noted for a long period. The woollen and silken goods are worth mentioning. Even today cottage work is being carried on in several parts of the town. Hand loom cloth, rope, shoes, wooden articles and jewellery are products which are worth noting.

For the first time in the industrial history of this town, in the year 1890-1 the Central Government of India set up a railway work-shop at Sukkur, which provided jobs for about 500 people. In the year 1906, a small scale cotton ginning factory was set up and in the year 1911-12 a flour mill was located at Sukkur, which could employ about 70 persons. In the year 1915, a set of rice husking hullers and an ice plant were opened in the town. In the

year 1918, a cotton press was also attached to the local flour mill. In the year 1921, a foundry and two small scale oil mills were also set up. With the extension in the railway work-shop, 2,000 people were now being employed there. In 1925, the number of rice husking and small-size flour mills, locally known as 'chakkis,' increased to eight. In the year 1937, hosiery work with hand-machines on a small scale employing 30-40 persons was started in the town. Two biscuit and confactionery factories were also set up in the same year.

Before 1942, almost all the factories worked by steam, but with the ereetion of the power house for the town, a few of them began using electric power whilst many of them had their engines converted to consume fuel oil because of its low cost. With the help of the electric power supply a few repairing work-shops were also started and the number of the foundaries rose to six. In the year 1943, a silk weaving hand loom factory was also established. Since then no more factories or industries have been started, except for the Zari woaks, started by a Delhi refugee who was the owner of the works at Delhi and has come to Sukkur with many of his old workers.

According to a personal survey of the industries of the town carried out in March, 1951, the existing position of the industries in the town has been shown in the attached table.

TABULAR STATEMENT SHOWING THE EXISTING INDUSTRIES IN SUKKUR.

	Nature of Work	No. of mills	Power used	Approx. No. of persons employed daily	Finished Products	Output
1.	(*a*) Flour Milling...Large Scale.	1	Oil	60-70	Flour	50-70 tons a day.
	(*b*) ,, ,, ...Small Scale.	2	,,	15-20	,,	10 ,, ,,
	(*c*) ,, ,, ...Small Units (Chakkis)	30	Oil and Electricity	100	,,	Local work.
2.	(*a*) Oil Milling	6	,,	100	Oil and Oil cakes	2,73,000 mds capacity Expellers 6, Refinery Plant—1.
	(*b*) Indigenous oil seed crushing or ghansi oil.	180	Animal	70	,,	Local Work, Oil yield 30% cake yield 70%
3.	Rice Milling. ...	1	oil	30	Rice	
4.	Cotton Ginning and Pressing.	1	oil	90	Cotton bales.	Cotton 4718 bales. (A season Cotton seeds 33000 mds)
	MANUFACTURING INDUSTRIES					
5.	Biscuit and Confectionery.	3	Oil, gas and Electricity.	525	...	Biscuit 10,000—17,000 Lbs. a day. Confectionery 4,200 Lbs. a day.
	,, ,, (Small units)	10	hand	42	Confectionery	7,000 Lbs. a day.
	Knitting ...	2	hand	56	Socks underwear etc.	...

6.	Ice Making ...	4	Oil	12	Ice	12 tons a day.
7.	Iron work-shops and foundries.	4	Electricity	210	...	...
8.	Lock making ...	1	hand and oil	20—25	Locks and Suit-case materials.	
9.	Zari making ...	1	hand and oil	40	Zari lace	30 Lbs. a day.
	INDUSTRIES BASED ON FOREST PRODUCTS					
10	Boat making ...	1	hand	10	...	
11.	Saw mills ...	10	Electricity and oil	50	Planks	Local work.
	COTTAGE INDUSTRIES					
12.	Handloom ...	900	hand	900	Cloth	... *
13.	Soap ...	1	oil	...	Washing soap	150 mds. a day.*
14.	Shoes making ...	...	hand	100	All sort of shoes and leather works.*	
15.	Furniture ...	...	hand	200	Wood work	*...Work is done by the individuals in their cottages.

PROPOSED INDUSTRIAL ESTATE

The third industrial Estate of Sind is to be located at Sukkur. The area for this estate has been chosen in the northwestern corner of the town which is topographically a part of the Sukkur hills. The eastern limits of the area are marked by the river Indus and the western by the railway line. Shikarpur Road runs through the area. In this area a few factories are working already. The entire estate comprises of two sites lying in the east and the west of the Shikarpur Road and covers an area of 850 acres.

This estate is intended to provide factories for industries based on local raw materials, the main industries to be established being woolen, mills, oil seed industries and hide and skin processing. The advantages of establishing such industries in Sukkur are enormous. Water and electric power are both available. Labour can be recruited entirely locally, which is the greatest single economic factor in industry. Communications with Karachi and other parts of Sind, Baluchistan and the Punjab by road, rail and river are good. The area is so planned as to afford all the facilities which industry can possibly require. Most of the population, which can be employed resides within walking distance of the area in the old town.

SUGGESTIONS

At present, the town of Sukkur cannot claim to be a planned town. There has been no attempt to develop it as such. For many decades it has been working as a market town and it is only during the past few decades that some settler in Sukkur tried to set up a few factories. Most of these factories are ill-equipped and have not been properly dispersed over the area. A number of factories have been set up in the heart of New Sukkur. Such a defect is not only found with the distribution of industries, but the town itself has no planning.

For the future development of the town, the following points may be taken into consideration.

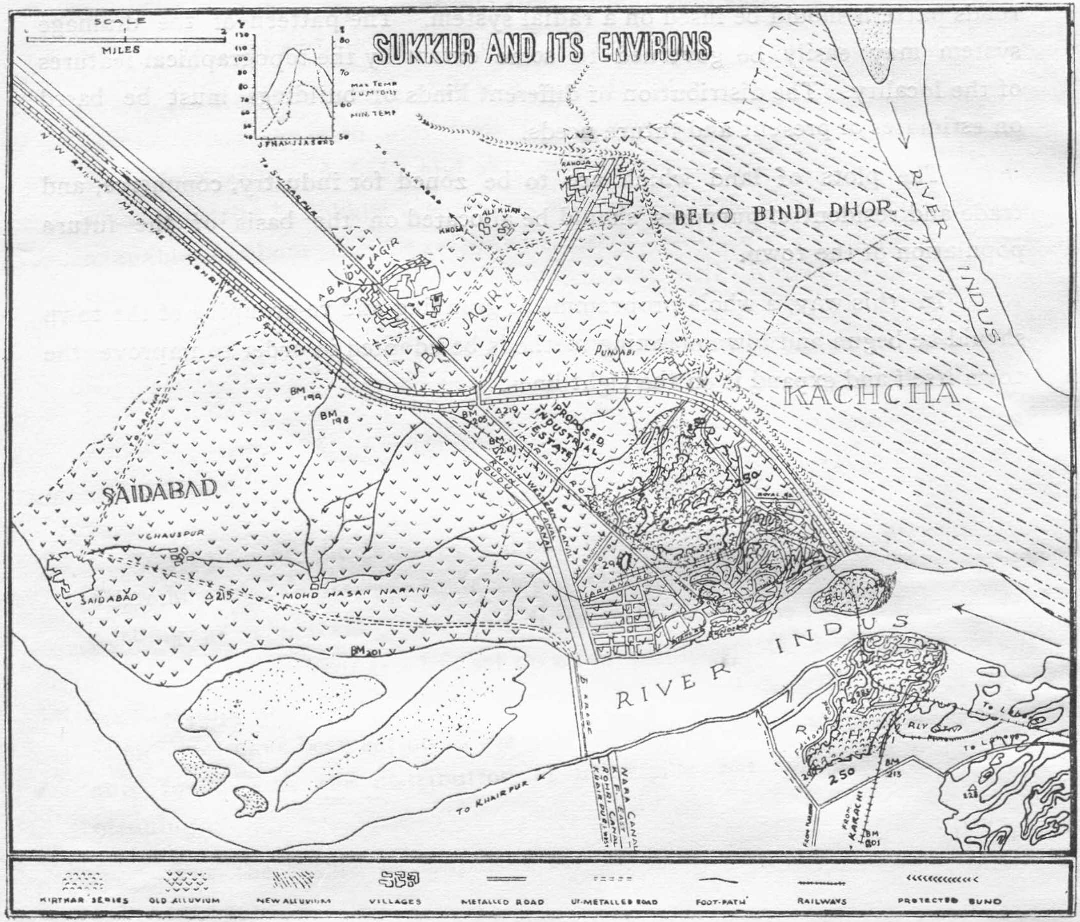
It is essential that residential and industrial sides of the town should be planned at the same time, and before taking steps in the work, the necessary information about the town *viz.*, some data regarding population, houses and factories should be collected. In this way, the Sukkur area is to be developed. Unluckily for Sukkur, due to the unforseen circumstances of mass migration of population, the town has been burdened with an enormous population.

Because of this, it is necessary to employ a large number of demobilised men and women in the execution of all such schemes.

At present most of the roads are dusty and the lanes are just dark and narrow alleys, through which nothing bulky can pass with ease in many parts of the town. The drainage is mostly cleared by evaporation in many parts of the town. In the interest of the public health, the roads should be developed in such a way that they should be wide enough for all traffic and the internal roads pattern should be fused on a radial system. The pattern of the drainage system may easily be governed to some extent by the topographical features of the locality. The distribution of different kinds of buildings must be based on estimates of present and future needs.

The plots of land which are to be zoned for industry, commerce, and trade and residential purposes, should be allocated on the basis of the future population of the town.

In this way, a whole propramme of grouping and re-grouping of the town should be begun and town planning methods be adopted in order to improve the town itself and expand it on the right lines.


SUKKUR AND ITS ENVIRONS
SCALE
MILES
MAX TEMP
HUMIDITY
MIN. TEMP
BELO BINDI DHOR
RIVER INDUS
KACHCHA
SAIDABAD
PUNJABI
PROPOSED INDUSTRIAL ESTATE
MOHD HASAN NARANI
RIVER INDUS
TO KHAIRPUR
NARA CANAL
ROHRI CANAL
KIRTHAR SERIES
OLD ALLUVIUM
NEW ALLUVIUM
VILLAGES
METALLED ROAD
UN-METALLED ROAD
FOOT-PATH
RAILWAYS
PROTECTED BUND