CHAPTER III.

Agriculture, Floods and theCanal system.

21. It is proposed in this report to deal with each district separately so far as possible, but certain matters require broader treatment. The present chapter is devoted to a general description of agricultural matters, the flood problem and the canal system.

22. *Principal crops*—Mr. Maddox dealt exhaustively with the crops of Orissa and the method of cultivation. I do not propose to repeat his descriptions, but to give some account of the changes and developments since the Provincial Settlemnt.

The principal product of Orissa is of course rice, which is grown in three main crops. *Beali* is the autumn rice harvested in August and September. *Sarad* is the winter rice harvested from October to January. *Dalua* is the spring rice sown in water-logged depressions in the cold weather, and harvested in March and April.

The other crops which are sufficiently important to require mention are, among cereals and pulses, *mandia, kulthi, biri, mung, harar* and *chana*; among oil-seeds linseed, *til* (sesamum) and castor; among fibres cotton and jute; in addition sugarcane, *pan, tobacco*, brinjal and potato.

The position found by Mr. Maddox at thc Provincial Settlement is described at pages 102-103 of his report. Reviewing the situation as it now appears from the figures of the present settlement, one finds the general outlines unchanged. Rice retains its predominant position. In fact the proportion of rice-growing area has advanced from 88 per cent to 93 per cent. (As the areas under settlement are different, I have quoted percentages for purposes of comparison.) It appears that this gain has been largely at the expense of homestead lands, as these have decreased from 108,899 acres to 48,804 acres, thus indicating a tendency to reduce homesteads to the minimum in order to grow more rice. This increase is not to be found in the *dalua* area, which has actually fallen from a proportion of 1.4 per cent to 0.9 per cent of the net cropped area. The proportion of *sarad* has risen from 80 per cent to 84 per cent and that of *beali* from 6.7 to 8.1 per cent.

There has been a marked decline in the cultivation of *Mandia*. At the Provincial Settlement this crop was grown on 17 acres in every thousand while now it is only found on 9 acres in every thousand. On the other hand cereals and pulses such as *mu g, biri, kulthi* and *harar* show an increase. These now cover 12 per cent of the cropped area compared with 10 per cent at Provincial Settlement. As *mandia* is essentially a food of the poorer classes, while *mung* and others are more highly esteemed, this may reasonably be regarded as some evidence of increased prosperity.

The area under oil-seeds including mustard has also icreased, from 47 to 95 acres in every 10,000. Cotton-growing has dwindled into complete insignificance, and it is only found on 246 acres at the present settlement. On the other hand those other valuable crops, jute, sugarcane and *pan*, have advanced in a very marked manner, although the areas covered by these crops are still only a few thousand acres in each case.

Jute is now grown on 5,860 acres, i.e. on 2 acres in every thousand, and its proportion has been multiplied nearly seven times. Sugarcane is found on 4,525 acres, and its proportion has doubled, assuming Mr. Maddox's figure to be correct (he himself suspected it to be an underestimate). This crop is not generally grown for many years in succession on the same land.

The area under *pan*, has increased from 469 acres to 1,180 acres since the Provincial Settlement. Although some of the new area is in Kujang, which was not previously under settlement, it is certain that the increase in *pan* cultivation is very great.

The area under tobacco has decreased, and its proportion is not much more than a third of what it was. The total area recorded under this crop is 1,456 acres. But the area varies from year to year and it is certain that the cultivation of this crop was suspended during the years of settlement to avoid assessment of higher rent on the lands. In some parts, indeed there has been a real decrease owing to sand deposit, rendering the soil unfit to grow this crop. It is nearly always found on river-side lands where silt is deposited.

There are 282,968 acres growing more than one crop. The proportion of twice-cropped area has increased since Provincial Settlement from 8 per cent to 11 per cent,

23. *Soils*—The soils of Orissa are described by Mr. Maddox at paragraph 120 of his report. They are generally either clayey or sandy or an admixture of both. *Matal* is the name given to the stiff clayey soils and *balia* to the loose sandy soils. In *dorasa* the admixture of sand and clay is about equal. *Balia matal* is a generic name given to sandy loams of varying fertility. These are the most common types. *Matal* is the most fertile and *balia* is a poor soil. *Dorasa* is found suitable for *beali* and *rabi* crops. The lands near the coast become saturated with salt and are called *numia* or *nunajami*. The rich alluvial *pattu* soils which contain the silt deposited by river floods are very fertile and are used for growing tobacco and vegetables. *Kala mati* is the name of a black soil and *kelua mati* of a blackish muddy soil. *Ranga mati* is a reddish soil, *kala kelua* a sticky clay and *teli balia* a sticky clay with an admixture of sand.

In flooded areas, except where sand is deposited, the soil becomes enriched with river silt. The irrigated areas are immune from flood and drought but on the other hand lose this advantage.

24. *Agricultural stock*—The number of draught cattle in the area under settlement, as it appears from figures prepared at *khanapuri* is 687,949 or 1 in 4 cultivated acres. The number of ploughs is 326,936 or 1 in 7½ cultivated acres. The proportion is larger in Cuttack and smaller in Puri. The cattle census of 1930 indeed gave higher figures. For purposes of comparison it may be stated that in Palamau the proportion of ploughs to cultivated acres is 1 to 10, in Ranchi 1 to 8 and in Hazaribagh and Manbhum 1 to 6½. The general impression among the people is that one plough in necessary for every 6 acres.

The number of carts was found to be 32,763. The number of cows and she buffaloes is 620,588, or one to 5 or 6 of the human population.

The cattle of Orissa are of a very poor type, the bullocks being feeble and the cows giving a very low yield of milk. Neglect, under-feeding and the absence of any control of breeding are the causes. The Agricultural Department is giving its attention to the problem, particularly in the direction of experimenting in the growth of fodder crops and introducing them in the villages. In view of the difficulty of finding adequate pasture in Orissa this appears to be the best solution of the problem of food supply for cattle.

25. *Agricultural farms*—At the time of the Provincial Settlement there was no Government agricultural farm in Orissa. The Cuttack Farm, situated in village Bidhyadharpur, was opened in 1904 with 70 acres of land, and was expanded in 1918 to 120 acres and in 1917 to 150 acres. A branch farm was started in the same year at Balia, in Balasore district, for the study of upland crops, and another at Puri in 1925 for the study of cocoanut cultivation in the sandy tracts. A branch farm has been opened at Kujang in 1928 for experimenting in special crops suitable for flooded areas.

26. *Work of the Agricultural Department*—The floods of 1926 and 1927 brought clearly into prominence the unsuitability of the unprotected

parts of Orissa for the cultivation of ordinary varieties of paddy, and the Agricultural Department is now engaged in an attempt not only to introduce special strains of paddy that are better suited to these areas, but also more particularly to encourage the growth of *rabi* and special crops. The policy of the Department is clearly described in the following note, which Mr. H. L. Dutt, at present Deputy Director of Agriculture in the Orissa Range, has kindly supplied to me :—

27. *Experiments in flooded areas.*—"The problem of the flooded areas in Orissa is one of the greatest importance and it has been engaging the serious attention of the Agricultural Department for the last few years. With a view to solving this serious problem a special farm was started in 1928 within the flooded areas at Kujang, outside the protective embankment, and another small temporary farm of 5 acres, on rented land, has been started more recently in 1929-30, within the ring-bundh of Aul. Experiments are being conducted on these farms (1) to select or evolve a variety or strain of paddy which will stand satisfactorily the severe conditions prevailing in flooded areas—strong tearing current and prolonged submergence under water ; (2) to discover a strain of paddy which will grow satisfactorily on the extensive saline tracts on the Orissa seaboard, where nothing can be grown at present on account of the saline salts in the soil, and (3) to find out, by trial, more remunerative crops which may replace the uncertain paddy in the monsoons or which may be grown more successfully and with better results on the flooded areas in winter, after the recession of the flood, to compensate the loss of their monsoon crop.

28. *Flood-resisting paddy and other crops.*—The Agricultural Department has already found a flood-resisting paddy which shows promise, as well as a paddy suited to saline lands. One of the recommended sugarcanes also has been found to do quite well on saline soil. It is recognized that the cultivators of Orissa attach too much importance to their paddy, crop, and that in the flooded areas other crops could be cultivated with better results. The value of the silt brought down by the floods is lost sight of; the silted land is eminently suitable for paying crops such as wheat, gram, peas. barley, lentils, etc. Propaganda is being carried on to encourage people to plant other crops, and a sugarcane which stands waterlogging has already won the confidence of the cultivators in Kujang and has spread over some 700 acres. Interest is also being aroused in intensive crops such as potato and onion. For all these dry season crops irrigation is essential and accordingly a scheme is under consideration for demonstrating cheap pumping installations."

29. *Cost of paddy cultivation.*—The average cost of cultivating an acre of paddy land was worked out by many Assistant Settlement Officers, but there was considerable divergence in the figures which they produced. The following appears to be a fair estimate of the cost in an area growing *sarad*:—

	Rs.	a.	p.
(1) Ploughing raking (Kalamohi) reploughing (Behushan)...	2	0	0
(2) Manure	0	8	0
(3) Seed	2	0	0
(4) Puddling and dressing	1	0	0
(5) Weeding	2	8	0
(6) Harvesting	3	0	0
(7) Storage and threshing	1	8	0
(8) Repairs and repurchase of tools	1	8	0
Total	14	0	0

The above is the cost of cultivation when all the labour has to be paid for. In actual practice of course a great part of the labour is often done by the *raiyat* himself and his family members.

30. *Profits of paddy cultivation.*—The average outturn of paddy in all the three districts according to crop-cutting experiments done at this settlement was 14 maunds and 36 seers. At the price of Rs. 2 per maund, which was common before the present depression, the value of the product would be Rs. 29-12-0. If the value of the straw is taken at Rs. 5, the total value of the product will amount to nearly Rs. 35. This clearly leaves a good margin of profit, even after payment of rent, say Rs. 3. In the irrigated areas the *raiyat* also has the water-rate to pay, but he also gets a greater average outturn of paddy, which as shown elsewhere, should more than cover the water-rate.

The recent depression in prices has, of course, very greatly reduced the value of the product. At the same time the cost of living has also fallen. In the statistical statement issued by the Director of Industries in September 1931, it was shown that the average cost of living in Cuttack in June 1930 was 28 per cent higher and in June 1931 4 per cent lower than the level of the five years preceding 1914. There can be no doubt however that the financial condition of the cultivators has considerably deteriorated owing to this depression.

31. *Profits of* pan *cultivation.*—The cultivation of *pan* has increased greatly since the last settlement. This crop is grown on very small patches of ground. The cost of cultivation is heavy but the crop is nevertheless extremely profitable. Rai Bahadur Rajendra Kumar Sen, the Sub-Manager of Kujang Estate, has provided me with an interesting statement of the details of expenditure and income for a plot of 10 decimals of land growing *pan*. This statement tallies substantially with the estimates worked out by various Attestation Officers during this settlement. The initial expenses are put down at Rs. 125 and the annual recurring expenses at Rs. 174, which in fifteen years would amount to Rs. 2,610, making a total expenditure of Rs. 2,735. Assuming that the garden produces 15 *balads* (1 *balad* = 16,000 leaves), and the market price is as low as Rs. 20 per *balad*, the yearly income will be Rs. 300, and the income for fifteen years Rs. 4,500. The profit on a plot of 10 decimals over fifteen years will then be Rs. 1,765, or Rs. 118 per annum. The average life of a *pan* garden is about fifteen years, and when it is finished the land is left in a state scarcely suitable for cultivation.

32. *Profits of sugarcane cultivation.*—Sugarcane is also a profitable crop. Mr. H. L. Dutt, in the note which I have quoted above, has stated that the flood-resisting variety No. C. L. 5 brings in a profit of about Rs. 100 to Rs. 200 per acre.

33. *The river system.*—Four large rivers find their outlets to the sea in the plains of Orissa. The Subarnarekha has its mouth at the extreme north end of Balasore district and is quite separate from the extensive and intricate deltaic system formed by the Baitarani, the Brahmini and the Mahanadi. These latter three rivers enter the plains from the hilly country of the Feudatory States, and thereafter branch into numerous channels which spread their net-work over the face of the country from the southern part of Balasore district to the Chilka Lake. The branches of the three rivers intermingle with each other forming in effect one large deltaic system. The main streams of the Baitarani and Brahmani meet again near Chandbali and reach the sea in a common estuary, known as the Dhamra. The central streams of the Mahanadi come together near the sea forming an estuary at False Point. Other streams find an outlet at the Debi estuary and others after meandering through Puri district find their way into the Chilka Lake.

34. *The flood problem.*—The main flood problems affecting each district will be dealt with in the separate district chapters. The whole question has been dealt with recently by the report of an expert committee in 1928. That committee described the flood problem in Orissa as due first of all to the three rivers reaching the plains at a high velocity carrying silt, which as the

velocity decreases is deposited, so as gradually to raise the level of the streams and form ridges with lower land between them. Two factors which accentuate the problem are the heading up of water in the estuaries during the monsoon, and the littoral sand drift which forms bars across the river mouths preventing the improvement of the estuaries. In the flood season the various channels are not able to take the full discharge which comes down these rivers in the rainy season and flooding is inevitable. The erecting of embankments to protect particular areas merely diverts the flood to other areas and the unsystematic disposition of such embankments aggravates the whole problem by holding up the flood water, which would do less damage if allowed free passage to the sea. The general recommendations of the committee therefore are that systematic action should be taken to clear away such obstacles and to regulate their future construction and management. It is also proposed to improve, where possible, the outlets to the sea. Such action will of course result in larger areas being inundated, but it is anticipated that the flooding will be for shorter periods and will do less damage. Further it will be expected and will therefore cause less anxiety than is felt under present conditions in those semi-protected areas where the embankments are periodically breaching and being repaired. As a corollary to these recommendations it is suggested that the cultivators should be persuaded to grow *dalua* paddy and *rabi* crops in preference to the winter rice on which they concentrate at present. It is admitted that this change will necessitate further facilities for irrgation, for which purpose it is suggested that small temporary installations for pumping water should be introduced.

35. *Floods of recent years*—The following is a brief account of the floods that have occurred since the Revision Settlement :—

1913 was a year of heavy floods. In Balasore the Matai breached the Coast Canal and sea embankments, the Burabalang damaged several embankments, and the Baitarani also caused heavy injury, as did the Burha in the north of Cuttack. Further south the rivers rose high but less damage was done.

In 1917 there was some damage in Puri by breaches and surreptitious cutting of embankments in the high floods.

In 1919 there were floods of unprecedentedly long duration in the Mahanadi and Kathjori and the floods in Puri were unusually high.

1920 was a year of very exceptional floods, which came down three times in quick succession. All the three districts were affected. Breaches were numerous, especially in the north of Cuttack and the south of Balasore. About 900 square miles were affected in Jajpur subdivision and the north of Kendrapara. The Brahmini and Kharsua reached an unprecedented level and a vast quantity of sand was deposited at the head of that delta. In Balasore the Subarnarekha, Panchpara, Matai and Baitarani did much damage.

In 1923 the Brahmini made a breach at Narsinghpur. There were also breaches on both sides of the Monaguni in Puri.

In 1925 there were high floods and many breaches, particularly in Puri district in the parganas near the Chilka Lake.

In 1926 the floods were again abnormal. The Brahmini broke through the Pattamundai Canal at Indupur and swept across Kendrapara subdivision. There was also heavy damage done by a breach 1,730 feet long in the Surua right embankment at Korkor.

In 1927 abnormal floods occurred for the third successive year, and embankments were again damaged extensively. This year it was the Baitarani which distinguished itself by breaching through its left embankment above the railway and demolishing 11 miles of the line. Thana Dhamnagar was heavily flooded. The Brahmini broke through its left bank at the Janardan *ghai* and other places and devastated pargana Olas. The Kharsua

also broke through its right at Routra and deposited sand on a large area, There was a very high flood in the Subarnarekha, and the people of this area cut the Bhograi embankment at five places. There was also a flood of unprecedented height in the Panchpara. In the Mahanadi and its southern branches the floods of this year were moderate.

In 1929 there was some damage to embankments of south cuttack and Puri.

In 1931 the Damerpur circuit embankments was overtopped and breached. Thana Kakatpur in puri was damaged by floods of the Devi and Bindhan.

36. *The canal system.*—An adequate account of the canal system of Orissa has been given in the last two settlement reports. The following table will show the length of each canal, and the acreage commanded by each :—

Name of canal.	Length in miles.	Area irrigated in acres.
Taldanda Canal and its branches ...	52	73,371
Kendrapara Canal	75	100,260
High Level Canal, Range I	33	23,602
High Level Canal, Range II	12	1,053
High Level Canal, Range III ...	19	23,822
Jajpur Canal	6	22,057
Dudhai Canal	46	903
Total	243	245,069

At the end of 1929 the total mileage of canals was as follows :—

(*a*) Navigable channels (also used for irrigation), 205½ miles.
(*b*) Branch canals (for irrigation only), 122 miles.
(*c*) Distributaries, 1,302 miles.
(*d*) Village channels, 26 miles.

The total mileage of canals has not increased since 1911, but there has been an increase of 56 miles in the mileage of distributaries.

37. The following table will show the areas irrigated in triennial periods from 1911 to 1929 :—

Triennium	Acres irrigated in average annually.			Remarks.
	Kharif.	*Rabi.*	Total	
1	2	3	4	5
1911-12 to 1913-14	272,140	6,105	278,245	
1914 15 to 1916-17	272,982	6,162	279,144	
1917-18 to 1919 20	275,755	6,448	282,203	
1920-21 to 1922-23	276,182	8,031	284,213	
1923-24 to 1925 26	243,331	3,892	247,224	
1926-27 to 1928-29	241,343	3,726	245,069	

It will be seen that the irrigated acreage advanced slightly from 1911 to 1923, but thereafter there has been a decrease, which is particularly noticeable in the *rabi* area.

38. An account of the lease system will be found in paragraph 48 of Mr. James's report.

From 1912 the rate charged for long leases for the *kharif* season was Rs. 2 per acre, but in 1920 it was increased to Rs, 2-8-0 and in 1922 to Rs. 3-8-0. For *dhoya* or water-logged lands the rate is lower, viz. Re, 0-12-0 in 1912, Re. 1-8-0 in 1920 and Rs. 2 in 1922. These rates have been reduced in 1931, and are now Rs, 3 and Re. 1-12-0 respectively for all canals except the High Level Canal, Range III, where they are Rs. 2-8-0 and Re. 1-8-0 respectively.

The rate for season leases for the *kharif* season was reduced in 1931 from Rs. 4-8-0 to Rs. 4-4-0 (Rs. 4 in case of High Level Canal, Range III). The same applies to provisional leases.

The rate for *rabi* season leases has been reduced from Rs. 2-8-0 to Rs. 2 for all canals.

For sugarcane there are special rates, viz., Rs. 7-8-0 for the period of cultivation, Rs. 5-8-0 for the period 1st April to 16th June and Re. 1-5-0 for a single watering.

The figures of areas irrigated, quoted above indicate that the raising of the rates in 1922 caused a decrease in the demand for irrigation. The recent reductions may raise the demand again, but in the present period of financial depression this cannot be expected for some time.

39. The following table shows the areas irrigated under different leases in the years 1923, 1926, and 1929 :—

Kind of leases.	Average of triennial period ending—			Remarks.
	March 1923.	March 1926.	March 1929.	
1	2	3	4	5
	Acres.	Acres.	Acres.	
Long term	275,714	241,487	244,794	
Season leases	7,566	4,891	6,366	
Other	934	846	94	
Total	284,214	247,224	251,254	

The different crops irrigated are as follows (the figures are for 1928) :—

(1) Paddy lands, 244, 136 acres.

(2) Jute lands, 55,905 acres.

(3) Sugarcane lands, 339 acres.

(4) Cereals and pulses, 54,843 acres,

40, Crop-cutting experiments are made annually by officers of the Public Works Department to show the comparative outturn of paddy on irrigated

and unirrigated lands. The following table shows the results during the last twelve years (omitting the year 1919-20) :—

Year,	Irrigated land (outturn per acre).				Non-irrigated land (outturn per acre).			
	Experiments.	Paddy.	Straw.	Value.	Experiments.	Paddy.	Straw.	Value.
		Mds. srs.	Mds. srs.	Rs.		Mds. srs.	Mds. srs.	Rs.
1917-18 ...	80	22 10	48 0	39	73	20 8	46 0	35
1918-19 ...	75	22 25	40 0	...	65	10 12	24 0	29
1920-21 ...	71	22 19	42 0	73	66	17 4	30 0	59
1921-22 ...	74	23 37	44 0	63	66	18 33	33 0	49
1922 23 ...	68	26 1	47 0	59	63	21 5	...	47
1923-24 ...	30	24 2	38 0	54	30	17 36	31 0	42
1924-25 ...	55	24 27	37 0	76	51	15 27	23 0	49
1925-26 ...	28	23 11	39 0	81	27	19 7	31 0	67
1926-27 ...	24	22 36	37 0	72	22	15 31	26 0	50
1927 28 ...	26	24 32	40 0	80	25	17 3	28 0	54
1928-29 ...	26	25 7	39 0	60	23	18 12	33 0	46
Total 11 years ...	557	262 7	451 0	657	511	191 18	305 0	527
Average per year...	51	23 33	41 0	59-12-0	46	17 16	30½ 0	47-15-0

It will be seen that the average for the irrigated lands is 23 maunds 33 seers and for the unirrigated lands 17 maunds 16 seers. The experiments done by the Settlement Department in recent years show an average of 19 maunds 21 seers in the irrigated area 15 maunds 29 seers in the unirrigated area.

The estimate of the comparative value of the Produce in irrigated and non-irrigated areas made by the Public works Department officers shows that an irrigated acre produces about Rs. 12 more than an unirrigated acre. Experiments and calculations made by the Settlement Department bring out a difference of Rs. 7-8-0.* The margin appears to be sufficient to cover the amount of water-rate as well as the heavier rents that are paid in the irrigated areas,

41. The Taldanda, Kendrapara, High Level and Jajpur canals are used for navigation, The following table will show the volume of traffic in the canals between 1913 and 1928 :—

——	Boats.	Estimated value of cargo.			Passengers	Total tollage (receipts)
		up.	down.	——		
		Rs.	Rs.	Rs.		Rs.
1913-14 ...	41,020	60,41,848	79,70,880	1,40,12,728	71,236	73,991
1918-19 ...	40,811	55,43,428	59,70,474	1,15,13,902	63,413	71,392
1926-27 ...	30,926	36,24,332	47,80,575	84,04,907	78,292	89,076
1927-28 ...	31,365	48,98,458	61,13,140	1,10,11,598	33,588	85,031
1928-29 ...	36,051	90,56,932	64.66,881	1,55,23,813	31,518	90,168
Total ...	180,173	2,91,64,998	3,13.01,950	6,04,66,948	278,047	4,09,658
Average of 5 years ...	36,035	58,33,000	62,60,390	1,20,93,390	55,609	81,932

The total tonnage carried by the canals was in 1898-546,766 tons, in 1911-309,884 tons and in 1929, 297,248 tons. The figures indicate that canal traffic declined after the opening of the railway. Most of the cargo carried consists of rice,but building materials and Jute are also important. Bamboos are also floated down the canals in large quantities, after coming down the rivers from the feudatory States.

*For this purpose the price of paddy has been taken at its previous level of Rs. 2 per maund. Adjustment will have to be made to suit existing prices.