LE PROBLÈME EN ASIE
Geographical situation

Rajasthan forms part of the dry zone in the North-West of India. The dry zone extends from the Indus in the west to the Jamuna in the east, and from the southern Punjab plains in the north to the Rann of Cutch in the south-west.

The Aravalli hills rising near Mount Abu and just beyond the borders of Rajasthan, and running mostly from South-West to the North-East, divide Rajasthan into two portions; about three-fifths of Rajasthan lying to north and west, and two-fifths on east of it. The portion to the West forms part of the Great Indian Desert, locally known as « Maroosthali » — the valley of death. The parallel hills of this range extend through the whole of Rajasthan terminating at Khetri although detached hills are traceable as far as Delhi. As the Aravalis approach Ajmer the continuous chain breaks up into separate hills and sets of hills. In the southeastern portion, on account of the protection afforded by the Aravalis, conditions are mild. This region gets about 35" of rainfall and forms the grannery of Rajasthan. Beyond the limit of protection of Aravalis, arid conditions are again to be found. In the north-eastern parts the sand has escaped through the gaps and over the low hills and the conditions in such places are similar to those prevailing in the west.

There is evidence to show that the Rajasthan desert is on the march. Recent surveys carried out by the Survey of India compared with those carried out some 50 to 60 years ago show that the desert has been spreading outwards in a convex arc roughly from Bhawalpur (north-west) to Ferozepur, Patiala and Meerut to Aligarh and Kasganj (then south up to Etawah) at the rate of about 1/2 a mile a year.
during the last 50 years. This means that approximately 350 sq. miles of fertile land are being converted into desert sands every year.

The desert area is not one flat level waste of sand but there are numerous isolated round bare hills or groups of rocky hills in various parts. Due to the action of prevailing winds sand has also been heaped up in a series of ridges or dunes of various shapes and sizes. The sands are very saline in nature and there are here and there inland lakes, the biggest being the Sambhar lake, which are regularly worked for salt. It has been remarked that on an average, 130,000 tons of salt are added annually. During the rains salt is washed down by running water from the sands into the lakes. There are no running water courses except when rain is actually falling. In the west, the wells are up to 300 feet deep and at places the water level is as much as 600 ft. below the sea level. The water is generally brackish and often unfit for consumption.

Near the mouth of the Luni falling in the Rann of Cutch the « flat unbroken surface of dark silt baked by the sun and blistered by saline incrustations is varied only by the mirage ».

Origin

The Rajasthan desert is comparatively of recent origin. It appears that the greater portion of the desert was first covered by an inland sea and connected with the Arabian Sea through the Rann of Cutch. Later for some reason the sea dried up, a process which is still continuing in the Rann. The creation of the arid conditions and desert is mainly due to the scanty and irregular rainfall occurring in this area and extremes of temperature and seasonal variations combined with the sand-drifting action of the strong south-west winds.

The average rainfall in the west is only about 10 inches and gradually rises to 30 inches in the east. Most of the rains falls in 2 months - July and August; out of 10 years there are on the average 4 deficit years in the east and 5 in the west. Famines are of frequent occurrence; there is scarcity every 2 or 3 years and a major famine every 10 years.

The situation of villages depends mainly on the location of water and villages are often named after the wells. Once the well is dry the village moves to a new well and acquires a new name. The conditions are said to be getting more severe.

The desert is not a desolate waste and vegetation is
found practically all over except on the newly formed sand dunes. But it does not get a chance to grow on account of the heavy grazing to which it is subjected. The expert Committee appointed by the Government of India to advise it with regard to averting the so-called «march of the desert» was of opinion that the desert in Rajasthan is primarily a man-made or rather, goat-made desert. People live practically all over the area; in some places there are more or less permanent villages while in others they lead a nomadic life to pasture their cattle. In spite of the fact that the country is barren and infertile, it is the breeding ground of some of the finest races of cattle and horses and some of the best camels in India; and the main wealth of the desert lands of the west and north consists of vast herds of these animals. Some of the finest bullocks, noted for their size, massive horns and humps are bred in Nagaur tract while the cows of Sanchor and Mallani are famous for their yield of milk. The endurance of the Mallani and Jalar horses is proverbial and some of the best riding camels are bred in Bikaner. People have frequently to migrate in the hot weather with their cattle to find pasture and water for their animals.

Vegetation and ecology

The vegetation comes under the category of tropical thorn and subtropical dry forests. The flora is not rich and only a few of the species are attractive in appearance. Most of the plants are equipped with organs or mechanism for reducing transpiration, such as reduced leaves, coating of wax, succulent thick stomata and there is a general tendency for vegetation to become tough and shrubby and to develop hair, spines or thorns.

Near the base of Aravalis, where the soil is deep and fertile and porous with a rainfall of about 20 inches, the crop consists of a mixture of thorny trees such as Prosopis specigera, Capparis aphylla, Acacia leucophloea, Dischoestachys cinerea, and Balanites Zoxhurgii; Zizyphus jujuba. Salvadora oleoides and Cassia auriculata also exist. Local patches of dry deciduous forest containing a large proportion of Anogeissus pendula, Lannea grandis, Sterculia urens, Boswellia serrata and other associates are met with on the slopes of the Aravalis and other hills. Locally, where soil conditions are suitable, Butea forests characteristic of badly drained soils is met with.

On the east of the Aravalis the crop it of dry deciduous type; the main tree species being Anogeissus pendula, Adina
carditolia, etc., and in the south teak of stunted size and bad quality is met with.

In passing westward from the Aravalis, the climate becomes dry and such species as cannot withstand the increasing dryness of the climate gradually decrease in number and are stunted and finally disappear while species of thoroughly desert type appear and increase in number and proportion until in the west they form the entire vegetation. The flora of the desert mainly consists of a kind of scrub comprised of shrubs and perennial herbs. The number of trees is small and they are stunted and generally provided with thorns or prickles to protect them against plant feeding animals; their height varies from 15 to 30 feet. The trees and shrubs tend to be collected in clumps leaving plenty of vacant spaces between them. In the Jaisalmer area the forest is reduced to widely spaced bushes. Regeneration by root suckers, notably that of Prosopis and Capparis, is common. Blatter and Hallberg have studied the ecology of the Indian desert of Jodhpur and Jaisalmer and details are to be found in the Journal, Bombay Natural History Society, Vol. XXVI, page 270-279 and 506-519. The main formations recognised by them are (i) aquatic, (ii) sand, (iii) gravel, (iv) rock, and (v) ruderal.

**Fauna**

The fauna of the desert area is limited. Black buck (Antilope cervicapra) and Chinkara (Gazella bennettii) are found throughout and in more wooded areas Nilgai (Boselaphus tragocamelus) is found. The Four horned Antelope (Tetraceros quadricornis) is found here and there. Pig (Sus cristatus) and Porcupine are quite common. Sambhar (Cervus unicolor) is occasionally found near the hills and also Leopard (Felis pardus). At places like Gajner in Bikaner, Sambhar and Chitals (Axis axis) have been introduced. The wild ass is found in the south-west in the Rann of Cutch and surrounding country. Desert Rats (Mus) are very common and do a lot of damage. In the Aravalis and in the areas East of it all the species mentioned above are found (except the wild ass), but the number of animals increases except that of the black buck. Tiger (Felis tigris) is to be found every where. Bear (sloth bear, Melursus ursinus) occurs in the hill ranges in the south east and in Sawai Madhopur. At places in Kota a brown variety of the sloth bear is met with. Other animals found are wild dog (Cyon dakhunensis), Crocodilus palustris, Langur (the back faced monkey), Rhesus monkey, Otter, Hedgehog, Hare (Lepus ruficaudatus), Lynx (Felis lynx), Jackal (Canis aureus),
Fox, Wolf (*Canis lupus*), Squirrel (*Sciurus indicus*), Mongoose (*Herpestes*). Game has suffered in the south (Banswara) and other places where the Bhils (an aboriginal tribe) is found.

Among the birds may be mentioned the Peafowl (*Pavo cristatus*), the Blue Rock Pigeon (*Columbia livia*), different varieties of partridges, the Grey (*Francolinus pondicerianus*) which is quite common the Black (*Francolinus francolinus*), and the Painted; sandgrouses, the Common (*Pterocles exustus*), the Painted (*Pterocles indicus*), and the imperial (*Pterocles orientalis*), the buttonquails (*Turnix*), and Bushquails (*Perdicula*), Green Pigeons; Painted Spur Fowl (*Gallopardix lunulata*); the Gray Jungle Fowl (*Gallus sonnerati*) which is very local and often introduced at places; and a few varieties of water birds — the Hukta Duck (*Sarkidiornis melatonos*), the Lesser Whistling teal (*Dendrocygna javanica*) and the Cotton Teal (*Nettapus coromandelianus*). The Great Indian Bustard (*Choriotis nigriceps*) and the small Bustard (*Tetrax tetrax*); are found everywhere, more commonly in winter; these are getting rare and need special protection; as also the Likh Floriken of Lieh (*Syphotides indica*) which visits the grassy areas of Rajasthan in the rains. Among the migrating game birds may be mentioned the goose (generally the bar-headed variety, *Anser indicus*), different forms of ducks and teals, the snipe (*Capella*, the Demoiselle Crane (*Anthropoïdes virgo*), the quail (*Coturnix coturnix*), the Rosy Pastor Starling, etc.

Among other birds may be mentioned vultures, kites, cormorants, pond herons, green parakeets, avadavats, spotted munias, weavers, ashy-wren-warbler, wire tailed swallows, crag-martins, swifts, mynas, sparrows, golden oriole, paradise flycatcher, crow pheasant, fantail flycatcher, tailor bird.

The peafowl and the Blue Rock Pigeons are protected by law throughout Rajasthan and now the public sentiment is strong enough to ensure their preservation and the pigeons are provided food daily at fixed places at the cost of the State and by the public. The peafowl which is such a cunning and shy bird in other places will feed here from one's hand. The pigeons have increased and are becoming a bit of a nuisance.

The birds are generally quite tame indicating they are not much persecuted, and in places, nilgai will not move away at the sight of man. The wild pig is fed every day in many places and at one place in Dholpur the deer are similarly treated and they have become so tame that they will come when called. The Kalcadeo Ghana near
Bharatpur is considered as one of the most important waterfowl refuges of India. Similarly the Gajner lake — 12 miles from Bikaner — is famous as a watering place for the Imperial Sand Grouse.

FACTORS BENEFICIAL FOR PRESERVATION

On the whole the game has been well preserved in Rajasthan. The Rulers being keen on Shikar, took great interest in the preservation of game. In fact, whatever forest conservation was introduced was on account of forests being the abode of wild animals. The game was practically the preserve of the Ruler and no shooting could be done without his express permission. The Ruler with his guests did a fair amount of shooting but on the whole the game benefited. The number of fire-arms was also limited.

There is scarcity of water throughout Rajasthan and the animals are exposed to slaughter by the village people when they come to drink in the village ponds or even to the troughs attached to the wells. Coming of game to the tanks attached to temples is quite common. The Rulers in their favourite places provided drinking water, either by damming up streams or springs or making « baories » (big wells with steps leading to the water) and in a few cases, where no other arrangements were possible, by providing water in stone troughs placed here and there in the jungle. In one place, I am told, iced water was actually provided for tigers. Some shooting was no doubt done in such places over the water but on the whole the animals were saved from destruction. The animals get so used to the water being supplied that they collect round the watering places at the appointed time and come out as soon as the man leaves the place.

Besides the Rajputs (who form the ruling class) the population consists mainly of Jains. Jainism forbids the taking of life in any form and this religious sentiment has greatly helped in the preservation of the game.

There is a special sect of Hindus known as Vishnois found in the eastern part of the desert in Jodhpur side who will not allow shooting within their villages. They particularly protect the little Chinkara gazelle whom they consider as a personification of their deity. On hearing a sound of gun-fire, the people will collect and force the shooter away from their village and in case of actual shooting, they may, in extreme cases, impose a penance as an expiation.
FACTORS HARMFUL TO GAME PRESERVATION

With the abolition of the States, the authority of the Rulers declined. The people, freed from the long imposed restrictions and with the issue of fire-arms on a more liberal scale, took to shooting. Even the special preserves of the Rulers are not always respected. The States used to have a special Shikarkhana Department which not only looked after the shooting arrangements but also looked after the protection of the game. On the merger of the States, the separate Shikarkhana Department was abolished and a « Wild life preservation department » under the forest department was started. After some time, this was also abolished and protection was given to the Forest Department in accordance with the custom prevailing in other States. The Forest Officer's sphere of duty is restricted and he has not the time and often not the inclination for game preservation. All this has resulted in destruction of game to some extent. Naturally, the deer has suffered most.

Reference has already been made to heavy incidence of grazing. This is a serious problem to the preservation of forest and the wild animals. The grazing destroys the undergrowth which provides food for the wild animals and is endangering the regeneration of cutover areas. The wild deer are also exposed to the danger of infection by domestic cattle. In a morning walk on the last hot weather the author came across six dead bodies of sembhar along a water course. They had apparently died of rinderpest contracted from the village cattle. On the same day another sambhar was seen some 20 miles away with a very mangy skin and hardly able to walk. Reference to this has been made by other observers and the problem would seem to be quite a serious one.

The Bhils (an aboriginal tribe), along with grazing, are responsible for destruction of large areas of forest which is only about 10 % of the total area of Rajasthan. The Bhil clears the hillsides not only for his Walra (roving or shifting) cultivation but also for sale of forest produce to make a living. As a result big stretches of bare hills are to be seen here and there, particularly in east and south.

There is also a strong and increasing demand for land for cultivation and in the last three years something like 35,000 acres of special grass areas had to be given out for cultivation. All this not only reduces cover for wild animals but also their food supply.
MEASURES FOR PRESERVATION

Any measures which will increase the area of forest will help in the preservation of game. In this respect, the decision of Government of India to carry out large scale afforestation to arrest the march of the desert will be of great benefit. The State Government is also undertaking afforestation.

Scarcity of water in forests has already been referred to. Any measures which will increase the water within the forests will be beneficial for the preservation of animals. The matter of damming up springs and streams is under consideration.

A Wild Animals and Birds Protection Act has recently been passed and a consolidated Forest Act, based on the Indian Forest Act applicable to all the integrating units, is likely to be passed in the next session of the Assembly. Framing of proper shooting Rules including closed seasons and formation of shooting blocks are under consideration. Gradually things are settling down and it is hoped that game protection will improve.