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THE DEPRESSION OF SISTAN IN EASTERN PERSIA.¹

By ELLSWORTH HUNTINGTON.

WINDY SISTAN, once the proud home of Rustom, the Persian Hercules, is a poverty-stricken district near the distant corner where Afghanistan and Baluchistan join Persia. A variable lake and a swamp occupy the lowest portion of a mountain-girt basin five hundred miles in diameter; while adjacent to them on the east lies habitable Sistan. The lake is a shallow body of clear water, very slightly saline. Its size varies from almost nothing in times of drought to a diameter of sixty miles or more during floods. Both extremes are sometimes reached in a single year. The maximum depth does not exceed ten feet, according to the statements of the inhabitants of the shores, who pole their rafts to all parts. The swamp, which lies chiefly east and south of the lake, and is gradually encroaching far into it, consists of a dense growth of feathery-topped reeds from five to ten feet high. Outside the swamp comes the most important part of Sistan, an arable plain of fine silt and clay left exposed by the withdrawal of the water during the gradual drying up of the lake. On the borders of what was formerly the lake-bed rises a rim of steep bluffs from fifty to four hundred feet high. Their level tops form the edge of a barren plain, a desert of sand and gravel which completely encircles the inner, better-watered regions. To the west the desert, composed wholly of naked gravel, is only a few score miles in width; to the east, more sandy and silty, it stretches hundreds of miles, broken only by the narrow green depressions of the Helmund and other rivers. Lastly, outside the desert, rise the mountains, shutting their remote basin from the outer world. Those on the west and south are comparatively dry, and furnish no perennial stream; but on the north and east the perpetual snows of lofty Hindu Kush give rise to countless rushing brooks and rivers. Of all these only one, the Helmund, is always able to endure the aridity of the inner basin and reach Sistan perennially.

The varied zones of the basin of Sistan—namely, the lake, the swamp, the arable plain, the encircling desert, and the surrounding mountains—present physiographic types of the utmost diversity; it is to be expected that in response to such environment animate nature will present equally diverse autographic types. In a region of extreme aridity, such as Sistan, the relief of the earth's surface is the main factor in determining the presence or absence of water, and hence of life, both vegetable and animal. In the Sistan basin an abundant water-supply is found on the edges among the high mountains, and in the centre, Sistan proper, which may be defined as the area anciently covered by the lake during its last notable expansion. In these two regions, therefore, life is abundant; while in the far greater area covered by the intervening desert it is very scarce.

The mountains west and south of Sistan lie one or two hundred

¹ Reprinted from the *Bulletin of the American Geographical Society*. Cf. also map, *S.G.M.*, vol. xviii. p. 211.

miles from the lake. They reach heights of from five to ten thousand feet, and are covered with snow in winter. In early spring they produce a growth of short, sweet grass, excellent for sheep and camels. In summer, however, the grass dries up, the springs vanish, the running streams disappear or contract and become bitterly salt, and neither man nor beast can live. The human inhabitants of the region are of necessity nomads, dwelling in tents and journeying from place to place with their flocks. On the advent of a dry season they reluctantly leave the relative coolness of the mountains and migrate across the parched desert zone to the vicinity of the lake. Sistan is a fearful place in summer; but water abounds, and there are smooth plains of grain and grass to support man and beast. It is a "hell full of bread," as the people say; but that is better than the starving heaven of the mountains. Thus a considerable portion of the population of Sistan consists of nomad Baluchis driven in by drought from the surrounding mountains and deserts. Some have settled in permanent villages as agriculturists; but the majority wander from place to place, going to the cool mountains or the healthful desert whenever there is sufficient grass and water.

The other human inhabitants of Sistan are more permanent. Part of them, the Sistanis, are agriculturists, inhabiting chiefly the delta of the Helmund River. The rest are a peculiar people, the so-called "Fowlers," or Sayads, who inhabit the swamp. Our habit of regarding deltas as smooth plains makes it seem almost absurd to speak of the relief of the delta of the Helmund as having a determining influence upon the conditions of life. Yet such is actually the case. To the eye the delta appears flat, but careful observation shows that, like others of its type, it consists of low, broad ridges, perhaps five or ten feet high and several miles broad, with corresponding hollows between. A main distributary of the river flows along a given radius, and during floods deposits silt, especially upon the inner portions of its flood-plain, until the stream flows on the top of a broad, smoothly-arched ridge, very flat, but very real. Then, during some flood, the stream breaks from its old course and follows a new radius, along which another ridge is built. The ridges of the Helmund delta can easily be detected, not by their relief, but by the character of their vegetation. They are dry and barren, with few plants except the prickly camel-thorn, a bushy weed with small reddish-purple flowers. Villages are rare, and animals of any sort are almost absent. Sand-dunes abound, and are gradually encroaching over the whole area. The soil is rich and easily tilled; but most of it is now left unutilised, although abundant ruins show that this has not always been the case. The reason is not far to seek: the rainfall of Sistan is very light, and is limited to the winter months. Agriculture is utterly impossible without irrigation. It is an easy matter to lead water along the ridges in canals; but it does not pay, for the few feet of extra elevation raise the surface of the soil too far above the level of permanent underground water maintained by the lake. The roots of the plants cannot reach it. Hence more water is required for irrigation, and a drought is much more disastrous.

In the hollows the case is different. Where they are subject to

flooding by the rivers in spring a dense jungle of tamarisks grows up to a height of twenty feet or more. It is frequently so dense as to be impassable, and furnishes splendid cover for unnumbered jackals, wild boars, and other smaller animals. The people realise that water is close below the surface, and clear away the jungle for fields of millet, which grows luxuriantly along with the feathery young shoots of the quickly-sprouting tamarisk. Other hollows, not subject to inundation, are completely cleared and highly cultivated; and they, with the low-lying borders of the delta, are the places where grain grows best and men congregate most thickly. In winter and spring it seems as though the people of Sistan had chosen the most marshy, unhealthy, and impassably muddy portions of the delta for their villages; but they have merely done what sad experience has taught them to be essential—located themselves where the roots of their crops can reach a perennial water-supply during the protracted dry season.

The irrigation system of Sistan is crude but, on the whole, effective. Every autumn, when the Helmund River is at its lowest, the Persian Governor, who controls most of the region, calls out a large part of the male population. Tamarisks, cut in the jungle and bound into great bundles with their own branches, are brought on the backs of men or donkeys and piled into the diminished river at the head of the delta. Bundle is tied to bundle, and the whole is plastered with clay, forming a porous but fairly effectual dam. All through the planting season of winter and the vegetative season of early spring it diverts the water into a labyrinth of sluggish canals, which make travel a torture in the flat plain. Then, in May, comes the great flood from Hindu Kush, and the flimsy dam is swept away. But the people do not care. The crops are almost grown, the remnants of the dam divert enough water into the canals for drinking purposes, and, when the time comes, the Governor will compel somebody—not them if they can help it—to build a new dam.

The flatness of the inhabited portion of Sistan causes the water to spread over very wide areas whenever the fields are irrigated. This, added to the depth of the canals and the slipperiness of the clayey soil, makes travelling wellnigh impossible in winter—a state of affairs which might be avoided if the aridity of the country did not compel the location of villages in the flattest, dampest places. The people are so accustomed to mud and water that even in freezing weather they wade unconcernedly through canals and rivers or through the water standing on roads and fields, and suffer fearfully from rheumatic complaints in consequence. Where a canal is too deep to be easily forded primitive bridges are constructed. As wood is very scarce, dry, bushy camel-thorn is thrown into the sluggish water and packed down until a firm but very porous dam is formed. A foot or two of clay is spread upon the camel-thorn, and a dry road is constructed. Such a bridge is easy to cross, and does not greatly check the slow flow of the water. Often the flimsy structures are so strong that even horses and camels can cross them, although, if the path is very narrow, difficulties ensue. One of my camels slipped off the path and fell with his front feet hanging over a bridge upstream

and his hind feet downstream. We were obliged to dig away not merely the bridge but part of the bank of the canal—a performance which the people seemed to regard as quite commonplace. In one case I saw a very broad bridge, which not only furnished an excellent pathway, but carried one canal directly across another.

In addition to the muddy roads and flimsy bridges, the aridity of Sistan produces other strange results. For instance, during the floods of the spring of 1904, a number of people were drowned because the water had been so low the previous winter. At that time the Helmund actually became dry. Fortunately, water could be obtained easily by digging wells, and no one suffered from thirst. The easiest places to dig wells were in the deep beds of the streams, for there the water was only a few feet below the surface. The most accessible parts of the stream-beds were at the fords, directly in the course of the everyday paths. So there the careless Sistanis dug their wells; and, when the water was high the next spring, walked into them and were drowned.

The lake and swamp of Sistan support more abundant life than do the plains. The vegetation is chiefly reeds and the low grass on which the Baluchi nomads feed their cattle. Among animals shell-fish and fish were formerly abundant, but are now scarce, having perished in great numbers during the almost complete drying up of the lake in 1871, and again in 1903. Insects and small animals of various sorts are abundant, as is evident when the swamp-men burn off the reeds for the sake of their cattle. The first fires that we saw appeared as immense columns of black smoke thirty miles away. Later, close at hand, we saw the fluffy heads of the reeds blazing up suddenly with a red flash and a sharp crackle almost like an explosion. The air in front of the flames was full of ravens, kites, crows, hawks, and other birds, which pounced now and again on the hapless little beasts and insects driven from their homes by the advancing heat. Behind the fire, where the ground had become cool, other birds were picking up the insects killed by the flames. The birds of Sistan are innumerable. During January we saw the water dark with thousands of them—coots, ducks, geese, pelicans, plovers, sand-pipers, grebes, swans, and others. Early in February they were beginning to leave, presumably on their way to the lakes of northern Europe or Siberia.

The strangest dwellers in the swamp are the people, the ancient race of Sayads, or Fowlers. They are of the purest Persian stock, and appear to have preserved the same mode of life unchanged for ages. Their houses are made of reed-matting, their cowsheds of bundles of reeds, their heavy canoe-shaped rafts of more tightly-tied bundles of reeds, their fuel is reeds, and the food for their small, humped cattle is reeds. In fact, their whole life has adapted itself to an environment of reeds and swamps. When the Government sends for taxes they are said to know how to lose themselves and their cattle in the swamp as if by magic. If a stranger builds a raft upon the lake they attempt to destroy it by night, for they claim the water and all that pertains to it as theirs. Most of all, the birds are theirs. Each winter evening, in the sunset glow, a fleet sets forth from every village; men in blue or

brown, with sturdy, naked limbs, stand on their golden rafts and pole them out over the grey-blue water to the fringe of yellow reeds. Nets are stretched on sticks half-overhanging the water, and the men hide themselves in the rushes. A duck, a coot, or a swan, swimming under a net, strikes it unwittingly; the Fowler pulls a string, the net falls, and the bird is entangled. The Sayads own fields of grain in many places, but their chief source of livelihood is swamp-fed cattle and swamp-caught birds.

Thus three types of men live in Sistan—the nomad Baluchis, the agricultural Sistanis, and the swamp-haunting Sayads. The Baluchi is a nomad because his mountains and deserts cannot support him permanently in one place. Therefore he wanders with his flocks, and makes his tent of easily-obtained portable cloth of goats'-hair. Being compelled by drought to come to Sistan, he is in part losing the nomadic habit and settling in villages. The Sistani is a settled tiller of the soil, because in no other way can a large population exist in Sistan. He uses the dry camel-thorn for fuel because it is nearer at hand than the tamarisk of the jungle, and he needs no fire except to cook his bread. He builds his house of mud, with a domed roof without a particle of wood, because good, stiff clay for sun-dried bricks is abundant, while wood large enough to serve as timber is almost unknown. Yet his brother of the same race, who lives in the jungle, builds his house of interwoven tamarisk boughs wattled with mud. The jungle man is also agricultural, but he moves from place to place every few years. It is easy to build a new house of his flimsy variety, and it is as hard in one place as in another to keep the tamarisks out of his fields. The Sayad once more is a nomad, because his humped cattle must be driven to new reed-beds; but he need not move far, for fodder is easily procurable in large quantities. Young reeds grow fast when the ground has been burned over, and old reeds are so large that cattle eat them slowly. Nor does he need to carry his house and stable with him, for if there are plenty of reeds a day's work will make a new house. Moreover, he cannot migrate far, for he must be near his fields on the outer edge of the swamp, and he must be where he can always go for waterfowl on the inner edge.

The wind, like the other physiographic features of Sistan, has a marked influence upon life. During three months of the summer a remarkably constant wind blows night and day with great violence from the north-north-west. It seems to be the northward continuation of the trade-winds deflected to the west by the prevailing trend of the mountains. It is said to blow at a rate of over sixty miles an hour for days at a time without intermission. Its violence is such that the air is thick with flying sand; and huge sand-dunes are formed or blown away with almost the rapidity of snowdrifts. At Chil Per, near the great ruins of Zahidan, I saw a sacred shrine located on the borders of the dune area, but entirely free from sand. A few months earlier, when the place was visited by Colonel MacMahon, of the Sistan Arbitration Commission, it was completely covered with sand, which—so the natives say—was blown away in three days after the summer wind began to blow. No

trees, except the tamarisk, can flourish in Sistan unless carefully protected from the wind. On the north-west border of the region, however, where the gorge of Bendun affords a shelter from the wind, fine palm-groves are the main support of the villagers. Even low-growing plants are influenced by the monotonously fierce gales. The vine of the wild water-melon, a bitterly acrid little fruit, most delicately striped with green and yellow, does not spread in all directions, according to its normal habit, but is blown into a tangled, closely-packed rope of stems extending south-south-east from the root and so uniformly oriented that it might serve as a compass.

In spite of its disadvantages, the wind is of use to the people of Sistan. It grinds their grain and makes life livable in summer. In the houses of the rich extra doorways are built in the north wall. In winter they are walled up with sun-dried bricks of mud; in summer they are opened and stuffed with brush. A servant standing outside throws water upon this. The wind whistling through is cooled by evaporation, so that, although the outside temperature may be over a hundred degrees, the interior sometimes becomes too cool for comfort—until the servant falls asleep and the burning blast sweeps in uncooled. When the wind dies down for a day or two the extreme heat is as nothing compared to the plague of the countless mosquitoes bred in the swamp.

Sistan deserves to be called a hell. A fly, like the tsetse of Africa, kills the horses; the dogs die of a peculiar epidemic which leaves the survivors blind; the camels are subject to two virulent contagious diseases. During January 1903 the transport camels of the British Arbitration Commission were dying of influenza at the rate of from twenty to fifty a day. As we approached the camel camp groups of villagers appeared—one with camel-leg slung on his donkey, another with a rib over his shoulder, and a third with a liver on his back. At the camp scores of men were waiting for the suffering camels to die, when they hauled them out of the compound with ropes and chopped them to pieces with axes. The poor Sistanis get so little except bread and melons to eat that any flesh is a boon. They ate every part of the diseased camels except the bones and skin.

Yet Sistan is rich in possibilities. Even under the present oppressive conditions of government it exports large quantities of grain. It is a prize for which four nations are struggling. England and Russia desire influence; Persia and Afghanistan desire actual possession. In both cases the struggle is a geographic response to the peculiar character of Sistan as a fertile depression in the midst of a desert. Russia wants her influence to be supreme, because Sistan is the only promising half-way house on the most feasible line of railway from Transcaspia to the Indian Ocean. England, in the same way, wishes to be paramount, because Sistan is the only half-way house from India to Western Persia. On every side stretch deserts, a month's caravan journey in width. In the middle Sistan furnishes a resting-place, with abundant water and supplies. The power that holds it has a priceless military advantage over its rival.

To-day Sistan is divided between Persia and Afghanistan in defiance of physiographic facts, and hence there is a continued and often sanguinary struggle. The water-supply comes wholly from the Afghan mountains, and the easiest line of approach is across Afghanistan down the main rivers. The strip of desert west of Sistan offers a natural boundary between Afghanistan and Persia. In a few places it is narrow and easily crossed; elsewhere it forms an almost ideal international barrier. An Afghan caravan which had crossed the desert north of Sistan in search of salt related that four or five men had died of hunger.

“Had the rest of you no bread?”

“Yes, but we feared that if we gave it to our friends we ourselves might suffer. That is the rule of the desert; each man for himself.”

A desert whose horrors engender such heartlessness would seem to be an effectual barrier between nations. While the boundary between Persia and Afghanistan defies geography and passes through Sistan, the two nations cannot be expected to live at peace.

Thus far we have considered a few of the many ways in which the physiography of Sistan influences the life of to-day. A complete study of the geography of the region must include also the influence of physiography upon life in the past. Tradition, historical record, and the distribution of ruins unite with the freshness of the abandoned lake bluffs in suggesting that within historical times the water-supply of Sistan was greater than now. One or two thousand, or even five hundred years ago, this region, which is now so poverty-stricken, was most prosperous. According to Lord Curzon, the number of ruins in Sistan is probably greater than in any equal area in any part of the world. The former population must have been far more dense, and at the same time more prosperous than that of to-day. It seems probable that the decrease in the water-supply, on the one hand, and the impoverishment and diminution of the people on the other, bear the geographic relation of cause and effect.

THE ALEXANDER-GOSLING EXPEDITION.

WE have recorded here from month to month the progress of the expedition undertaken by Lieutenant Boyd Alexander and Captain Gosling to Nigeria (*cf.* the April issue, p. 214).

Dispatches written early in February at Maifoni—the village to the south-west of Lake Chad where Captain Claud Alexander succumbed to enteric—have recently arrived in this country with further news of the expedition. These letters give an account of the journey undertaken by Lieutenant Boyd Alexander last year from Loko to Yo. It appears that, having had occasion to return from the camp at Ibi to Lokoja, he determined to journey separately to the Yo river, marching overland and deviating from the beaten tracks as far as circumstances would permit. A start was made in July from Loko, a town on the northern bank of