Notaev lines of railway have been opened during the last entry pars, and there is only one railway station to 154 have miles. Various proposals have been put forward for ving the south-east of the district, and a line from shrayan in Cawnpore to Auraiya has been included in the gramme of proposed lines since 1909, but has not yet been ctioned. The mileage of metalled roads has also been dequate, but a great improvement is being effected by the talling of the old Mughal road through the south of the trict.

The rents paid by recorded occupancy tenants have not n appreciably during the last decade : the average rate per b has changed only from Rs. 4.9 to Rs. 5.1 during this iod. Figures for competition rents are available since 3-4, and during this period the rate has risen gradually in Rs. 5.5 to Rs. 6.0 per acre.

The rural industries of the district have as a rule deed, and the loss of indigo has withdrawn a large amount of sonal employment. Glass-making and saltpetre-extraction e however developed. Organised industry is represented by ginning and the pressing mills. The centre of this indusis the headquarters town; formerly it handled a large ount of cotton grown in Gwalior, and it has suffered by erection of ginning and pressing mills in that State. The rict does not derive a large income from external sources, is the income rising appreciably: the sums distributed ually by money-order are about 6½ lakhs at the present e as against six lakhs at the end of the previous decade, a large proportion of this is known to represent local transons.

Dangers and possible remedies or improvements.

1. The area sown with kharif crops depends mainly on weather during the first month of the season counting in the first heavy fall of rain. An early beginning is an wing to proceed without interruption. If the first month is et, styings of dry crops will be delayed and the area will fall, ough the loss may be to some extent made good by larger wings of rice (which however is little grown), and also of ajra, which can be sown until nearly the end of August.

The transplanting of late rice, which covers a much larger ea than the early varieties, requires wet weather in the scond month of the season, and the area will be substantially duced by a long break at this period.

The area planted with sugarcane is influenced by the eather in early spring, at which time rain facilitates tillage : ut it is determined mainly by economic causes. One of these the yields and prices obtained from the crop in recent easons; the other is the financial position of the cultivators, hich depends mainly on the success or failure of the precedng harvests.

The area sown with cotton is affected to some extent by ne nature of the sowing season; an early start and a dry eason are favourable. The chief factors determining the rea are the profit obtained in recent seasons, and the relaive prices of cotton and food-grains.

2. The yield of the early dry crops, of which maize is far ne most important, depends mainly on the weather during the rst two months of the season: alternations of rain and right weather are desirable, and the yield may be much educed by excessive rain in the second month. The small rea under early rice requires more rain, and is not likely to ive a full yield when the dry crops do best.

The late dry crops require the prolongation of the rains o the middle of September or later: they may be seriously njured by heavy falls in the end of September or the begining of October, while they will give very little grain if Sepember is altogether dry.

The late rice requires more rain in September than is suitible of the dry crops, and where canal-water cannot be given at least one fall in October is desirable for its complete success.

In the north of the district the area under maize is usually sufficient to assure some supply of food when Septemper is dry: the two southern tracts depend to a dangerous extent on the late millets, but apparently maize cannot be grown successfully in them.

Sugarcane is apt to suffer seriously at two periods. The irst is the end of the hot weather: the crop benefits from an early commencement of the rains and suffers from delay. The second is the end of the rains: a premature cessation is most njurious, and rain in October is beneficial. The crop can stand considerable excess of rain, but prolonged breaks are ikely to cause injury.

Cotton is liable to considerable injury from excessive ain: the most dangerous times are probably just after sowing and again at the end of the season. It can withstand fairly ong breaks when once it has made a fair start, and suffers rom a dry September less than any other crop.

3. Apart from variations in the rainfall, the following langers occur in the kharif season :--

- (a) The kachar land on the Jumna and Chambal may suffer from flood.
- (b) Cotton may be seriously affected by boll-worms and juar by borers (vide Provincial Note, section VI).
 A watch should also be kept for other insectpests.

4. The rabi area depends largely on the rainfall during deptember and early October. The effects of drought at this period are minimised in the areas supplied with canal-water, but the reduction in area is likely to be large in the *kurka* and *Jumna-par* tracts and also in the dry villages along the dengar. 5. In ordinary seasons, when the seed-bed has been sufficiently moist, the bulk of the rabi in the *pachar* and the ghar can be matured without winter rains : these are however beneficial (within limits) in these tracts, and almost indispensable in the *kurka* and *Jumna-par*. Rain is useful until the early part of February, but the falls should be moderate and of short duration : rain in March or early April will probably do some harm, while prolonged periods of damp and cloudy weather between January and March must be expected to produce rust on wheat. The loss from this cause may be serious, and its extent may not be fully realised till the crop is harvested.

When the ground has been dry at sowing time, and sowings have been largely made with irrigation, an early fall of winter rain is of great importance. When there is little winter rain or when falls are delayed, the crops fall off in condition as they ripen, and tend to wither under the strong dry winds which in such season must be expected in the spring. It is noteworthy that gram as a rule suffers most in this case : a seed-bed prepared with irrigation is less suitable for it than for the cereals or peas.

6. Frost occurring early in January will not as a rule lo much harm except to arhar. A late frost is likely to cause very severe injury to the staple crops; probably the early days of February are the most dangerous time.

Hailstorms are not important until the cereals are beginning to ear: the danger from them increases as the season advances.

The rapeseed crop is liable to serious injury from the ophis if damp and cloudy weather occurs while the plants are n flower.

The poppy crop suffers severely when damp weather occurs late in the season.

A which should be kept for the appearance of the potator (vie Provincial Note, section VI), which may cause us loss to potato-growers.

The rabi crops in the lowlands may be severely injured pring floods on the Jumna and Chambal, but such floods of very rare occurrence.

7. The area sown with zaid crops in ordinary seasons is small: it increases when stocks of food are low and mes an important resource in particular villages.

8. A series of abnormal seasons of one type may procertain cumulative effects. After some seasons of defitrainfall the water-level falls, and the efficiency of tempowells decreases, while the cost and labour of irrigation are erially enhanced. It is possible that the lowering of the er-level may proceed so far as to render the masonry wells ess in some tracts, but this is not known to have occurred. On the other hand a series of wet years may raise the er-level to a point where the productivity of the land dees. This may happen throughout the district, and should atched for especially in the areas which suffered from erlogging twenty years ago, as the drainage-system may ibly be still inadequate.

9. Distress requiring some measures of relief must be beted to occur when the rains have ceased by the beginning eptember. Its intensity is likely to be greatest in the ka and Jumna-par tracts, and also in the dry villages g the Sengar. The following measures were taken in 7-8:--

Revenue suspended, kharif	-	The second s	ą lakhs.	
ay ya rabi			l lakb.	
Revenue remitted, kharif			t m	
Improvement loans		SA SAME AND AND AND ADDRESS OF A SAME	\$ 11	
Advances for rabi	1		1 lakhs	
Advances for kharif			flakh.	
timum proportion of popu	lation r	elieved 3	0 per	cent m
THATY				

areas not commanded by the canals in seasons when the rains have eased so early that the large millets wither altogether of all seriously stunted in growth; in this case the only remedy that can be suggested is the importation of grass from the forest and its distribution on the *takavi*-system. The lemand will depend very largely on the winter rains; if there are none, it may become very great, but even light falls bring up enough grass to keep large numbers of cattle going.

A fodder famine does not necessarily occur when the nillets yield no grain, as the plants may have grown to a sufficient size to yield fodder: but in such seasons juar occationally becomes poisonous and the loss of cattle due to this cause may be considerable. The poison is formed under the abnormal conditions of growth, and its presence cannot be recognised beforehand except by analytical method: the only action possible is to provide advances to enable cultivators to replace cattle that have died from this cause.

11. Loans for sinking wells should be readily granted n order to improve the water-supply of the tracts where they an be used. It is possible that the system of field embanknents may be found useful in the *kurka* and *Jumna-par* cracts (vide Provincial Notes, section II).

12. No demand for drainage works exist at present, but a series of wet seasons may possibly disclose minor defects, and these should be watched for.

13. To minimise losses from cattle-disease, attention should be paid to securing prompt reports of outbreaks under the rules contained in the Land Records Manual, and a sufficient veterinary staff should be maintained to cope with outbreaks where they occur.

It does not appear probable that the ravine systems which furnish the grazing-areas in the south of the district will ever be devoted to other purposes, but it is most desirable that any possible measures should be taken to increase their value

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isture, and their improvement (by planting or otherwise) Id be the subject of continued experiment.

14. The district is not well supplied with agricultural al, and for the present at least there is a wide field for *akavi*-system. Improvement loans may be wanted for mry-wells, and also for field embankments if the practice and to be desirable. Agricultural loans may be required are following circumstances :--

- (a) Early cessation of the rains. There may be a very large demand to sow the rabi, and possibly also for the following kharif, while smaller sums may be wanted in early spring to plant sugarcane and extend the zaid area. Advances for fodder may also be required.
- (b) Floods.—There may be a small demand for money to sow the rabi in places where the kharif has been injured by floods.
- (c) Cattle-disease.—It is important that cultivators should be in a position to replace working-cattle by the beginning of the next tillage-season.
- (d) Curtailment of the poppy area.—It may be desirable to offer advances in villages where the crop has been largely grown in order to enable cultivators to substitute some other remunerative crop.

15. There is at present no effective agency for the introion of agricultural improvements requiring associated on.

As regards cropping, there is room for a better cotton a available, and also for a better wheat; other varieties of reane can probably be substituted with advantage in a localities, and a leguminous crop is wanted sufficiently inerative to take a place in the rotation on the better

The cheaper forms of improved tillage-implements should ually come into use, and should assist in controlling the uncei weed (vide Provincial Note, section VIII). The ency of the sugarcane-mills in use should be examined if necessary an attempt should be made to introduce roved types.

DISTRICT NOTE.

CAWNPORE.

The references are throughout to the tabsils as constituted up to 1911. Statistics for the new arrangement of tabsils are not yet available.]

Topography.

THE surface of the district has usually been described with reference to the rivers, but it should be recognised that the various minor doabs do not constitute homogeneous agricultural tracts.

The Ganges ordinarily flows close to the high bank, and the lowlands are comparatively unimportant, except between Bithur and Cawnpore. In the extreme north-west of the district the Isan, on its way to the Ganges, cuts off a tract of light loam bordered by sand. Leaving these minor areas out of account, the first main sub-division is the Ganges-Fandu doab. The soil along the Ganges bank is sandy or gritty, and that along the Pandu is also light: it passes rapidly into rich loam, but large areas, particularly in the west and centre of the doab, consist of heavy soil with *jhils* and extensive usar plains.

The second duab, lying between the Pandu and the Rind, is generally similar—light soil along the rivers, then loam, with *jhils* and usar-plains, particularly in the west: but the loam is lighter than in the Ganges-Pandu doab.

The third doab lies between the Rind on the north and the Sengar and Jumna on the south. Here too there is some usar in the north-west, but it is not so heavy as in the north of the district. The bulk of the tract is a lightish loam passing into the extensive ravines, but as the Jumna is approached the soils become more of the Bundelkhand type, south west portion of the district, lying between the Sengar and the Jumna, is generally similar to the south of this tract, but a considerable portion is occupied by the two converging ravine systems. The area of lowlands along the Jumna is very small: what lowland there is, is as usual very fertile.

Water supply and drainage.

The Ganges-Pandu doab is watered by the Cawnpore branch canal which commands almost the whole area except the high villages along the Ganges, especially to the east of Cawnpore. Wells can ordinarily be made in this tract as the water-level is fairly high and foundation-clay is met with; but the level falls near the Ganges, and here foundation-clay is frequently absent. Hence such of these villages as do not receive canal water are liable to suffer in drought.

The north-west and centre of the Pandu-Rind doab is watered by distributaries from the Cawnpore branch canal: the south-east was formerly dependent on wells but is now served by the Fatehpur branch canal. Efficient wells can ordinarily be made as the depth to water is not great and foundation-clay is met with. There are dry areas along the Rind, but elsewhere the supply appears to be adequate.

South of the Rind, well-irrigation soon disappears owing to the great depth to water. The Sengar-Jumna doab is served by the Bhognipur branch and the rest of the tract by the Etawah branch with the Ghatampur extensions. These canals serve sufficient areas to make a general loss of crops impossible, but they do not cover the whole ground, and the and not commanded by them is still liable to suffer severely from drought. An attempt has recently been made to demonstrate the protective value of small field-embankments (bandhiya) in places where the conditions are apparently suitable, and if these succeed, the extension of the system appears to be the only measure that can be suggested. Practically no hostility to well-construction has been reported in this district, but at the recent well-survey the need for more wells was recorded in a large number of villages, particularly in Akbarpur, Cawnpore and Narwal tabsils : construction of wells has proceeded rapidly in the few years for which statistics are available, but is checked by want of capital.

The drainage of the district is generally good: considerable changes have been made in the original alignment of canal channels and obstructions caused by them have been rectified; but no large projects have been undertaken.

Cattle-supply.

The stock of cows in the district is large compared with other districts in the doab; it is to some extent localised in the neighbourhood of the varicus ravine-systems which afford the principal pasturage. Bulls are usually available for the desi cows: the few cows of the Punjab type have not access to bulls of their own breed. Owners are much more interested in making ghi than in rearing the young stock. The Makanpur fair is one of the main centres of trade in cattle for a large part of the province: cattle are brought to it from the Punjab, Gwalior, Bundelkhaud, and the adjoining districts, and distributed over the lower doab and Oudh. Consquently the stock in the district is very diversified. There does not appear to be any risk of the ravines ceasing to be available as pasture, but breeding would increase if it should prove possible to improve the pasturage.

The district is liable to all the commoner forms of cattledisease, as might be expected from its position as a collecting and distributing centre; losses from rinderpest are occasionally severe. There is at present no active hostility to the practice of inoculation, but it is not yet welcomed by the people.

Annals.

The district suffered severely in the earlier droughts, but its position has been meterially altered by the construction. began in 1894 the district was not prosperous. Cultivation had mecreased seriously in many villages, mainly in the south, and population had to some extent shifted to the more prosperous parts in the north. The seasons had for some time been unfavourable, the rainfall being as a rule either excessive or badly distributed, and successive losses had gradually impoverished the people. Apart from the poorer villages along the Jumna, depression was reported in 1894-5 in the Gauges-Isan tarai, the centre of Ghatampur, and the country round Akbarpur and Bhoguipur : in the two last-named localities kans was spreading. In 1895 the rains were scanty and ill distributed and the people suffered further losses, while the abrupt cessation of the rains in August 1896 destroyed nearly wo-thirds of the kharif crop; the following rabi was sown on a reduced area and much of the outturn was inferior. During his year the district suffered from famine and extensive neasures of relief were necessary: the tabsils most affected vere Narwal, Ghatampur and Bhognipur.

In 1897 the kharif was sown on a very large area and yielded well: the rabi area of 1398 was however somewhat educed. During this year it was noticed that the spread of cans had been checked, and the wetter parts of the district had been benefited. The Collector, while submitting propoals for the relief of certain villages, wrote as follows: "The amine has done harm to a few villages on the Jumna, but on the whole the succession of dry years may be said to have lone more good than harm. The improvement is most marked where there is canal irrigation: fallow is being relaimed and yielding capital crops, the soil has recovered after he years of rest, spring level has gone down, and there is a prisk demand for irrigation."

The rains of 1899 were at first so heavy that the kharif rea was considerably reduced, but a large rabi was sown for 300. The rains of this year were good and a large kharif

area gave a good yield. The rabi of 1901 was also good excell in the case of wheat, which suffered somewhat seriously from rast. Two favourable seasons followed, but the kharif of 1902 was inferior owing to a prolonged break in August.

The seasonal yields since 1903 are given in the following table :---

		Rabi.				Kharif.				
Yoar.	All crops.	Whent.	Barley.	Gram.	All crops.	Juar.	Maize.	Cotton.		
1903 1904 1005 1906 1907 1908 1909 1910 1911	94 100 46 75 94 87 81 100 97	94 97 31 94 87 95 81 100 87	94 97 44 79 94 95 81 100 100	81 94 62 75 94 85 81 100 100	85 63 68 107 47 86 86 86 90	87 62 50 119 25 87 78 81 	94 69 69 94 33 100 81 100 	87 50 75 106 59 81 87 87 		

The rains of 1903 began nearly a month late, and the charif area was somewhat contracted. Heavy rain in October njured the late crops, but enabled a large rabi area to be own for 1904. The rains of 1904 were heavy and continous in July and August, and there was an injurious fall in October. The exceptional frost of 1905 caused very serious njury to the cereals and to arhar. The rains of this year were ery deficient, and all crops suffered. The rabi area of 1906 ras restricted by the drought, and the crops suffered from want f moisture, especially in Bhognipur, Ghatampur and parts of Derapur. There was also serious damage by hailstorms. During these seasons distress was felt in Bhognipur and hatampur: and in particular there was a severe shortage of odder leading to a reduction in the stock of cattle. Belief orks were open from January to June, and gratuitous relief

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was continued until September, when an excellent kharif crop was assured on a very large area.

The rabi of 1907 was also satisfactory except that wheat suffered somewhat from rust. The rains were however very late and the falls in September were altogether inadequate. The kharif suffered seriously and the rabi of 1908 was sown on a much restricted area: the winter rains were however sufficient and the yield was fair. Test works were opened during the spring but failed to attract labour, and direct reliefmeasures were limited to a small amount of gratuitous relief, which was discontinued in August.

The rains of 1908 were heavy in August and inadequate in September, especially along the Jumna. Cotton was injured but food-grains did well on the whole. The rabi area of 1909 was restricted owing to the dryness of the ground, and the severe outbreak of malaria, which hindered field-work : rain was insufficient in the winter, but there was considerable damage from hail, and storms at harvest did further harm. The rains were at first very heavy and affected the maize crop, while there were floods on the Ganges. Later in the season the rain was deficient, and rice and juar suffered, while juar was also injured by the borer. It was found possible to sow a large rabi area for 1910, which yielded exceptionally well. The rains of this year were scanty in July and somewhat excessive in September, but the kharif did well, except juar, which was again attacked by borers. The late rain secured a large rabi area for 1911, and the yield was exceptionally good except in the case of wheat which was attacked by rust.

Progress.

There has been no increase in the cropped area. After the depression recorded above it gradually attained a maximum in 1902-3, which was still somewhat below the standard of the previous settlement; and in the last few years cultivation has fallen slightly below this maximum. There is no

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prospect of any material expansion. The area cropped in each season is subject to substantial fluctuations according to the weather,

The proportion of remunerative crops is low and shows no tendency to expand. The chief change has been the loss of indigo, which has been reduced in the last two decades by about 35,000 acres, and is now of little importance. Wheat and cotton have increased slightly in the same period : sugarcane fluctuates widely and it cannot be said that an increase has been established : poppy has not been of great importance of late years, and is now being reduced. On a smaller scale there has been a marked increase in the cultivation of potatoes and garden crops.

The practice of sowing certain kharif crops early with the aid of canal-irrigation has made substantial progress though less than in the central and upper doab: about onesixth of the area under maize, cotton and fodder (taken together) is new sown in this way, while twelve years ago the practice was almost unknown.

The canal system has been greatly improved during the last two decades by the construction of the Fatchpur branch and the Ghatampur extensions: tahsils Ghatampur and Narwal have benefited most, but the area protected has increased substantially in Akbarpur, Cawnpore and Bhognipur. Construction of masonry wells has proceeded actively in the same period: accurate statistics are only available from 1906, since when the net number of wells has increased by about 1,300. In 1911 there was one such well to 65 acres of normal cultivation as against 71 acres in 1906.

The census of 1901 showed a substantial increase during the decade, which was most marked in the city and in the tahsils along the Jumna. The last census however shows a serious fall of close on ten per cent; it is common to all tahsils but is more marked in the north-west and centre than in the south and east.

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Agricultural wages do not appear to have risen substantially in the last five years, except close to the city; in the rural tracts the rates most commonly paid in 1911 were 2 or 2¹/₄ annas.

The practice of taking loans for land improvement, and also for other agricultural purposes, is fairly well established in the district. From 1900 to 1905 the sums taken were small, but they rose rapidly in unfavourable seasons. Close on Rs. 19,000 have been distributed in the last three years in loans for improvements, the popularity of which has increased There has been so far no development of agricultural cooperation.

No new railways have been opened in the past twenty years, but there was in 1911 one station to 91 square miles and the system will be practically complete when the line to Hamirpur and Banda, now under construction, is open for traffic. The road-system is also well developed, the chief recent advance having been the improvement (which is still in progress) of the old Mughal road which crosses south of the district.

The rents of occupancy tenants recorded after the settlement which closed in 1906 gave an average rate of Rs. 4.9 per acre and there have been no material enhancements up to 1911. Competition rents have risen from Rs. 5.5 in 1906.7 to Rs. 5.8 in 1910-11.

The employment offered by the organised industries in the city has increased very greatly during the last twenty years: cotton-mills, woollen-mills and tanneries have all extended while the new industries established include engineering works, sugar-refineries, brush-manufacture and oil-mills. There has been no extension of organised industry beyond the immediate environs of the city. In the rural tracts the closing of indigo-factories has withdrawn a large amount of seasonal employment, and the local textile industry has declined;

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extraction of saltpetre has apparently revived to some extent in the last few years.

The sums distributed annually in the district by moneyorder have risen during the last decade from about 28 to about 45 lakhs, but a very large proportion belongs to the trade of the city, and so far as is known the rural tracts do not draw a large income from external sources.

Dangers and possible remedies or improvements.

1. The area sown with kharif crops depends mainly on the weather during the first month of the season counting from the first heavy fall of rain. An early beginning is an advantage, but the most important point is that there should be bright weather with just sufficient rain to enable tillage and sowing to proceed without interruption. If the first month is wet, sowings of dry crops will be delayed and the area will fall, though the loss may be to some extent made good by larger sowings of rice, and also of bajra which can be sown until nearly the end of August.

Late rice is planted to a small extent; the area depends mainly on the weather of the second month, which should be wet, and a long break at this period will result in a reduction.

The area planted with sugarcane is influenced by the weather in early spring, at which time rain facilitates tillage but it is determined mainly by economic causes. One of these is the yields and prices obtained from the crop in recent seasons; the other is the financial position of the cultivators, which depends mainly on the success or failure or the preceding harvests.

The area sown with cotton is affected to some extent by the nature of the sowing season; an early start and a dry season are favourable. The chief factors determining the area are the profit obtained in recent seasons, and the relative prices of cotton and food-grains.

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Caunpore.

2. The yield of the early dry crops, of which maize is much the most important, depends mainly on the weather during the first two months of the season: alternations of rain and bright weather are desirable, and the yield may be much reduced by excessive rain in the second month. The small area under early rice requires more rain, and is not likely to give a full yield when the dry crops do best.

The late dry crops require the prolongation of the rains almost to the end of September: they may be seriously injured by heavy falls in the end of September or the beginning of October, while they will give very little grain if September is altogether dry.

The late rice requires more rain in September than is suitable for the dry crops, and (where canal-water cannot be given) at least one fall in October is desirable for its complete success.

The cropping in the north of the district is sufficiently varied to ensure a supply of food in ordinarily unfavourable seasons; in the south, where the soils are apparently unsuited to maize, the food-supply is dependent to a dangerous degree on the rainfall of September.

Sugarcane is apt to suffer seriously at two periods. The first is the end of the hot weather: the crop benefits from an early commencement of the rains and suffers from delay. The second is the end of the rains: a premature cessation is most injurious, and rain in October is beneficial. The crop can stand a considerable excess of rain, but prolonged breaks are likely to cause injury.

Cotton is liable to considerable injury from excessive rain: the most dangerous times are probably just after sowing, and again at the end of the season. It can withstand fairly long breaks when once it has made a fair start, and suffers from a dry September less than any other crop.

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3. Apart from variations in the rainfall, the following dangers occur in the kharif season :--

- (a) Floods may injure the crops in the lowlands of the Ganges and Jumna and along the minor rivers.
- (b) Juar may be seriously injured by boring insects (vide Provincial Note, section VI).
- (c) A watch should be kept for insect-pests on other crops, especially cotton and sugarcane.

4. The rabi area depends mainly on the rainfall of September and early October : the effects of a moderate drought at this period are largely mitigated by irrigation within reach of the canals, but where canal-water cannot be had the fall in area may be very serious.

The area in the Ganges lowlands may be reduced if late floods leave the land unfit for sowing.

5. In all seasons the occurrence of winter rains is important for the success of the rabi, especially in the south of the district. Rain is beneficial up to the early part of February, provided the falls are moderate and of short duration. Rain in March or early April will probably do some harm, while prolonged periods of damp and cloudy weather between January and March must be expected to produce rust on wheat and linseed; the injury from this cause may be very serious, and its extent may not be fully realised till the crops are harvesped.

When the ground has been dry at sowing time, and sowinge have been largely made with irrigation, an early fall of winter rain is of great importance. When there is little winter rain or when falls are delayed, the crops fall off in condition as they ripen, and tend to wither under the strong dry winds which in such seasons must be expected in the spring. It is noteworthy that gram as a rule suffers most in this case : a seed-bed prepared with irrigation is less suitable for it than for the cereals or peas.

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6. Frost early in January will do little harm except to arhar and possibly potatoes: frost at the end of the month or early in February may cause very serious injury to the chief rabi crops.

Hailstorms are not important until the cereals are beginning to ear: the danger from them increases as the season advances.

The rapeseed crop may be seriously injured by the aphis if damp and cloudy weather occurs while the plants are in flower.

The poppy crop may suffer severely from damp weather in March.

A watch should be kept for the potato-moth (vide Provincial Note, section VI), which may cause very great loss to growers.

7. The area sown with *zaid* crops in ordinary years is very small: it increases, but not to a very great extent, when stocks of food have been reduced.

8. A series of abnormal seasons of one type may produce certain cumulative effects. After some seasons of deficient rainfall the water-level falls, and the efficiency of temporary wells decreases, while the cost and labour of irrigation are materially enhanced.

On the other hand a series of wet years may raise the water-level to a point where the productivity of the land declines. This may happen throughout the district, but its effects will probably be most noticeable in the lowlands. If the land in the south of the district is affected, the spread of *kans* may cause a rapid decline in cultivation.

9. Distress requiring some measures of relief must be expected to occur if the rains have ceased at the beginning of September. Its severity will depend largely on the financial position of cultivators as determined by previous seasons, but it will probably be relatively greatest in the southern tahsils.

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Whe following measures were taken in 1907-8 when there was very little need for direct relief :--

Revenue suspended, kharif		***		11 lakhs.
99 99 rabi				j lakh.
Revenue remitted kharif	•••		400	14 lakhs.
n n rabi	700		ede	2 "
Improvement loans		020		ž lakh.
Advances for rabi				2 lakhs.
sy sy kharif	***		244	14 11

Maximum proportion of population relieved 0.3 per cent in March.

10. A serious shortage of fodder may occur, especially in the south of the district, in seasons when the rains have ceased so early that the large millets wither altogether or are seriously stunted in growth: in this case the only remedy that can be suggested is the importation of grass from the forests and its distribution on the *takavi*-system. The demand will depend very largely on the winter rains: if there are none, it may become very great, but even light falls bring up enough grass to keep large numbers of cattle going.

A fodder famine does not necessarily occur when the millets yield no grain, as the plants may have grown to a sufficient size to yield fodder; but in such seasons juar occasonally becomes poisonous and the loss of cattle due to this cause may be considerable. The poison is formed under the abnormal conditions of growth, and its presence cannot be recognised beforehand except by analytical methods; the only action possible is to provide advances to enable cultivators to replace cattle that have died from this cause.

11. There is still room for a considerable increase in the number of masonry wells, and loans for this purpose should continue to be readily given. There may be scope for fieldembankments in the unirrigated villages in the south of the district (vide Provincial Note, section II). may still exist in this respect.

13. To minimise losses from cattle-disease, attention should be given to securing prompt reports of outbreaks under the rules laid down in the Land Records Manual, and the local veterinary staff should be sufficient to localise outbreaks where they occur.

If it is found possible to improve the pasturage in ravines, special attention should be given to the land along the Sengar and the Jumna in this district.

14. The district is not well supplied with agricultural capital, and for the present at least there is a considerable field for the *takavi*-system. Improvement loans are wanted mainly for sinking masonry wells, but they may also be required for field-embankments. Agricultural loans may be required in the following circumstances :---

- (a) Early cessatian of the rains.—Money may be wanted to a very large amount for sowing the rabi, and probably also for the following kharif : smaller sums may be required in the early spring for planting sugarcane and extending the zaid area, while advances to buy fodder may also be needed.
- (b) Floods.--Money may be wanted to sow the rabi in areas where the kharif crops have been injured.
- (c) Cattle-disease.—It is important that cultivators should be in a position to replace working-cattle by the beginning of the next tillage-season.
- (d) Curtailment of the poppy area.—It may be desirable to offer advances in villages where the crop has been largely grown to enable cultivators to substitute some other remunerative crop.

15. There is at present no effective agency for the introduction of agricultural improvements requiring associated action. There is probably room for better varieties of wheat,

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cotton and sugarcane, and also for a leguminous crop sufficiently remunerative to take a place in rotation on the better soils. The cheaper forms of improved tillage-implements should gradually come into use; the tillage of the dry soils in the south of the district requires study to see if improvements are possible in regard to moisture conservation and the control of kans.

DISTRICT NOTE.

FATEHPUR.

Topography.

THE district is divided lengthwise into three tracts, the Ganges, the Central and the Jumna. The limits of these tracts do not coincide with the pargana boundaries, and exact statistics of their area and population are not on record.

The Ganges tract lies in parganas Bindki, Kutia, Gunir, Fatehpur, Kotila and Hathgaon. There is a considerable extent of *tarai* and then a belt of sandy land, often somewhat uneven, up to the watershed, which lies only from three to five miles from the Ganges. The average breadth of this tract is therefore about four miles or roughly one-sixth of the district.

The central tract includes the whole of parganas Haswa and Aya Sah, and parts of all the remaining parganas except Muttaur: it extends over more than half the district. Its cross-section is slightly concave: below the watersheds which bound it on north and south the land is at first a light loam which then gets firmer and passes into clay; *jhils* are large and numerous in the centre, and extensive usar plains are common. Three streams, the Bari Nadi, Chhoti Nadi, and Sasur Khaderi rise in this tract: the two former unite in the west of Ekdala and then fall into the Jumna; the latter lies to the north and passes into Allahabad.

The Jumna tract includes the whole of parganas Muttaur and parts of Kora, Tappa Jar, Ghazipur, Ekdala and Dhata; it forms from one-fourth to one-fifth of the district. The soils are in many places distinctly of the Bhundelkhand type, kabar and parwa predominating. Ravines are extensive and tend to increase along both the Jumna and its

Fatehpur.

tributary the Rind, which joins it in Tappa Jar. There is much less *tarai* on the Jumna than on the Ganges, but what exists is more fertile and less liable to diluvion. *Kans* is found in this tract, but at present does not occupy a large area.

Water-supply and drainage.

In the Ganges tract the *tarai* does not ordinarily require irrigation, but is subject to injury from floods. The higher land on the watershed is irrigated from wells, both masonry and temporary, but the slope towards the river is ordinarily unirrigated; the subsoil here is too sandy for temporary wells and foundation-clay is not usually met with.

In the Jumna tract the water-level stands so low that well-irrigation is almost impracticable, and consequently the facts regarding the existence of foundation-clay are not well known. The greater part of this tract is now within the reach of canal water which was made available between 1897 and 1902; the land between the Rind and the Jumna is supplied by the Bhognipur branch canal, while the Fatehpur branch serves the rest. There are however several areas along the edge of the ravines which the canals do not reach, and which are practically unprotected : the largest of these is in the extreme west of the district, being cut off by the Nun Nadi. The higher part of this tract is over-drained and suffers from erosion : the small areas of *tarai* are exposed to injury from untimely floods.

From the point of view of irrigation, the greater part of the central tract may be regarded as divided into two portions by the line of the Bari Nadi. The Fatehpur branch canal, which enters the north-west of the district is carried south parallel to the course of the Rind and then runs between the Bari Nadi and the Jumna until it crosses the former near Asothar. Up to this point the distributaries do not cross the Bari Nadi, which thus marks the northern limit of canal-irrigation. Wells, both masonry and temporary,

are also possible throughout this southern division, while considerable areas are watered from the *jhils* in Ghazipur and Aya Sah. North of the line of the Bari Nadi wells and *jhils* are the sources of supply. Temporary wells are made almost everywhere: there is practically no hostility to the construction of masonry wells, and their use is spreading, particularly in the eastern parganas; but there is very little capital available in the villages. The analysis of the wellsurvey of the district is not complete, but over 200 villages have so far been recorded as needing more masonry wells.

The natural drainage of the central tract is defective. The Bari Nadi rises in a group of large *jhils* west of Fatehpur town, and for a considerable distance its channel is illdefined and obstructed. The same is true of the Chhoti Nadi and Sasur Khaderi, which rise from *jhils* further to the east: and the whole system is unable to carry off the flood-water which accumulates in years of heavy rainfall. Particular areas have benefited by minor drainage works constructed from time to time and projects for more radical improvements have been prepared but have not yet been sanctioned.

Cattle supply.

The stock of cows in the district is relatively much greater than is the case in the central doab; they are to some extent concentrated along the Jumna and the Bind, where the ravines provide a certain amount of grazing, and also along the Ganges. The quality of the cows is moderate, those kept along the Rind being superior to the rest. The supply of bulls is adequate, and the young stock would be much better than they are if they were allowed more milk: but cow-owners are more interested in *ghi* than in calves.

The trade in working cattle is considerable. Dealers from the Punjab bring small numbers of expensive animals; while large numbers of cheap cattle come from Bundelkhand, either for sale in the district or on their way to South Oudh; and local young stock are also exported to Oudh. The



market at Fatehpur is the most important centre of trade.

The district is liable to all the common forms of cattledisease, and losses from rinderpest are periodically serious; this disease appears to be introduced by the cattle coming from Banda when there is an epidemic in Bundelkhand, and from Fatehpur it is distributed over South Oudh. The people were at first very suspicious of the practice of inoculation, but their attitude has changed, and the practice is now welcomed.

Annals.

The annals of the district, as detailed in the annual reports, may be summarized as follows. In 1895 at the end of the series of wet years, the whole district was depressed: exceptional floods in October 1894 caused serious injury to the kharif and also to property in the central tract, and retarded rabi sowings : the rabi of 1895 suffered further from excessive rain in the cold weather, and wheat was affected by rust. Cultivation was decreasing near the *jhils* in the central tract, while kans was spreading in the Jumna tract. The rains of 1895 were scanty and ill-timed; the crops were generally poor, and the Jumna tract was noticed as particularly depressed. The failure of the rains in 1896 reduced the kharif ontturn to less than one-third of the normal*; and this failure, coming when the district was already depressed induced severe distress. Relief operations were not at first so successful in this district as elsewhere, and for a time the mortality was serious, while very many tenants left the district. The rabi area of 1897 was about two-thirds of an ordinary year, but the outturn was fair, and the need for relief ceased with the rains.

Recovery was, however, not so rapid as in most districts. In 1898 there were several severe hailstorms, and large numbers of cattle were lost owing to an epidemic of

^{*} By an error in procedure which cannot now be rectified the areareturned as cropped in this year excluded all fields on which the crop failed entirely, and the figures for area cannot therefore be compared with those of other years.

rinderpest; kans was reported to be decreasing. The ill i distributed rains of 1899 reduced the kharif area, but the yield was fairly good. In this year the extensions of the canal system (the Fatehpur branch and the Ghatampur extension) became effective in places.

In 1900 the kharif area was again restricted by the lateness of the rains, and rice suffered from insufficient rain at the end of the season. The wheat crop of 1901 was severely injured by rust, and there was a destructive hailstorm in the Jumna tract. Kans continued to decrease, but the district as a whole had not entirely recovered; the census showed a decrease in population, and in some localities land was lying vacant for want of tenants. In the next two years there were no special calamities and recovery was rapid, though some local floods were reported in the central tract. In 1902-3 the cultivated area at last reached the level of the years before 1895 in almost all parganas.

The seasonal yields since 1903 are given in the following table :--

Rabi.			Kharif.						
Year.	All crops.	Wheat.	Barley.	Gram.	All crops.	Rice.	Juar.	Cotton.	
1903 1904 1905 1906 1907 1908 1909 1910 1911		90 94 20 77 88 75 90 100 102	94 94 12 75 75 87 87 100 87	94 94 19 81 87 75 87 100 106	88 84 25 75 94 69 94 100 106	80 87 62 105 42 90 84 88 	87 94 56 125 29 100 81 100 ***	81 87 56 100 40 94 75 69 	56 81 75 113 53 69 100 81

In 1903 the rains were late and the kharif area was materially reduced: heavy falls in October injured the cotton seriously and millets to a less extent. The year 1904 was

on the whole favourable though the season was rather too wet for cotton. The frost of January and February 1905 did more harm in this district than almost anywhere else, and a large proportion of the revenue demand had to be remitted. The following rains were late and inadequate throughout; the *jhils* were empty very early and the rabi area of 1906 was reduced. This crop suffered from want of moisture, and there was widespread and severe damage from hail. Remissions of revenue became necessary during these seasons, and test-works were opened in the winter but failed to attract labourers.

The rains of 1906 were very favourable and there was an excellent kharif: the following rabi too was good except for injury to wheat caused by rust. The rains of 1907 began very late, and there was hardly any rain after August. The areas most affected were the heavy rice-soils in the central tract and the dry villages along the Jumna. Large sums were distributed as *takavi* to get rabi sown for 1908 and a surprisingly large proportion of the normal area was sown, but the dry crops suffered from lack of moisture. During these seasons village and aided relief-works had to be opened and gratuitous relief was given until August.

In 1908 the rains were favourable until September, when they were insufficient: cotton however was injured by too much rain in the early part of the season. The rabi area of 1909 was restricted by want of moisture and by the severe outbreak of malaria which prevented field-work. Some damage was done by heavy rain at harvest time. The rains were favourable on the whole, but insufficient for the rice-crop; and juar was seriously injured by borers. Moisture was sufficient for sowing practically a full rabi area for 1910, and the yield was exceptionally good. There was however a severe outbreak of rinderpest during this year, and losses of ploughcattle were heavy. The rains of 1910 were favourable until the end of September when cotton and millets were injured:

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in also again injured by borers. Rinderpest continued inarry the close of the year. The rabi of 1911 was sown an exceptionally large area, and would have been excellent t for rust on wheat and blight on poppy.

Progress.

In the matter of cropping the district has remained actically unchanged throughout the last two decades. There is been no extension of cultivation: the area cropped fell between 1894 and 1900, but since 1901 the former level is been regained, and there is apparently no room for future pansion.

The proportion of remunerative crops is very low, and ows no tendency to rise. Wheat fell in the period of distress t has regained the former level: cotton shows a slight idency to expand: sugarcane promised to extend along the hal, but the promise has not been made good: while the ppy area is now being reduced. Some varieties of rice are own for rent-paying, but the area ander them cannot be tinguished from that where rice is grown for food. Among d crops, maize is apparently extending though the area is l very small.

The position of the southern half of the district has been olutionised by the introduction of canal water between 98 and 1902. Construction of masonry wells has proceeded wly of late, the number having risen by about 700 since 95; there was in 1911 one such well to 38 acres of normal tivation as against 40 acres in 1905. No material progress a been made towards improving the drainage of the central ct.

The district shows a small but steady decrease in populan since 1891, but the distribution of this has been unequal; each census the northern half of the district has declined, ile the south has either increased or declined to a less ent, and in 1911 tahsil Ghazipur alone shows an increase.

Agricultural wages have been almost unchanged during the last five years, but there is apparently a tendency to rise in a few localities. The rates paid in 1911 varied between 1¹/₂ and 2¹/₂ annas.

1891.

The district appears to be unusually short of agricultural capital owing to the poor circumstances of the bulk of the landholders. Advances for temporary wells are readily taken in unfavourable seasons, and their offer should be a most important part of the functions of the administration. Substantial sums were taken as advances for land-improvement in the famine of 1896, but for several years afterwards practically no loans were made. Of late years rather more has been taken: but progress is slow having regard to the need of capital for more masonry wells established iby the well-survey. Agricultural co-operation has made a satisfactory start: in 1911 there were 24 rural credit societies with working capital of over Rs. 34,000, financed mainly by the Fatehpur district bank.

N railways have been opened in the district during the past twenty years : the number of stations on the East Indian Railway has been increased in this period, and there is now one station to 182 square miles. This proportion is low, but the configuration of the district does not suggest the need for further construction. The mileage of metalled roads is exceptionally high, and has been increased in the same period only by the construction of short lengths of feeder-roads.

The movement of rents during the last two decades has been very small. There has been no general enhancement of the rent of recorded occupancy tenants and the average rate paid by them has risen only from Rs. 4.4 to Rs. 4.6 per acre; while competition rents have risen from Rs. 4.1 to Rs. 4.8.

CONTRACTOR OF A DATA AND A

The are no industries organised on modern lines in diseast indigenous industries are of little importance, and we as a rule declined.

The external income of the district is not great: the sums tributed annually in the district by money-order have an in the last decade from about $5\frac{1}{3}$ to $7\frac{1}{2}$ lakhs, and a ge proportion of this is known to represent local transtions.

Dangers and possible remedies or improvements.

1. The area sown with kharif crops depends mainly on the ather during the first month of the season counting from the ather during the first month of the season counting from the the avy fall of rain. An early beginning is an advantage; the most important point is that there should be bright ather with just sufficient rain to enable tillage and sowing proceed without interruption. If the first month is wet, rings of dry crops will be reduced, while rice will extend ess the rainfall is very heavy; there may also be larger vings of bajra which can be sown until nearly the end of igust.

Late rice is planted on an extensive area if the weather ring the second month of the season is sufficiently wet; ong break at this time may result in a large proportion of a land being left fallow.

The area planted with sugarcane is influenced by the ather in February and March, at which time rain facilitates age; but it is determined mainly by economic causes. One these is the yields and prices obtained from the crop in ent seasons; the other is the financial position of the tivators, which depends mainly on the success or failure the preceding harvests.

The area sown with cotton is affected to some extent the nature of the sowing season; an early start and a dry son are favourable. The chief factors determining the ea are the profit obtained in recent seasons, and the relative ces of cotton and food-grains. Taking a longer view, the

apertiension.

2. The yield of the small area under early dry crops depends mainly on the weather during the first two months of the season: alternations of rain and bright weather are desirable, and the yield may be much reduced by excessive rain in the second month. The early rice requires more and rather later rain, and is not likely to give a full yield when the dry crops do best.

The late dry crops require the prolongation of the rains almost to the end of September; they may be seriously injured by heavy falls in the end of September or the beginning of October, while they will give very little grain if September is altogether dry.

The late rice requires more rain in September than is suitable for the dry crops, and, where canal-water cannot be given, at least one fall in October is desirable for its complete success.

The district depends for its food to a dangerous extent on crops that require rain in September, and a considerable extension of maize would be a great improvement: the crop can probably be grown successfully on the better soils except in the Jumna tract.

Sugarcane is apt to suffer seriously at two periods. The first is the end of the hot weather : the crop benefits from an early commencement of the rains and suffers from delay. The second is the end of the rains : a premature cessation is most injurious, and rain in October is beneficial. The crop can stand a considerable excess of rain, but prolonged breaks are likely to cause injury.

Cotton is liable to considerable injury from excessive rain: the most dangerous times are probably just after sowing, and again at the end of the season. It can withstand

Fatehpuri

fairly long breaks when once it has made a fair start, and suffers from a dry September less than any other crop.

3. Apart from variations in the rainfall, the chief danger to the kharif crops arises from floods which may affect the lowlands on the Ganges and the Jumna, and more seriously a large portion of the central tract, where houses and property are threatened as well as standing crops.

The juar crop may be seriously injured by boring insects (vide Provincial Note, section VI), and a watch should be kept for other insect-pests, especially on cotton.

4. The rabi area depends mainly on the rainfall of September and early October: a late fall will secure an area considerably in excess of the normal, while drought at this period involves a large reduction.

The area in the lowlands may be reduced by late floods leaving the land unfit for tillage.

5. Winter rains are important in all seasons for the success of the rabi crops provided they come by the end of January and that the falls are moderate and of short duration. Rain late in the season will do some harm, while prolonged periods of damp and cloudy weather in January and February must be expected to produce rust on wheat and linseed. The injury from this cause may be very serious, and its extent may not be fully realised till the crops are harvested.

When the ground has been dry at sowing time, and sowings have been largely made with irrigation, an early fall of winter rain is of great importance. When there is little winter rain or when falls are delayed, the crops fall off in condition as they ripen, and tend to wither under the strong dry winds which in such seasons must be expected in the spring. It is noteworthy that gram as a rule suffers most in this case : a seed-bed prepared with irrigation is less suitable for it than for the cereals or peas.

Fatehpur.



6. Frost early in January does little harm except to the arhar: at the end of the month it may almost destroy the staple-crops.

Hailstorms are not important until the cereals are beginning to ear; the danger from them increases as the season advances.

The rapeseed crop may be seriously injured by the aphis if damp and cloudy weather occurs while the plants are in flower.

The poppy crop suffers greatly when damp weather occurs late in the season.

7. The area sown with zaid crops in ordinary years is very small, but when stocks of food are low it may be trebled or quadrupled and becomes of some local importance.

8. A series of abnormal seasons of one type may produce certain cumulative effects. After some seasons of deficient rainfall the water-level falls, and the efficiency of temporary wells decreases, while the cost and labour of irrigation are materially enhanced.

On the other hand a series of wet years may raise the water-level to a point where the productivity of the land declines. This may happen throughout the district, but its effects will be most noticeable in the lowlands and the lower portion of the central tract. If the tillage of the Jumna tract is hindered in such seasons, *kans* will probably spread and cultivation may fall off to a serious extent.

9. Distress requiring some measures of relief must be expected to occur when the rains have ceased by the beginning of September. Its intensity will depend very largely on the economic position of the cultivators as determined by previous harvests, but the dry portions of the Jumna tract and the heavy rice soils in the central tract will probably be most affected. The following measures were taken in 1907-8, when the need for direct relief was small :---

Revenue suspended,	kharif					ah.bs.
,, ,,	rabi		-	140	3	lakh.
, remitted	kharif	289		lan di s	1	
	rabi	wat	200		\$	40
Improvement loans		-			*	1 ## S
Advances for rabi		***		-	1	20
», khari	P	***			3	- 29

Maximum proportion of population relieved 2.0 per cent. in March.

10. A serious shortage of fodder may occur, especially in the south of the district, in seasons when the rains have ceased so early that the large millets wither altogether or are seriously stunted in growth: in this case the only remedy that can be suggested is the importation of grass from the forests and its distribution on the *takavi*-system. The demand will depend very largely on the winter rains: if there are none, it may become very great, but even light falls bring up enough grass to keep large numbers of cattle going.

A fodder famine does not necessarily occur when the millets yield no grain, as the plants may have grown to a sufficient size to yield fodder; but in such seasons juar occasionally becomes poisoneus and the loss of cattle due to this cause may be considerable. The poison is formed under the abnormal conditions of growth, and its presence cannot be recognised beforehand except by analytical methods: the only action possible is to provide advances to enable cultivators to replace cattle that have died from this cause.

11. There is room for a large increase in the number of masonry wells, and improvement loans should be readily granted for this purpose. There is probably scope for constructing field-embankments in the Jumna tract (vide Frovincial Note, section II).

12. The drainage of the central tract should be regarded as an urgent matter. Here as has been the case elsewhere the first step should be to improve the defective waterways; until this is done the construction of drains

Fatchpur.



discharging into those waterways must aggravate the evil further down.

13. To minimise losses from cattle disease, attention should be given to securing prompt reports of outbreaks under the rules contained in the Land Records Manual, and the veterinary staff should be sufficient to localise outbreaks when they occur.

If it is found possible to improve the pasturage in ravinecountry, special attention should be devoted to the ravines of the Jumna and Rind.

14. The supply of agricultural capital is entirely inadequate; the need may be gradually met by the extension of the co-operative organisation, the prospects of which are favourable, but for the present there is a wide field for the *takavi*-system. Improvement loans should be readily given for sinking masonry-wells, and efforts should be made to get them taken in the villages where wells are known to be possible and to be required. Loans may also be required for fieldembankments if these are found to be desirable and also for embankments in the rice tracts. Agricultural loans may be wanted in the following circumstances :—

- (a) Early cessation of the rains.—A very large sum (exceeding probably what was given in 1907), may be needed to sow the rabi, and a further large sum for the ensuing kharif: small sums may be wanted in early spring to plant sugarcane and extend the zaid area, while advances to buy fodder may also be required.
- (b) Floods.-Advances may be required to sow the rabi in villages where the kharif crops have been injured: the need may be urgent in the central tract if the floods have destroyed houses, or if cattle have been lost.
- (c) Cattle disease.—It is important that cultivators should be in a position to replace working-cattle by the beginning of the next tillage-season.

able to offer advances in villages where the crop has been largely grown to enable cultivators to substitute some other remunerative crop.

15. The co-operative organisation is, or will shortly be, a position to carry out agricultural improvements requiring associated action.

The district is exceptionally backward and great improvenents should be possible when capital and other requisites are rovided. In appears possible that more wheat, cotton and agarcane can be grown, and probably better varieties of these rops are required; while the extension of maize, and the etter utilization of the canal are obvious needs. The tillage f the dry lands in the south of the district requires study with regard to moisture conservation and the control of cans.

DISTRICT NOTE.

Provide the cost

ALLAHABAD,

Topography.

THE district is made up of three distinct portions, the eastern end of the doab, a portion of what is geographically Oudh, and the east of Bundelkhand.

The doab .- This tract lies between the Ganges and the Jumna and includes parganas Kara, Karari, Atharban and Chail. The Ganges khadir varies greatly in width, but is in places extensive and fertile; it is however liable to lose its kharif owing to floods, and to be affected by changes in the course of the river : the Jumna khadir is of small extent, but is fairly stable. Each river is fringed by an extensive belt of ravines or broken ground, enclosing the central upland : this upland is on the east light loam or sand, and wells are not easily made in it : but towards the west where the upland widens, the centre of it is occupied by stiff loam or clay (a continuation of the central tract in the Fatchpur district). and here wells are usually possible. This land is drained by the Sasur Khaderi, which develops an extensive ravine-system before it falls into the Jumna. The south of the upland differs from the north in having some admixture of the typical Bundelkhand soils, which is seen chiefly in pargana Atharban.

The lowland in the west appears to be adequately drained in ordinary years, but is liable to injury when the rainfall is excessive. *Kans* appears in Chail and Atharban; there is little at present, but ten years ago it covered considerable areas.

The tract is held largely by small landholders who are in many cases thriftless, quarrelsome and indebted, and who rackrent their tenants,

The Oudh tract.—This tract lies north of the Ganges and includes parganas Soron, Nawabganj, Mirzapur, Chauhari, Sikandra, Jhusi, Mah and Kiwai. Most of Mirzapur Chauhari is separate from the rest of the district, lying within the boundary of Partabgarh. The Ganges *khadir* is in places extensive, and is similar to that of the doab : beyond it there is the usual light and inferior soil on the river bank, which gradually becomes better and heavier until in the north and east (parts of parganas Soron, Sikandra, Mah and Kiwai), the country is typical rice-land, large stretches of clay with usar plains and numerous *jhils*. This tract is much more productive than the doab : the cultivators are more numerous and skilful, and the class of crops is better.

The loam is effectively drained: the *jhils* in the north drain ultimately into either the Barna river, which rises in this district, or into tributaries of the Sai.

There are complaints of flooding in wet seasons.

The Bundelkhand tract.—This tract includes parganas Arail (or Karchhana), Bara and Meja (or Khairagarh). It is by no means homogeneous and may be sub-divided as follows :—

(a) Ordinary alluvium.—Nearly the whole of Karchhana, the north of Meja and the northern strip of Bara consist of ordinary alluvium with none of the special features of Bundelkhand; the soil is mainly light loam and the level portions are almost fully irrigated from wells; the villages along the rivers (Jumna, Ganges and Tons) are lighter soil with considerable ravine-systems and in them irrigation is deficient; while there is a belt of clay growing rice under the hills that border the alluvium on the south. On the west of Karchhana the land dips to a clay basin which merges in the mar tract of Bara.



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(b) The upland stony tract of Bara.--This includes more than half the pargana; the soils are thin and poor, and there is little irrigation.

- (c) The mar plain in the east of Bara and extending into the clay of Karchhana.—The predominant soil is mar which is productive where properly embanked and cultivated, but is liable to injury in wet seasons. Kans is found in the south of this area.
- (d) The centre of Meja, extending from the hills bounding the alluvium to the river Belan.—The characteristic soils are the stony soil (locally called bhonta) along the hills falling to a great stretch of mar, mostly of an inferior type, intermixed with smaller areas of matiar. The population is scanty, and kans is apt to spread.
- (e) The south of Meja extending from the Belan to the Kaimur range.—The east of this area is similar to the centre of Meja just described. On the west in Tappa Pal there is a tract of rich loam with a denser population: cotton is here one of the staple crops.

Water-supply.

In the doab, the Fatehpur branch canal supplies water in Atharban, the south of Karari and the south-west of Chail, as well as a trifling area in Kara. The records of the wellsurvey show the conditions regarding well-sinking in each village : broadly speaking wells can be made in the centre of the tract, while on the south the depth to water is too great for irrigation, and on the north foundation-clay is often missing along the Ganges. Masonry wells are numerous except in Atharban, but a very large number of villages were recorded as insufficiently provided; the nature of the proprietary bodies impedes construction, and there is little capital

available. The water-level appears to have sunk, and a considerable number of old wells have been rendered inefficient in the east of the tract. Irrigation from other sources is not important.

In the Oudh tract, very large areas are irrigated from the *jhils* in ordinary years. Temporary wells are most common in Jhusi, but elsewhere masonry wells are popular and there is no hostility to their construction. There is ordinarily a good supply of water at a moderate depth, but in a considerable number of villages (recorded in detail in the well-survey) foundation-clay is not met with, and in these the wells are inferior. A large number of villages have been recorded in the survey as requiring more wells.

In the Bundelkhand tract, Arail depends mainly on wells, but there is also irrigation from jhils. The distribution of foundation-clay is very irregular in this pargana : where it exists masonry wells are popular, but considerable areas depend on temporary percolation-wells. In Bara well-irrigation is important only in the loam tract the mar is supplied from reservoirs which catch the drainage from the hills, and the supply is sufficient for ordinary years but fails in drought ; the stony tract is dry. The north of Meja is irrigated from wells, the conditions being similar to those of Arail, though with a greater depth to water. The centre and south have very little irrigation beyond supplies from reservoirs, but conditions will be materially changed if the proposed Belan canal is constructed, which is designed to irrigate a large area in this tract. Wells can be made in Tappa Pal in the southwest, but very few exist.

Cattle-supply.

The number of cows in the district is relatively large. There are few in the Oudh tract where a high proportion of the plough-cattle is imported from Bundelkhand and the doab also imports mainly from Bundelkhand, though some western animals are obtained from the Makanpur fair. The largest

numbers of cows are found in the trans-Jumna tract, especially in Meja; they are not as a rule grouped in large herds, but are owned by large numbers of men who are primarily concerned in making *ghi* and give less attention to the quality of the young stock. The supply of sacred bulls is sufficient generally for the cows, the numbers of which were much reduced by the droughts of the last decade. The centre of the trade is the cattle-market at Karma in Arail, which is visited by dealers from many places including Calcutta.

The district, and especially the Bundelkhand tract, is liable to all the common forms of cattle-disease. The practice of preventive inoculation is now welcomed by the people.

Annals.

Of the period prior to the introduction of annual reports it is sufficient to say that in the Bundelkhand tract the seasons from settlement up to 1886 were favourable. Then followed seasons of excessive and badly distributed rainfall which reduced the cultivation : 1888 was the worst, but this tract did not suffer so much as Banda. From 1889 to 1893 seasons were on the whole favourable.

The year 1894 was exceptionally wet and parts of the western tract of the doab and of pargana Sikandra were injured by floods; the exact localities are not defined in the report, which is silent as regards the Bundelkhand tract, but there is no doubt that the crops there were poor. In 1895 the rain was scanty and ill-distributed and distress appeared in Bara and Meja. In 1896 the early cessation of the rains led to acute famine in these tahsils and also to some extent in Karchhana; there was also distress in the doab, and to a less extent in the Oudh tract. For the whole district the outturn of the kharif was only one-fourth of the normal, and only two-fifths of the usual rabi area were sown for 1897; what was sown on unirrigated land suffered from want of

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winter rain, and the outturn as a whole was about one-half of the normal.

In 1897 favourable rain led to a great improvement in the deab and Oudh tracts: in Bundelkhand the recovery was less rapid and it was not till 1901 that a measure of prosperity returned, the excessive rain in June and July of 1899 and the dry September of the same year having resulted in a reduction in the area sown in both seasons. In the same year troubles about drainage recurred in the north of the Oudh tract, but disputes between proprietors prevented the application of remedies. Kans was reported to be generally decreasing. The rabi crops of 1901 were generally good, but there was severe rust on wheat and barley. In the same year the early cessation of the rains injured the rice crop, which is most important in the Oudh tract, but other crops were exceptionally good, and the year 1902 was prosperous.

The seasonal yields since 1903 are given in the following table :---

Year.	Rabi.					Kharif.			
	All crops.	Wheat.	Barley.	Gram.	Linseed.	All crops.	litee.	Juar.	Cotton.
1903	90	94	94	90	100	76	87	87	50
1904	94	100	94	90	87	81	90	81	75
1905	38	25	31	62	6 69	80	78	75	50 87
1906	74	75	75	75		89	90	81 25	31
1907	86	81	87	87	94	29 86	16	87	87
1908 1909	87	94	94	81	87 94	94	75 94	87	95
1910	94	94 94	94	94 94	100	89	97	69	85
1911	100	87	94	106	106	0.0			

The rains of 1903 were late in arriving, and excessive falls in October injured cotton and to a less extent juar. A large rabi area was sown for 1904 and was successful though

slight damage was caused by hail. The rains of this year were sufficiently heavy in August to damage crops in the lowlands: while falls in October again injured cotton and millets. An exceptionally large area was sown with rabi, but the crops were almost ruined by the exceptional frost of February 1905, and extensive remissions of revenue were required. The following rains began somewhat late, but a very large kharif area was sown in order to replenish stocks: the crops suffered from drought in September and from various insect-pests. Rabi sowings for 1906 were much contracted by the drought and suffered from lack of moisture. Test-works were opened in the Bundelkhand tract in the spring of this year, but direct relief was found to be unnecessary.

The rains of 1906 were favourable, but there were floods on the rivers, and juar suffered from insects. In the rabi of 1907 there were severe hailstorms in Bara and Manjhanpur tahsils necessitating remission of revenue, while wheat was affected by rust, and rapeseed by the aphis. The rains of this year were practically confined to August, and the crops suffered very seriously from the drought of September, while the rabi area of 1908 fell off by nearly 40 per cent. The existence of famine conditions was recognised in Bara and Meja in December and in Karchana in the following month, and regular relief works remained open until June, while gratuitous relief was given in the rest of the district. The mortality among cattle was very high in the Bundelkhand tract.

The rains of 1908 ceased prematurely and the rice crop suffered, while the rabi area of 1909 was still low. This year was however prosperous, and the reports noted the decline of *kans*. The rabi area of 1910 showed a substantial increase, and yielded well; and the following kharif was also satisfactory except for the injury caused by heavy October rain, and by borers to juar. In this season the sugarcane in the

Oudh tract was attacked by the cane-hopper. The October rain followed by a fall in November, gave a full rabi area for 1911, and there was an excellent yield, except in the case of wheat which was affected by rust.

Progress.

There has been no advance in the cropped area of the district taken as a whole. The Oudh tract shows a slight increase during the last two decades but this is only the recovery of ground that had been lost in the wet seasons. In the doab Atharban shows a slight increase, due probably to the canal, but it is counterbalanced by a fall in Chail. In the Bundelkhand tracts the area sown varies so very largely with the season that accurate comparisons are very difficult to draw, but it may be said that the cultivated area at the present time is below the maximum attained about 1892, slightly in Arail, and more markedly in Bara and Meja.

The proportion of remunerative crops is exceedingly low, and shows no sign of advancing. There has been a marked fall in the area under cotton and a slight drop in sugarcane (which however fluctuates greatly), and poppy is now being reduced. On the other hand there has been a distinct extension of sann-hemp in the Oudh tract, whence a considerable export is made to Calcutta, and there are signs of a slight extension of potatoes and garden crops.

In the Oudh tract the construction of masonry wells has proceeded steadily: accurate statistics are available only since 1905, and during this period the number has increased by about 12 per cent: there is now one such well to 29 acres of normal cultivation as against 33 acres in 1905.

In the doab the opening of the canal has greatly improved the area which it commands, ensuring the irrigation of about 20,000 acres in case of need. Well-sinking has been fairly active, the increase since 1905 being about 18 per cent.

In the Bundelkhand tract well-sinking has proceeded satisfactorily in Karehhana and in the well-tracts of Meja but

there is still room for many more wells. Reservoirs have also it is understood increased substantially in number, but separate statistics of these are not available for comparison with past years though they are now being recorded.

There has been a distinct fall in the population of the Oudh tract during the last ten years: in the doab there has been a small decrease and in Bundelkhand a nominal increase. In 1911 the population was 1,467,000 as against 1,549,000 in 1891. Rural wages have apparently risen slightly in the Bundelkhand tract during the last five years: they are low and almost stationary in Oudh and the doab.

The district is naturally deficient in agricultural capital, but its borrowings from Government have hitherto been spasmodic. Over two lakhs were taken in the famine of 1895-97, and then very little until 1903-1905 when substantial sums were advanced for special works in the Bundelkhand tract. In 1907-08, over 6½ lakhs were advanced (of which nearly 2½ lakhs were for improvements), and substantial sums have been taken in the last three years. A beginning has been made in agricultural co-operation; in 1911 there were 27 societies at work with 703 members: most of these were financed by the Kara central bank with a working capital of about Rs. 20,000.

The doab and Bundelkhand tracts have not been provided with new lines of railway during the past twenty years; but the communications of the Oudh tract have been transformed in the last decade by the construction of the broad gauge lines to Fyzabad, Jaunpur and Rai Bareli, and the narrow gauge line to Benares. Allowing for additional stations on the older lines, the area per station has been reduced from 317 square miles in 1891 to 84 square miles in 1911. The railway bridge over the Ganges at Paphamau includes a free roadway replacing the ferry which was a serious obstruction to road traffic during the rains. The system of metalled

roads is fairly complete; the most recent improvement is the road to Rajapurghat, connecting with the Banda district, which is being gradually metalled.

The rents of recorded occupancy tenants have remained unchanged since statistics became available in 1904-05, the average rate being Rs. 4.6 per acre. In the same period competition-rents have risen only from Rs. 4.1 to Rs. 4.3.

There has been some recent development of organised industry in the city: increased employment has been given by the foundries and printing presses, while flour-mills and a sugar-refinery have been opened. Outside the city the only organised factory is the oil-mill belonging to the East Indian Railway. Minor industries have also developed in the city, especially the manufacture of tranks and boxes. The cessation of indigo-growing has curtailed seasonal employment chiefly in the Oudh tract; indigenous rural industries have a a rule declined.

The sums distributed annually by money-order are large, and have increased during the last decade from about 27½ to about 40 lakhs; it is understood that a large proportion of this income accrues to the city, but a substantial share represents the earnings of inhabitants of the Oudh tract who find temporary employment outside the district.

Dangers and possible remedies or improvements.

1. The area sown with kharif crops depends mainly on the weather during the first month of the season counting from the first heavy fall of rain. An early beginning is an advantage, but the most important point is that there should be bright weather with just sufficient rain to enable tillage and sowing to proceed without interruption. If the first month is wet, sowings of dry crops will be delayed and the area will fall, though the loss may be to some extent made good by larger sowings of rice, and also of bajra and (in Bundelkhand) of til, which can be sown until the end of August.

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The area under late rice, which is important in the Oudh tract, depends mainly on the weather of the second month, which should be wet; a long break at this period may cause a considerable reduction in the area planted.

The area planted with sugarcane is influenced by the weather in February and March, at which time rain facilitates tillage: but it is determined mainly by economic causes. One of these is the yields and prices obtained from the crop in recent seasons; the other is the financial position of the cultivators, which depends mainly on the success or failure of the preceding harvests.

The area sown with cotton is affected to some extent by the nature of the sowing season; an early start and a dry season are favourable. The chief factors determining the area are the profit obtained in recent seasons, and the relative prices of cotton and food-grains.

2. The yield of the early dry crops, chiefly small millets, depends mainly on the weather during the first two months of the season: alternations of rain and bright weather are desirable, and the yield may be much reduced by excessive rain in the second month. The early rice requires more and later rain, and is not likely to give a full yield when the dry crops do best.

The late dry crops require the prolongation of the rains almost to the end of September: they may be seriously injured by heavy falls in the end of September or the beginning of October, while they will give very little grain if September is altogether dry. Continuous rain is particularly injurious to these crops in the Bundelkhand tract.

The late rice requires more rain in September than is suitable for the dry crops, and at least one fall in October is desirable for its complete success.

The district as a whole, and particularly the Bundelkhand tract, depends to a dangerous extent on the prolongation of

the rains through September; from this point of view an extension of maize, which is very little grown, would be an improvement, but it is probably unsuited to most of the Bundelkhand soils.

Sugarcane is apt to suffer seriously at two periods. The first is the end of the hot weather : the crop benefits from an early commencement of the rains and suffers from delay. The second is the end of the rains : a premature cessation is most injurious, and rain in October is beneficial. The crop can stand a considerable excess of rain, but prolonged breaks are likely to cause injury.

Cotton is liable to considerable injury from excessive rain, the most dangerous times are probably just after sowing, and again at the end of the season. It can withstand fairly long breaks when once it has made a fair start, and suffers from a dry September less than any other crop.

3. Apart from variations in the rainfall, the following dangers threaten the kharif crops :---

- (a) Floods.—These may occur in the lowlands of the Ganges and Jumna, and also in the west of the doab and the north of the Oudh tract.
- (b) Boring-insects.—These may cause much injury to the juar crop and also to sugarcane (vide Provincial Note, section VI).
- (c) Cane-hoppers.—These may be disastrons to the sugarcane crop (vide Provincial Note, section VI).

4. The rabi area depends mainly on the rainfall of September and early October. A late fall of rain leads to a large extension of the area in all three tracts, subject to the exception that if the heavy Bundelkhand soils are already very wet further rain may leave them unfit for cultivation. Continued drought during September and October results in a large reduction of area in all three tracts.

The area in the Ganges lowlands may be greatly reduced if late floods leave the land too wet for tillage.

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5. In all seasons the occurrence of timely winter rains is of much importance for the rabi yield of the district as a whole: their importance is perhaps least in the Oudh tract and greatest in Bundelkhand, but in the latter tract it varies according to the September rainfall; when September has been wet the heavy soils will yield good crops, and the light soils may yield fair crops, with little or no winter rains; while if September has been dry the light soils may yield scarcely anything and the heavy soils an indifferent crop.

Winter rains are valuable up to about the end of January, provided the falls are moderate and of short duration. Rain late in the season will probably do some harm, while prolonged periods of damp and cloudy weather must be expected to produce rust on wheat and linseed (the latter a crop of great importance in Bundelkhand). The loss from rust may be very serious, and its extent may not be fully realised till the crops are harvested.

When the ground has been dry at sowing time, and sowings have been largely made with irrigation, an early fall of winter rain is of great importance. When there is little winter rain or when falls are delayed, the crops fall off in condition as they ripen, and tend to wither under the strong dry winds which in such seasons must be expected in the spring. It is noteworthy that gram as a rule suffers most in this case : a seed-bed prepared with irrigation is less suitable for it than for the cereals or peas.

6. Frost occurring early in January will do little harm except to arbar: frost towards the end of the month or early in February may almost destroy the cereals and linseed and cause great injury to all other crops.

Hailstorms are not of much importance until the cereals are beginning to ear: the danger from them increases as the season advances:

The rapeseed crop may suffer seriously from the aphis if damp and cloudy weather occurs while the plants are in flower.



The poppy crop may be seriously injured by damp weather late in the season.

In Bundelkhand the gram crop is liable to injury from caterpillars when the season is wetter than usual.

7. The area sown with *zaid* crops in ordinary years is important in some localities, chiefly in the Oudh tract, but it is not so large as to constitute an important resource for the district as a whole; it increases to a moderate extent when stocks of food are low.

8. A series of abnormal seasons of one type may produce certain cumulative effects. After some seasons of deficient rainfall the water-level falls, and the efficiency of temporary wells decreases, while the cost and labour of irrigation are materially enhanced. It is possible that the lowering of the water-level may proceed so far as to render the masonry wells useless in some tracts; their efficiency has recently been much reduced in the east of the doab.

On the other hand a series of wet years may raise the water-level to a point where the productivity of the land declines. This may happen almost throughout the doab and Oudh tracts, but its effects will be most noticeable in the west of the doab and the north of Oudh. The same conditions will produce more serious effects in the heavier soils of Bundelkhand; these soils cannot be tilled when wet, and if tillage during the rains is hindered less rabi will be sown and an opportunity given for the extension of the kans, which in its turn hinders tillage in the following year, and may rapidly occupy a large area of the best land. Any extension of the area rendered unculturable by kans should be regarded as a serious symptom. The extension of kans may also occur, though probably to a less extent, in the villages lying in the south of the doab.

9. Distress requiring some measures of relief must be expected to occur in seasons when the rains have ceased by

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the beginning of September; its severity will depend largely on the position of cultivators as determined by previous harvests, but it will probably be most widespread in the Bara and Meja tahsils. The following measures were taken in 1907-08.

Revenue suspended, kharif				24 lakhs.
,, ,, rabi		. See		i lakh.
Revenue remitted, kharif		S		14 ,,
rebi		and the second		1 ,,
Improvement loans	***	and the second		23 lokhs.
Advances for rabi		1		3 38
,, kharif			1. 1999. 1	14 10 1

Maximum proportion of the population relieved 5.7 per cent. in February.

10. A serious shortage of fodder may occur in seasons when the rains have ceased so early that the large millets wither altogether or are seriously stunted in growth: in this case the only remedy that can be suggested is the importation of grass from the forests and its distribution on the *takwi*system. The demand will depend very largely on the winter rains: if there are none, it may become very great, but even light falls bring up enough grass to keep large numbers of cattle going. The shortage may apparently be felt almost throughout the district, but will probably be most intense in Bundelkhand.

A fodder famine does not necessarily occur when the millets yield no grain, as the plants may have grown to a sufficient size to yield fodder; but in such seasons juar occasionally becomes poisonous and the loss of cattle due to this cause may be considerable. The poison is formed under the abnormal condition of growth, and its presence cannot be recognised beforehand except by analytical methods: the only action possible is to provide advances to enable cultivators to replace cattle that have died from this cause.

11. The chief measures for improving the water-supply consist in the encouragement of well-sinking in all tracts