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Proto-historic Indian Ecological Background: - A study

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Indus River has its origins in Autonomous Region of tibet, (China); within the glaciers and snowmelt to the north of Mount Kailasha whose Tibetan name is Kangrinpoche. The name of the river in Tibetan is Senge-Khambab or Lion-mouth. It flows through deep gorges and a slim alluvial plain east of Leh, India. Eventually it empties into the wide valley of Skardu, pakistan before plunging into even deeper gorges as it descends to affix the Gilgit river at Bunji. this is the juncture of the three highest mountain ranges, the Karakorum, the Hindu Kush Mountains and also the Himalaya. as a result of the high water levels during the spring snow soften and the summer rainy season, no cultivable land is found on the banks of the Indus within the upper valleys. in fact the river is so full of silt and gravel that only a few fish areable to exist except in deep pools and side streams. Streams that be part of the Indus from forested valleys are deep blue whereas the Indus is often a steel grey color. Most agriculture within the higher Indus is carried out on alluvial fans of snow-fed tributaries that join the Indus all along its length or in slender valleys sliced out by the numerous glaciers that still hang on the rocky peaks of the himalaya and also the Karakorum.

After it empties into the plain the Indus is joined by the kabul river, that flows in from the west. Cutting through the low hills at attock, the Indus flows on the face of the Suleiman range where it is joined by the tiny tributaries that link the plains to the rugged highlands of Baluchistan to the west and the potwar plateau and Himalaya Mountains to the east. The Soan River cuts deeply into the Potwar highland and joins the Indus just north of the salt range. On the west, the Kurram and Tochi rivers flow through the Bannu basin that has proof for settled communities starting in the Neolithic period around 5000 B.C. Further south is the Gomal river, that is joined by the Zhob river. The isolated Zhob valley and the Gomal plains supported the emergence of large agricultural communities throughout the Neolithic and chalcolithic periods.

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South of the zhob is the Loralai river that empties into the Kachi plain that is watered by various perennial streams, the biggestbeing the Bolan river. The Bolan Pass is one amongst the foremost vital routes between the Indus plain and the highland highland of the Quetta valley. the early Neolithic settlement of Mehrgarh (7000 BCE) was established on the Bolan river within the Kachi plain. Following these tributaries, nomadic pastoral communities and traders could cross low pass into the plateaus and major alluvial plains of Afghanistan.

Today, none of the rivers that empty into the Kachi plain reach the Indus, but this is often due to historical silting and there could have been direct links between several of those rivers and the Indus in the past. Flowing in from the east, five major tributaries emerge from the himalayas and provides this part of the subcontinent its trendy name, Punjab (five rivers). The Jhelum river links the Indus with the valley of kashmir where Neolithic communities existed long after the emergence of cities in the Indus valley.

The Chenab, Ravi, Beas and Sutlej Rivers also lead into the center of the Himalaya and provided access to the highlands of Leh and tibet. after rising from the Himalaya Mountains, each of these rivers aluvial fertile silts to form the punjabplain that has played a crucial role in the history of the subcontinent. The punjab plain is vital for its wealthy agricultural lands, scrub forests and grasslands.

Cholistan Desert

The Cholistan desert contains of two-thirds area of the previous state of Bahawalpur and covers a complete 25613 sqare kilometres, indeed it is a part of the great Thar desert that is spreading from Bikanir State of india to the banks of the indus river, Pakistan. The Cholistan chiefly consists on sand dunes and mud flats. The climate of the Cholistan is very hot in summer and extremely cold throughout winters of short duration from december to January.

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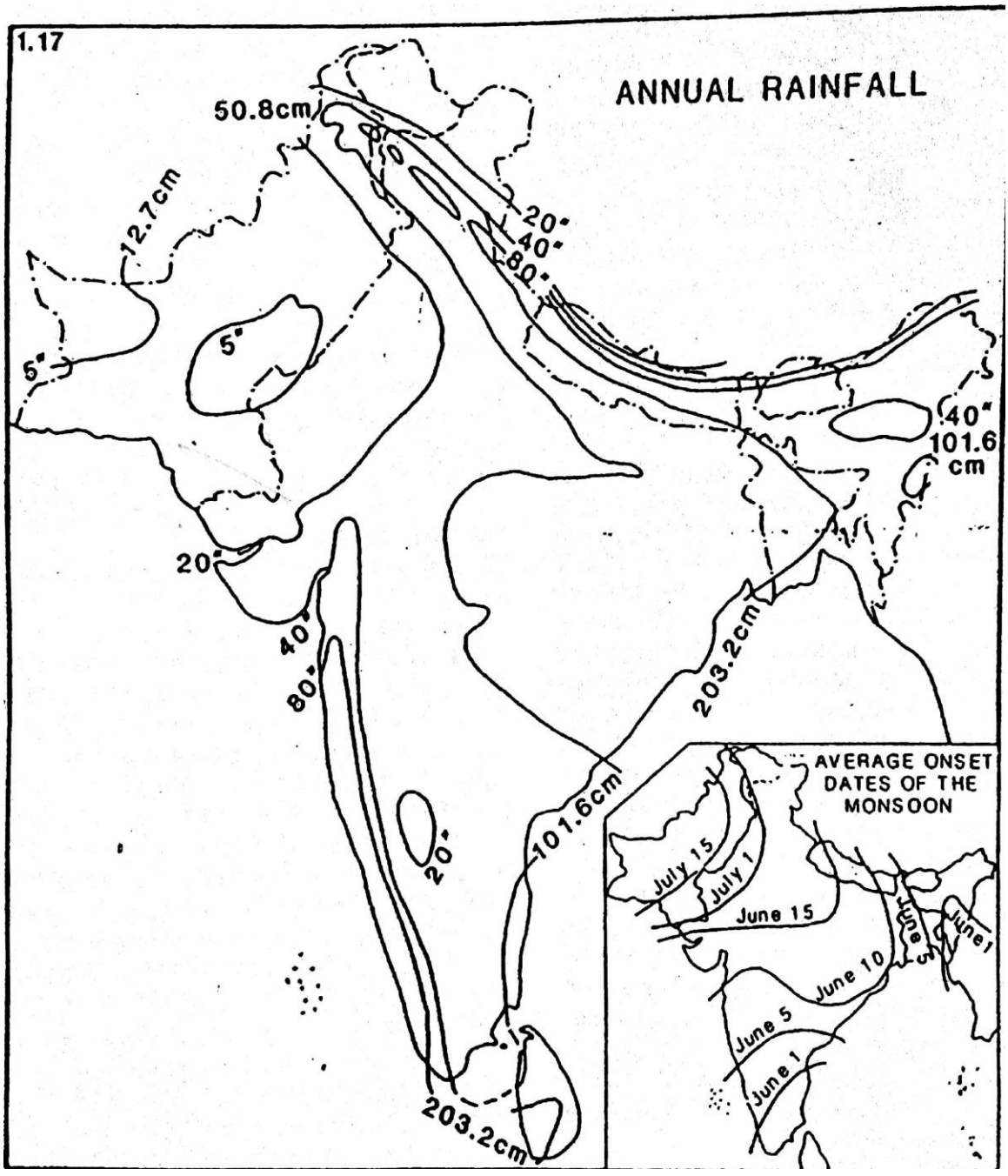
Map:- 3



(Source: Dutt, Ashok K. & Gelb, M.M., Atlas of South Asia, Westview Press, 1987)

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The temperature in these moths falls below freezing point. Annual precipitation is less than 5 inches that is alsounreliable. subsoil water is brackish. Sweet water suitable for human and animal use is only available in few places near ancient dry bed of Hakra river. In Cholistan cattle grazing nomads are settled around 'Tobas'(an artificial tank dug into mud flat 'Dahars' where rain water is stored for human and animal use).[1]

When tobas become dry the nomads migrate to the cultivated areas irrigated by trendy canal system. a large number of prehistoric sites explored by Archaeologists in this area was much inhabited in ancient times. At that point the Cholistan was watered by Gaggra/Hakra river that has been known as the sacred Saraswati river of vedic times. It became completely dry after 1900 B.C., when due to titanic actions and sedimentation the water of Gaggra/Hakra was captured by the Satluj river of the Indus system in the west and Yamuna River of large system in the east.[2]

Kirthar Range:

Kirthar range consists of shallow marine and continental sedimentary rocks (Tertiary) that unconform-ably overlie erodedand inclined older sedimentary rocks (Cretaceous). The rocks were folded and faulted in the Middle miocene and further deformed in the Early pleistocene. The Kirthar range fault zone remains seismically active, as northward convergence of India into the Eurasian continent continues to produce left lateral offset and compression in Baluchistan. the bulk of the basin is under-lain by nummulitic limestones of the Kirthar group that forms the core of the anticline. The hogbacks in the eastern part of the basin are composed of the Nari Formation, that is comprised of interbedded sandstones, shales, and conglomerates. Soil development among the basin is very limited, and it is estimated that about 60 % of the basin expanse is bare rock.[3]

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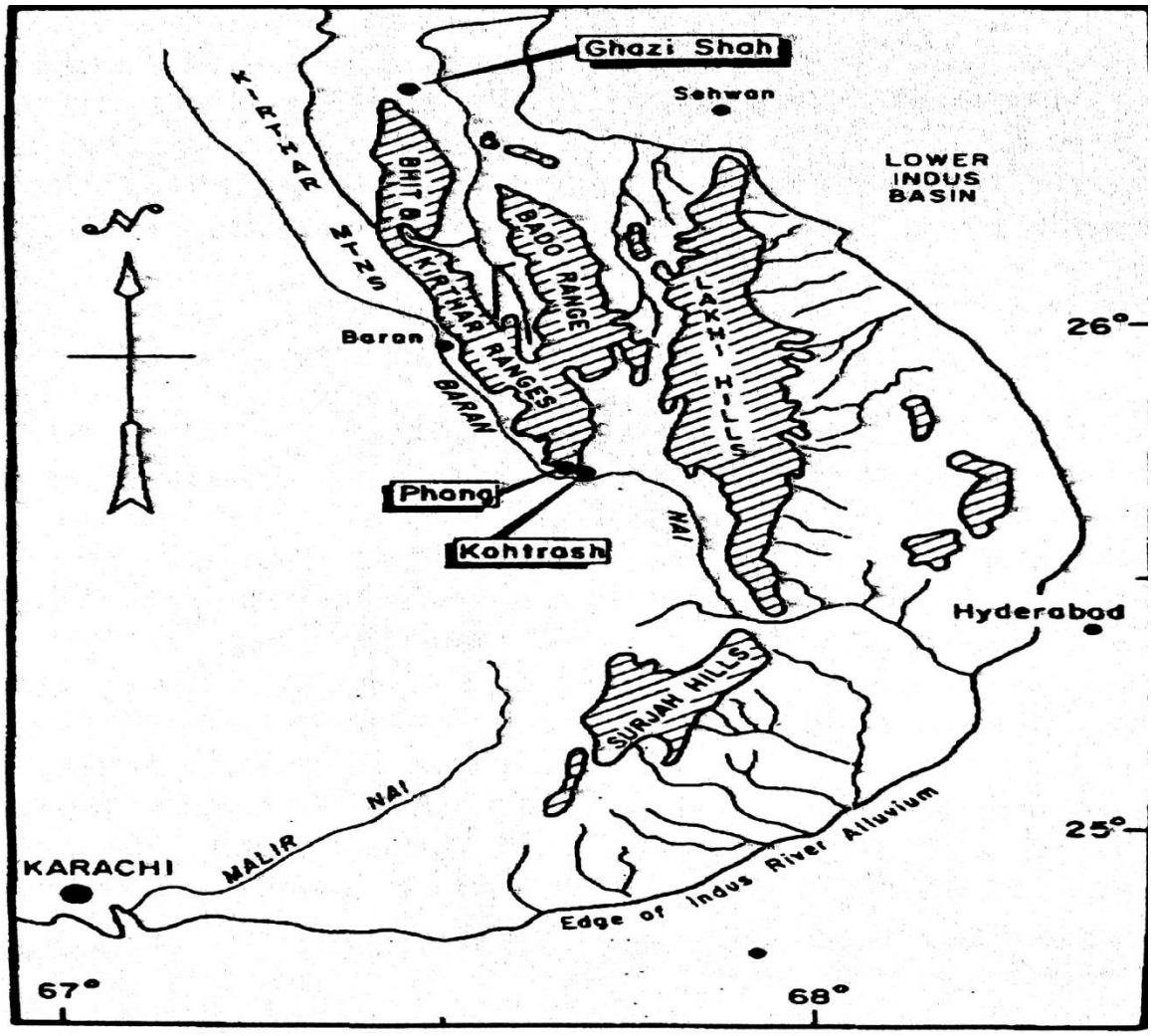
Sindh Kohistan : -

Map: 4



(Source: Harvey, Michael D. Flam, Louis. Prehistoric Soil and Water Detention Structures (Gabarbands) at Phang, Sindh Kohistan, Pakistan: An Adaptation to Environmental Change, Geoarchaeology: An International Journal, Vol. 8, No.2, 1993)

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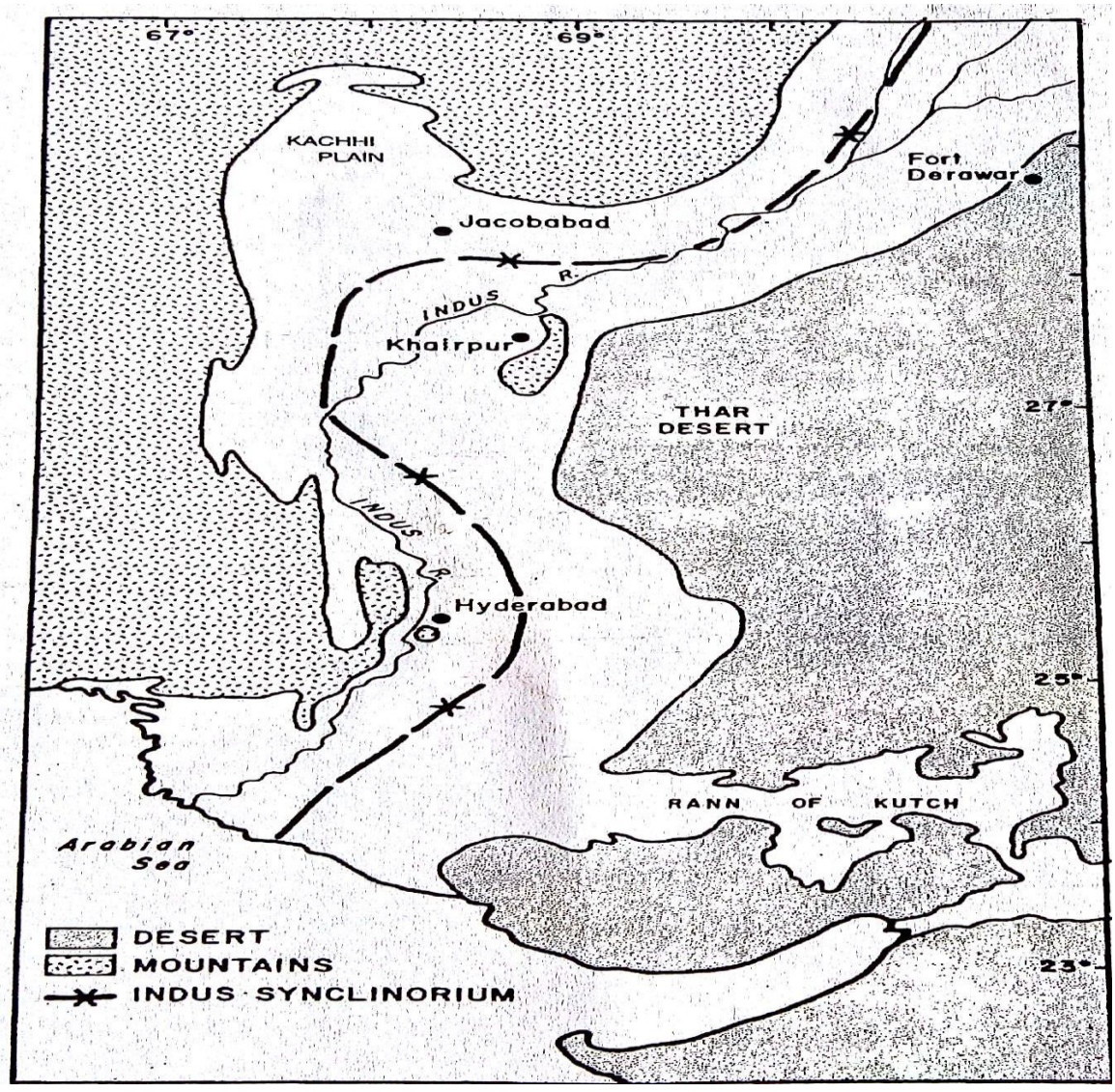
Sindh Kohistan is located inside an arid climatic zone. Mean annual precipitation is about 130 millimeter, mean summer temperature is about 29 degree C, and mean winter temperature is about 18 degree C. downfall tends to be erraticallydistributed, and the annual precipitation can fall in a single high intensity event. Annual potential evapotranspiration has been estimated to be about 2240 millimeter.[4]

Lower Indus Basin:-

Map: 5



(Shroder, John F., Jr. (Ed). Himalaya to the sea, Routledge, London, 2004)

No physical barriers to flow of rivers within the lower Indus basin occur aside from the Rohri hills near Khairpur and others at Hyderabad. Neither group of hills rises over 61 m higher than the surrounding plain. The Rohri hills extend-55 kilometre south from Sukkur in northern Sindh province. Ganjo Takar hills extends 22- kilometre south from Hyderabad in southern Sindh. much of the Rohri hills is hard, fissured and cracked limestone with flint. This flint normally weathers out and covers the surface over a large area. it was major resource for the manufacture of prehistoric stone tools. differentbeds are nummulitic limestone, ironstones close to Khairpur, as well as red or green clays with large quantities of gypsum, Ganjo Takar hill upon which Hyerabad sits has an escarpment all around it, with gigher elevations to the south. It is an unfossiliferous, white chalky limestone.[5]

The soil of the lower Indus basin is one among its most significant geological features. Ecologically they play a significant role in the biotic community including, of course, potential human land-use patteras. The developments of distinct soil profiles on stratified alluvial aluvials, and the approximate dating of these soils, are vitally important for the analyses of ancient stream environments. as a result of soil development could be a consequence of regional climate and vegetation, as well as of edaphic conditions including type of parent material, native hydrology, and topography, the soils is also a major clue to past environmental conditions. The parent material of soil, the transportation of this parent material to varied locales, and the transformation or development of the material into distinct native and regional horizons and profiles, coupled with the approximate timing of their development, can be a significant factor toward reconstructing the palaeo geography of the primarily alluvial lower Indus basin.[6]

The major categories of soil parent material are these formed in place through weathering of consolidated or soft and unconsolidated bedrock, those that have been transported and realuvialed, and organic aluvials. Soil parent materials that eventually find their approach into the lower Indus basin as transported alluvium primarily have their origin in the Himalaya where,

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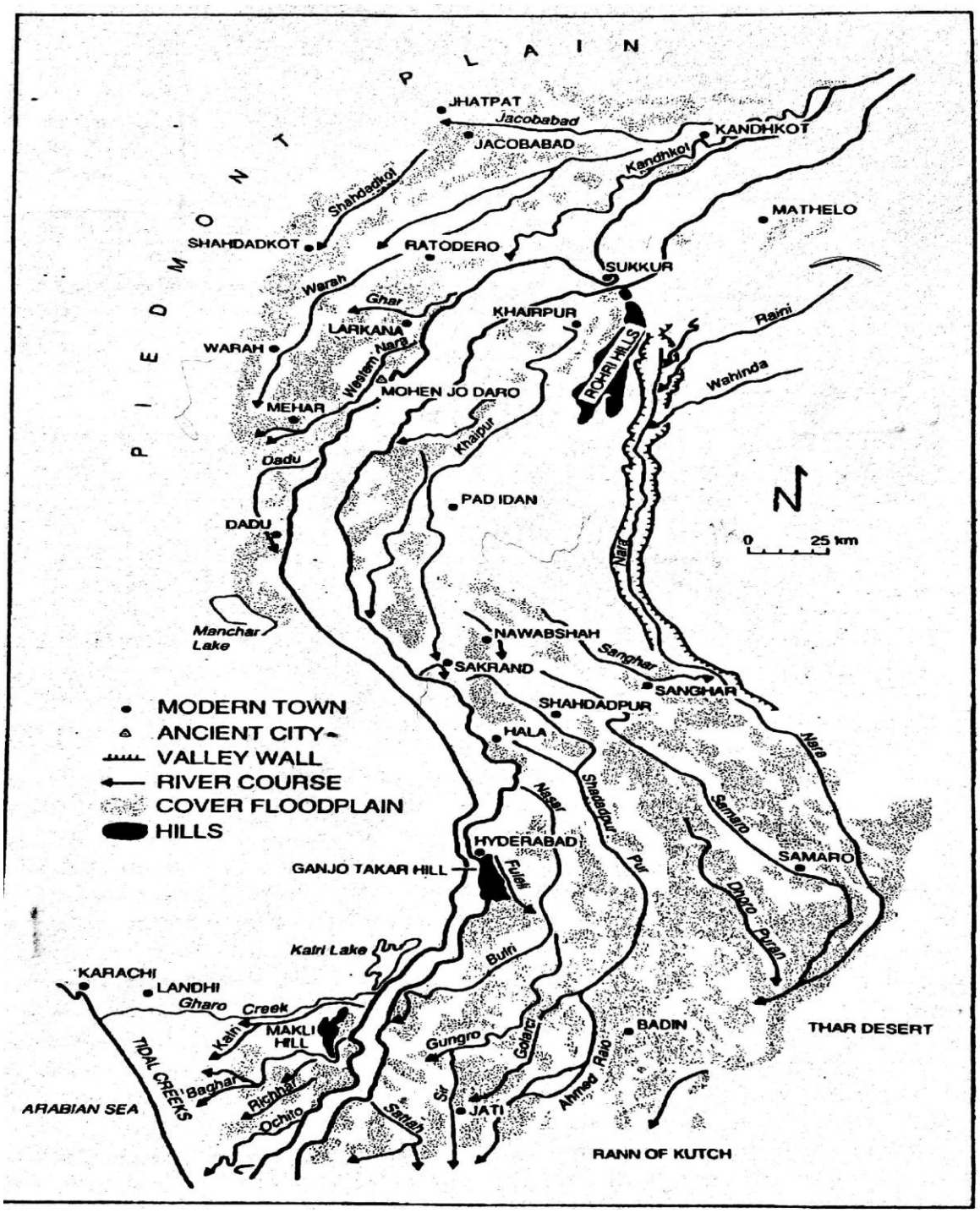
in declining order of surface exposure, the bedrock is diverse metamorphic, igneous and sedimentary[7]

Map:-6 (Geomorphology of the lower Indus Basin)



(Shroder, John F., Jr. (Ed). Himalaya to the sea, Routledge, London, 2004)

Gujarat:

The plain of Gujarat is traversed by four main rivers-Sabarmati, Mahi, Narbada and Tapti, of which all but the last have two major alluvial terraces (Allchin et al. in preparation). The rivers are subject to severe flooding in the summer monsoon, rising in some years (as in 1968 and 1970) to as much as 30-32 m. higher than their winter flow level. The plain is predominantly covered by silt and black soils, and the precipitation shows a steep meridional trend from 1,425 mm. at Surat on the Tapti to 900 millimetre. at Baroda and 500 millimetre. In the Ahmedabad area. The downfall is heaviest with the south-west summer monsoon, however fluctuates significantly from year to year. In terms of precipitation the plain of Gujarat can be considerd as a marginal area between aridity and humidity, and one where pleistocene and holocene climatic changes would be most likely to be in evidence.[8]

Wind conditions are dominated by the monsoonal reversal from north-east to south-west. The north-east monsoon is mostly lacking in great velocity and is basically ineffective in the shaping of the dune forms. The south-west monsoon, however, particularly from may to september, is related to a large number of high winds and it is these which account for the dominant trend of the dunes referred to above. Analysis of wind information for Ahmedabad for 1957-61 shows that 71.76% per cent. of all winds gusting to more than 38 km./hour occur in the period may to september inclusive . The frequency of winds in excess of 58 km./ hour is at a maximum in June, and in that month twenty days on average have winds in excess of 38 km./hour. At Baroda the effective winds in terms of sand movement are those in the mid-summer months, though dust storms are comparatively occasional. In 1963 and 1964 only three days with dust storms were recorded at Baroda aerodrome, with one occurring in each of the three months may, June and July.[9]

Some of the foremost spectacular Aeolian landforms in central Gujarat are those associated with the Chota Udaipur escarpment and its outliers. At Pavagarh Hill (829 m.), east of Baroda there is a massive windward accumulation some 2km. long and 1 km. wide that rests on a gently sloping

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pediment running all the way down to the Dhadhar River. The accumulation rises to a maximum of 28-32 m. on top of the pediment, and shows marked asymmetry with the steeperslope facing the Hill. the accumulation does not rest against the Hill, but is separated from it by a sand-free tract approximately 0.5 km. wide, which probably results from the establishment of eddies and locally reversed winds in the immediate neighborhood of the Hill itself. The dune may be a composite form consisting of a large, low pedestal dune with a narrower ridge at its surface.[10]

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[1] Dogar, Muhammad Aasim, *Tala Wala Ther,* Lahore Museum Bulletin. Vol.XIV, No.2, July December, 2001, pp 9-10.

[2] Ibid.

[3] Harvey, Michael D. Flam, Louis. *Prehistoric Soil and Water Detention Structures (Gabarbands) at Phang, Sindh Kohistan, Pakistan: An Adaptation to Environmental Change,* Geoarchaeology: An International Journal, Vol. 8, No.2, 1993, pp 109-26.

[4] Ibid, pp 112.

[5] Shroder, John F., Jr. (Ed). *Himalaya to the sea*, Routledge, London, 2004, pp, 265-69.

[6] *Ibid.*

[7] *Ibid.*

[8] Allchin Bridget and Goudie Andrew , *Dunes, Aridity and Early Man in Gujarat, Western India,* Man, New series, Vol. 6, No.2, (June, 1971), pp248-265.

[9] *Ibid.*

[10] *Ibid.*