

It is obvious, in the first place, that after a large mortality and abandonment of cultivation the facility in obtaining land, and the reduction in the size of families by rendering subsistence a matter of much greater ease, encourage corresponding increase in population. As circumstances change and subsistence becomes more difficult there is a natural check to population, so long as the standard of comfort is not abandoned. But these reasons in themselves appear insufficient to account for the lower rate of increase, and as methods improperly called Malthusian are never resorted to by any except the educated classes, undoubtedly the further explanation required is found in the habit of emigration largely prevailing in the district.

62. Some note as to composition of the population at the census of 1881
Composition of the population. may be of interest—

Total population of			Musalmans	
1891	....	994,625	number	 24,250
Males	....	481,638	percentage	 2
Females	....	512,087	Buddhist, Christian— and others—	
Hindus			number	 1,164
number	969,211		percentage	 1
percentage	97			

Of the first six castes, Brahman, Baidya, Karan, Kayastha, Kshatriya, Khandait, which rank as high, only three are numerous—

Brahmans		119,289		12	} per cent. of the total population.
Karans	....	24,773	....	2	
Khandaits	....	185,852	....	18	

Of the intervening castes, most of which rank as *Hatua* or manual labourers—the following are most numerous—

Goura	....	73,463	Tanti	....	56,767
Bhandari	....	17,087	Goala	....	33,820
Guria	....	13,190	Kamar	....	11,194
Raju	....	40,750	Kumhar	....	11,248
Chasa	....	20,672	Dhoba	....	22,625
Teli	....	46,890	Rarhi	....	24,848
			Keuta	....	26,110

Amongst the low castes may be mentioned—

Gokha	....	27,147
Pan	....	54,319
Kadma	....	33,593

According to the census report the agricultural population numbered 750,607, or 75 per cent. of the total, and of these 299,000 were set down as actual cultivators

63. The present population of the District is, according to Mr. Kingsford's estimate, 1,024,463,¹ of which 908,733 are resident in the 1,712 square miles now under settlement. The largest thana, Soro, contains the largest population, viz, 212,000, while the smallest, Jaleswar, including its permanently settled areas contains 55,000. The density varies, in thanas entirely temporarily settled, from 635 to the square mile in Bhadrak to 404 in Basudebpur. The average density in the south is 572, in the north 499, and throughout the entire District 531.

That the density of population should have attained in one thana to the figure of 635 to the square mile, or one to the acre, may seem alarming. It is clear that under such circumstances the subsistence limit has been nearly reached. In 1793 the density in well-peopled districts of Bengal, including Bengal, Bihar, and what was then called Orissa but is now Midnapore, was estimated at 200² and the total population at 25,000,000. This had risen by 1882 to 60,000,000, and the density throughout Bengal rose, therefore, to 480, which is little less than the average for this District.

1. This does not quite agree with the estimate in paragraph 170, where I take the population at 1,080,000.

2. Leslie Brooke's Husbandry of Bengal, written in 1794.

64. The only towns worthy of the name are Balasore and Bhadrak, the former with a population of 21,000 and the latter of 16,000.

Balasore³ though it includes an extensive bazar, is in effect a collection of hamlets, and the area included within municipal limits is no less than 3,404 acres, or 5 square miles surveyed in 28 villages.

The town lies upon the right bank of the river Burabalong, about 15 miles from the mouth, though only 6 miles in a direct line from the sea. This was one of the earliest European Settlements in India, and its history presents some features of considerable interest. Popular tradition ascribes the derivation of the name to the Mahadeb Baneswar whose temple still stands in Purana Balasore. It is said that in the Dwapara Yuga, or third of the Hindu ages, a demon king named Banasura dwelt in the portion of the town now known as Sunahat⁴.

He established and named after himself the shrine of Baneswar, and it was his custom every morning to repair to this and to four other temples—Gorgareshwar at Remna, Khajureswar near Sergarh, Bakreswar in the village of Bankeswar, and Mani Nageswar in Bardhampur—and after performance of his devotion to return to his palace by midday. Incredible as the performance of this daily journey of some 40 miles or as the very existence of the demon may appear, the survival of two great tanks lying near the site of the supposed palace of Banasura and the remains of the moat round the dwelling of his daughter, Usa' whose name still survives in that of the village Usamerha⁵ may go some way to convince the modern antiquarian of the authenticity of this mythological legend. However this may be, Balasore remained an insignificant village inhabited by fishermen and milkmen until the year 1642, when the British factory was established.

As early as 1514 the Portuguese had effected a settlement at the ancient port of Pipli on the Subarnarekha, 30 miles north of Balasore. The site is now lost, and the only of European colonisation is found in the name of the pargana Sahabunder⁶. In the beginning of the seventeenth century the Portuguese settlement was deserted, and in 1635 the first British factory in Bengal was established on its ruins under a *firma'n* of the Mogul Emperor Shahjehan. Five years later the patriotism of Dr. Broughton secured permission for the erection of a factory at Balasore, and the location of Pipli having proved inconvenient owing to the silting of the Subarnarekha, the little colony removed its quarters to what is now known as the village Barbati on the right banks of the Burabalong, a mile below the site of the modern town of Balasore.

The factory was protected on one side by the river and upon the other three by a deep moat, and a native village inhabited by the artisans and weavers who worked for the company sprang up rapidly around it. The trade at this time was in "Satran" a kind of coarse longcloth, and in muslin for the manufacture of which Orissa had early been famous. Though surrounded by strife and dangers, the colony continued its peaceful existence for upwards of a hundred and thirty years, and the only occasion when its security appears to have been menaced was in 1688. In that year, on the outbreak of hostilities between the British and the Mogul Emperor, when the company's servants removed in a body from the Hooghly to Balasore, the Governor of the town seized two factors as hostages, whereupon Captain Heath burned and blundered the town. But as early as the year 1700, the Burabalong, like all Orissa rivers, had commenced to silt at the mouth, and the passage of the bar gradually became more difficult. From 1751 the decline of the factory set in and it appears to have been ultimately abandoned before 1786. It was found in ruins when the British entered Balasore in 1803. The only traces of it now existing are the graveyard and a house in Barbati said to occupy the site of the old factory building. This house is now the residence of one Baidyanath Kar and was at one time the Collector's cutcherry, built by Mr. W. Blunt as Commissioner. The cemetery contains 33 graves with dates from 1634-86 * Little remains to be said as to the town itself. The residents include

3. The information given regarding the town is compiled mainly from a report submitted by Babu Abhoy Prasad Das, Assistant Settlement Officer, a resident of the town.

4. Properly "Sonita" the bloody, so-called after the fight between Banasura's men and his daughter's lover Pradyumna, the son of Krishna.

5. More properly Usa' berh, or the dwelling-place of Usa'.

6. Sahab-bunder, the Sahib's port.

* See paragraph 30 of Mr. Kingsford's Report, page 396 of the Appendices. Sri Henry Ricketts was buried in England and his body was not brought over, as Mr. Kingsford was informed, for interment in Balasore.

some of the leading zamindars, such as Raja Baikuntha Nath De Bahadur, Babu Raj Narayan Das, the Mandal family, and a considerable trading community, the importance and wealth of which is rapidly on the increase. Some of the merchants are Uriyas and Bengalis, but the majority are Musalmans, Madrasis, and men of Bombay. The *Telis* in particular are acquiring considerable local influence as large money-lenders.

The town is the headquarters of the District, and the administration includes a District Magistrate and Collector with three or four Deputies, an Executive Engineer, a District Superintendent of Police, a Civil Surgeon, who is also Health Officer of the town, a Munsif, three benches of Honorary Magistrates, and a Sub-Registrar. A proof range under control of an officer of Royal Engineers has lately been established at Chandipur, near the mouth of the Burabalong, and an office and other buildings in connection with it are in process of erection in the town.

There is a jail, a general hospital, a charitable dispensary, Roman Catholic Mission with a school and orphanage, and a settlement of Free-will Baptists from New Hampshire, U. S. Just outside municipal limits, to the west, are the quarters of a District and Assistant Railway Engineer, together with the new station buildings which are now approaching completion.

The railway bridge over the Burabalong was opened on the 9th May of the current year, and though in regard to size it does not compare with those of the Brahmini and Mahanadi in Cuttack, yet it has an importance of its own as an imposing structure, as the only bridge in the Province constructed over tidal waters, and as the visible sign of the commencement of what may prove a new era in the trade and material circumstances of the District.

The climate of the town is healthy, and, with the exception of cholera outbreaks before and after the rains, there is little sickness. The rainfall is large and has averaged 70 inches during the last five years. Opium-eating is properly described as the curse of the town, which has earned for itself an unenviable reputation for the abnormal quantity of the drug consumed. The lower classes especially regard it as a preventive of chill and fever, and men, women, and children alike look upon it as an item of their daily food.

It remains to notice Balasore as a port. At the commencement of the century it was the only one of which Orissa could boast, and though after the abandonment of the old settlement trade stagnated until the British entered the Province in 1803, the circumstances of the port subsequently rapidly improved.

In 1853 the sloops numbered 167, although 44 had been lost in the gale of 1851, and the trade was rapidly increasing. Between 1848 and 1852 the annual value of the imports rose from Rs. 83,000 to Rs. 1,01,000 and of the exports from Rs. 12,600 to Rs. 1,99,000, nearly the whole of the latter being rice and paddy.

The highest export figure was reached in 1850 when the amount was Rs. 3,49,000, and the subsequent falling off was attributable to the loss of shipping in the town. The manufacture of salt gave the chief impetus to trade, and with its abandonment there was a considerable decline. It is not necessary to deal further with the present trade than to note that in 1897-98 the total value of the exports was Rs. 12,96,350 and of the imports Rs. 16,25,561, and that since 1850 a new and valuable export trade has arisen in stoneware of "Muguni" quarried chiefly in Nilgiri.

65. The British was not the only factory at Balasore, for the French, Dutch and Danes also possessed settlements. The two Foreign settlements at Balasore. The two latter, known as Ulan sahi and Dinamardanga, were ceded to us in 1846, and are now held as khas mahals and leased to Raja Baikuntha Nath De. The area of each is 7 acres. The moat round the Dutch factory known as Ulan *nala* and the graveyard, containing two old-fashioned monuments are still in existence.

The French settlement was never ceded and still remains the territory of that Nation. It is under the authority of the Administrator-General at Chandernagore. I can not ascertain whether this factory, known as Frasdanga, was ever captured by the British; but the French certainly ceased to occupy it, and under the treaty of 1783 it was restored to them with their other factories, the restoration being actually made in 1786. The area at this time appears to have been 64

acres, which, according to the map of last settlement, had diminished to 43 acres. At the present Settlement an area of 169 acres was claimed as French territory, and Mr. Maddox was directed to enquire into the matter. He held the claim to be untenable, and his recommendation that the area should be limited to 38 acres, of which the French were actually in possession, was accepted by Government. (A considerable portion of the old area has been washed away by the river).

The lease of this French territory is disposed of annually by auction and generally fetches a considerable sum, the profits to the lessee from the Abkari revenue alone being Rs. 250 per annum. The lease realised as much as Rs. 925 in 1878, when it was purchased by the Mandal family, who were anxious to control the Frasdanga blacksmith's trade so as to hold a monopoly of it in their neighbouring bazaar. In the following year again it realised Rs. 462, the purchaser being desirous of establishing a monopoly in the liquor business of the town. The former lessee Raghunath Mahapatra made the position of both his successors so uncomfortable that neither afterwards came forward, and he purchased the lease himself 1880 for Rs. 100. It has since passed into the hands of Raja Baikunth Nath De.

The existence of Frasdanga has been a fruitful source of trouble to the British authorities. Resort to it was at one time habitually made for the purpose of disposing of stolen goods, and for other criminal purposes, and in 1893 a criminal case which attracted some notoriety was brought by Raghunath Mahapatra against the lessee on the charge of kidnapping him out of British India. All three settlements were centres for this illicit traffic in opium during the early part of the century, and the drug was smuggled into British territory in large quantities.

66. This is the head-quarters of the southern sub-division, and lies on the bank of the Salandi at the 43rd mile of the Trunk Road below Balasore.

Bhadrak.*

It consists of a group of hamlets covering an area of some 3 square miles, and contains a population of 16,000, of which 75 per cent. are Musalmans. The town contains two quarters, the Naya bazaar on the right bank of the Salandi and the Purana bazaar on the left. The former is situated near the Trunk Road, and contains numerous lodging houses for travellers, for suitors in the courts, and for the clerks and muharrirs in Government employ.

Provisions are the chief commodities sold in this bazaar, though a short time ago some Bengali merchants opened shops for the sale of tobacco and piece-goods. The real centre of trade is, however, the Purana bazaar, where the Musalman element is strongest. The mahajans, zamindars and merchants reside here, and Messrs. Turner, Morrison and Co., have a store for the sale of Liverpool salt and petroleum. Another business for the sale of Madras salt has lately been opened up by a company for which Messrs. Macneil and Co. are the local agents.

In addition to the stores and shops there are two markets held weekly upon Wednesdays and Saturdays. Some description of these will be found under that heading, † but it may be noted here that the Wednesday market is the most important in the District, and that sales of cattle, timber and fuel take place there to a large extent.

The following are the principle articles of trade :—

Rice and paddy are purchased during the five months following the *sarad* harvest by Bombay Nacoda merchants either from the local rice dealers or through agents who visit the smaller market.

Salt—Imported by merchant to a small extent from Calcutta. The chief business is done by Messrs. Turner, Morrison and Co., who, in the year ending March 1899, sold 35,191 maunds, value one-and-a-quarter lakhs of rupees, at Rs. 3-10-6 per maund.

I believe the above firm is likely to be supplemented by the new agency already referred to, since the Madras salt can be put on the market at a cheaper rate than the Liverpool article.

Kerosine Oil—The sales of the smaller marchants amount to an annual total of Rs. 5,000. The largest importers are, however, Messrs. Turner, Morrison and Co., who sold last year 7,536 cases at Rs. 3-11 per case; total value Rs. 27,600.

* This paragraph is written from information supplied by Baleu Harakrishna Mahanti, Assistant Settlement Officer.

† Paragraph 67

Cotton—There are four merchants who import English cotton-piece goods from Calcutta to the total value of one-and-a-quarter lakhs of rupees annually.

Cattle—Sheik Iman and some five other Musalman merchants purchase cattle at the local markets of Bhadrak, Dhusuri Ramchandrapur, and Duhal to the number of about 9,000 annually. Taking Rs. 10 as average, the value of the trade amounts to Rs. 9,000. The cattle are sent by the Trunk Road to Midnapur, where some of them are purchased as plough oxen, but most go to Calcutta and further north where they supply the meat markets.

Hides—Golab Khan and half a dozen others control the trade, and the value of the export is about Rs. 72,000 per annum. The hides are sent to Calcutta, a few by Balasore; but most by Chandbali.

Yarns—English and Bengal twist for the manufacture of local cloth is imported to the annual value of Rs. 23,000. *Turmeric, chillies, sugar* and *cocoanuts* are imported by steamer from Cuttack by three Marwaris and by other local traders. The sugar is in the form of molasses, and *kanda*. The same merchants export resin and tamarind to Cuttack.

Betelnut, spices, wheaten flour, refined sugar, potatoes, and plantains are imported, to the annual value of Rs. 10,000, from Calcutta *via* Chandabali by Sankar Sahu and others. A small quantity of potatoes and betelnuts also comes from Cuttack.

Ghi is brought from the grazing grounds of pargana Ankura, and some is exported to Calcutta and Midnapore.

Though living in the town is dear and a proverbial saying runs that fuel costs a pice for half a seer, the towns people are prosperous, and even the beggars have lands*. There are very respectable resident Musalman families, and they are careful to maintain a position and social observances which distinguish them from the ordinary Mahomedan community in the mufassal. The climate is considered superior to that of Balasore but there are severe outbreak of cholera in the season preceding the rains.

67. The number of markets in the temporarily-settled portion of the District is 59, and particulars of area, position, assessment and of the commodities ordinarily sold at each will be found in the Appendix referred to.

Many of the markets are situated on *bahal*, and the most important of all, that of Bhadrak, on *bazyafiti* land. The total assessment imposed on the zamindar in whose estates markets lie amounts to Rs. 783, and it was fixed as a ground rent varying from Rs 1-3 to Re. 210 per acre.

Though, with a few exceptions, they are not of great size, they are well distributed for the supply of local wants and as centres where grain collects for export. It is likely that, in the course of the next few years, markets of considerable size will spring up in proximity to the railway stations, and some that now exist in less convenient situations will decline.

The commodities ordinarily exhibited for sale include cottons of local and English manufacture, brass and bell-metal utensils and ornaments, kerosine oil, provisions of all sorts, such as paddy, rice, salt, spices, molasses, dried fish, vegetables, *dal*, fruits, fresh fish, castor and mustard oil, grain, confectionery, fried rice, milk and *pa'n* for chewing, earthenware pottery, blacksmiths-ware, mats, brooms, fuel, cheap finery, hair oil, mirrors, combs, soap, needles, pins, tobacco, *sa'l* leaves, scrap-iron, cotton, thread, string, rope, and small utensils and lamps made of tin.

At markets of a larger size there is often a trade in special articles including cattle, timber, charcoal, yarn, tamarind, resin, druge (opium, *bhang* and *ganja*) medicines, *ghi, tari* and Uriya books and tracts sold by the missionaries.

In the cold season Kabuli pedlars sell warm cloths of various descriptions. The regular shop-keepers do a lucrative trade, and make a profit from 50 to 100 per cent.

From noon till 9 O' clock at night the Uriya market presents a busy scene. The traders set out their wares each in his appointed place. The drummer and

* One of these professional beggars on receiving a dole of rice from an Assistant Settlement Officer in the town proceeded to urge some grievance with reference to the assessment of his *thani* holding.

flute-blower make music at every shop in turn and receive a few pies or a small article exposed for sale. The sweeper collects a similar contribution. The village postman attends to deliver letters, and the zamindar's peons to press the raiyats for their rents. People, women predominating, flock in with rice or fish for sale and to make purchases for the weekly family wants. The *dandidar*, or weigher appointed to supervise the markets, goes round to receive his commission on the sales or to give his opinion in the rates to prevail for the day. The gomasta, of the zamindar, or of the the *ijardar* who has taken a lease of the market, collects his fees (*tola*) in kind or cash, or some times a stipulated annual rent from every shop. The money changer exhibits piles of small coins and cowries and a shop keeper may be seen bartering his good in exchange for some articles of domestic requirements.

In the north of the district the three markets of most importance are Singla in Nangleswar, Deula in Bhograi, and Shahaji in Remna near Balasore. The average attendance at these is probably seven or eight hundred, and people come to them from a distance of 10 or 12 miles.

The two daily markets of Balasore town are entitled to some notice. The more important is that in the centre of the town, belonging jointly to the zamindars of the Mandal family, Babu Rasik Charan De and Babu Dolgobinda Ghose.

The market contains some brick buildings erected by the Mandals, and these are occupied by the fish and vegetable sellers. The Mandals are proprietors of the fishery estate in the river Burabalong, and have shown some enterprise and business capacity in providing the fishermen with means for disposing of their catch.

Vegetables from Remna and the villages near the town, sea-fish from Chandipur on the coast, seasonable fruits, including pineapples, guavas, plantains and a species of orange from the *Garhjats*, are daily brought for sale, and at the bi-weekly market there is a trade in brass and bell metal ornaments and utensils, and in cloth which is largely, purchased by Santhali women from the *Garhjats*. At the approach of the rains *chamars* bring umbrellas, hats and *pakhias** of palm-leaf and bamboo.

The markets are let out to contractor, who collect fees generally half a pice per day, from the sellers. The shops are paid for at from Re. 1-8 to Rs. 2-8 a month. The lessee of the vegetable markets pays a rent of Rs. 25 per month, and Rs. 15 a month is paid by the *ijaradar* of the fish market. The market is capable of improvement and requires a supply of drinking water. It is under the control of the Municipality, which levies a quarterly tax of Rs. 35.

The other market is situated on the Trunk Road and was constituted as a *sarai* for travellers. The trade is in provisions only. It is let out annually by the Municipality by auction, and the rent now realised is Rs. 106. It contains lodgings for travellers and suitors in the Courts, but with the advent of the Railway its importance as a *sarai* for travellers is declining. The lodgings are now occupied by Railway contractors and coolies.

In the south may be mentioned Chandbali Jamjhari on the Trunk Road between Soro and Bhadrak and Turigaria in Mangalpur; but the most important of all is that of Bhadrak known as Esafpur.

This consists, in fact, of two markets, one of which is situated on *bazyafiti* land and the other on that of Babu Radhakanta Rai Mahasoy, Zamindar. The latter has been lately established and has attracted much of the trade of the older market.

The specialities of the old market are timber and cattle; the yearly sales of the latter averaging 6,500, value of Rs. 39,000, which gives a price of Rs. 6 per head. Each purchaser pays to the *ijaradar* a fee of 3 pies per rupee, while the sellers pay a similar amount per head of cattle and the total fees derived amount to Rs. 700. Various portions of the markets are let out annually to *ijaradars*, the leases being disposed of by auction.

The fee levied on the sale of timber varies from 1½ to 6 pies according to size, and the annual amount paid by the *ijaradars* of this portion was found to be Rs. 120/-. The income derived from shops is Rs. 700. The total annual sum realised by the *bazyafitidar* after deductions of the *ijaradars*' profits on cattle and miscellaneous shops, probably does not fall short of Rs. 1000. †

* A shade of palm-leaves to protect the head and back from sun and rain.

† Particulars obtained from an enquiry by Babu Prasanna Kumar Banerjee, Assistant Settlement Officer.

68. The tendency of Balasore rivers to silt at their mouths has been fatal to the stability of almost every port in the district. It was on this account that Pipli was abandoned in 1642, and the same cause led to the decay of Balasore during the last century.

In the Year 1871 there were said to be seven principal ports—Subarnarekha, Sartha, Chhauna, Balasore, Laichanpur, Churamon, and Dhamra (including Chandbali). Owing to the silting up of the river mouths and to the construction of the Coast Canal which facilitated the silting while it also provided a new waterway, and to the abandonment of the salt manufacture, some of these have ceased to exist, while the position of others has been changed. Thus Subarnarekha is now represented by Batanga and Mandhata on the coast Canal and Barbatia on the Gochida river. Panchpara has taken the place of Sartha; Chauna, Laichanpur and Churamon* have ceased to exist. A new port has formed at Baliapal on the Matai river, and Chandbali has absorbed the trade of the old port of Dhamra situated 15 miles lower down the river at the confluence of the Matai.

Some account may now be given of the seven existing ports, in the order of their importance, with the exception of Balasore which has been already treated of as a town.

The establishment of this port is due to the enterprise of Captain Macneil, who, thirty years ago, sailed up the Dhamra with Mr. Ravenshaw, Commissioner of Orissa, with the intention of discovering a suitable site. Chandbali, which was then a small village occupied by a few fishermen's huts, was found to combine the advantages of high position free from all risks of inundation, and sufficient depth of water in immediate proximity to the river bank. Captain Macneil immediately obtained a lease of a small area of land by arrangement with the zamindar.

Subsequently Government, recognising the advantages of the site, acquired an area of 179 acres, which now forms the Chandbali Khas Mahal and includes the lands leased by Captain Macneil. These eventually passed into the hands of the India General Steam Navigation Co. and Messrs. Macneil and Co., to whom the leases were first granted by Government in 1877.

The area held by the two companies now amounts to 12 acres and, besides offices and ware-houses, contains a flourishing bazar which occupies one-third of the area. The tenants of the companies pay rents amounting to Rs. 2,500, and the rents payable by the companies under the leases lately granted amount to Rs. 168.

Chandabali lies on the north bank of the Baitarani river some 8 miles west of its confluence with the Brahmani and 20 miles from the mouth. It is connected with the interior by the river Natai, the Bharak road, and various tidal creeks. The river frontage area is small and contains chiefly the companies' warehouses, bazar and lodging houses. At the divergence of the Bhadrak road there is a second bazar and a flourishing market.

Mandhatta is situated on the Coast Canal a short distance above the crossing of the river Haskura. This port has been in existence but a few years, and is of growing importance.

A bazar including a number of stores has been established, and rice and paddy together with a small quantity of *birhi* from Singla market are collected by the merchants for export to Calcutta in country boats by the canal. The total value of the exports amounts to about Rs. 90,000. The imports include the usual items—English cloths, English and Bengali yarn, betelnut, spices, kerosine oil, potatoes, and turmeric, and the total value amounts to Rs. 70,000.

Baliapal on the river Matia near Karanjaria bungalow affords a trade centre for pargana Ankura and part of *killi* Kanika. The chief export is rice which, to the annual value of a lakh of rupees, is despatched in sloops to Calcutta, Madras, and to the Laccadives and Maldives.

Barbatia on the Gochida river, a tributary of the Subarnarekha, exports rice paddy and mats to Calcutta in country boats by the canal, and also in small

* Once a centre of salt and rice export. The zamindars in 1832 levied a tax of Rs 578 on the export of rice alone.

sloops by sea. The value of the exports amount to less than a lakh and the imports include the customary articles, but are chiefly oil and cloths.

Batanga is situated on the Coast Canal some 6 miles north of Bhograi lock and not far from Deula market. Some Bombay merchants have established stores here and export rice, to the value of about half a lakh of rupees, *via* the Coast Canal to Calcutta whence it is sent to Bombay.

Other centres from which a small export trade is carried on, but which are hardly worthy of the name of ports, are Talpada, Inchuri, and other places along the Coast Canal, where, perhaps, a single trader has established himself. At Churakhai, on a tidal creek communicating with the Panchpara river and adjoining the Trunk road 12 miles north of Balasore, is a warehouse belonging to a Contai merchant, whence country boats laden with rice travel down into the Coast Canal and so to Calcutta, returning with oil and other commodities.

A similar centre in Panchrukhi on a tidal creek connecting with the Subarnarekha near Jamkunda. There are two stores here, and rice is exported to Calcutta.

Soil.

69. Lands are ordinarily of three classes—

- (1) *Jala* or rice lands.
- (2) *Pal* or riverside lands enriched with silt deposit. These grow tobacco, cotton, *rabi* crops, and best paddy.
- (3) *Kala*, the high lands of the homestead, which generally grow vegetables. These are constantly enriched by manure and refuse of all kinds, and are locally known as *bazefasal* or capable of growing every description of crop.

Soils are further distinguished as *Matial*, which includes a large proportion of clay and grows *biali*, *sarad*, sugarcane, *kulthi*, and other *rabi* crops.

Dorasa, a mixture of clay and sand; grows *biali* and *sarad*, rice, sugarcane, *kulthi*, and other *rabi* crops.

Baliara, sandy soil; grows *sarad* rice.

Chikta Matial, adhesive clay; grows *sarad* rice

Two further classifications under which all lands fall are—

Dangar, upland soil; grows *sarad*.

Gahir, low land soil; grows *sarad* and *dalua*.

Lands growing *sarad* are generally classed according to their situation. The first class or *aul* includes all soils which retain moisture up to the time when the ear is fully ripe. Homestead and alluvial lands also rank under this class on account of their special fertility.

The second class or *doem* includes the medium level soils which only retain moisture up to September. Inferior and sandy soils rank under the third class or *soem*. There also exists a fourth class, and sometimes a fifth and sixth.

70. Mr. N. N. Banerjee in his report on the Agriculture of Cuttack has given on this subject a quantity of information which is equally applicable to this district, and I shall therefore treat the subject as shortly as possible. Paddy is the principal crop and includes three distinct classes—*sarad*, *biali*, and *dalua*.

Of the 7,76,000 acres of cropped land in the area under settlement of rents no less than 7,08,000 or 91 per cent. are under *sarad* rice. Three descriptions are recognised—*asu* grown on high lands, *kanda* grown on land of mean level, and *garu* grown on low lands. On the higher level the crop is sown broadcast, but in the low lands, especially in parganas Ankura, Bhera, Kaima, and Bayang, it is transplanted because in such parts the water gathers more quickly, and would wash away the seeds or drown the early seedlings. But transplantation is also resorted to for a better crop, since only the strongest seedlings are planted and the better class of raiyats passes *talha is*, plots of good high land, generally within their homestead and specially reserved for growing the paddy for transplantation. A quarter of an acre of *talhati* suffices for the transplantation of four times that area. The transplanted crop is expected to yield from one to five maunds in excess of that sown broadcast.

The sowing is the work of May or June according as the rain is early or late. *Asu* is reaped in August or September, *kanda* is September and October, and

* See appendix F. The estimates in the paragraphs are Mr. Kingsford's and do not always agree with those in Chapter VI.

garu from November to January. The yield is from 10 maunds of paddy to the acre in the unfertile tracts, such as Ambohatta, to 30 maunds in the best reverside lands on the Burabalong below Balasore, on the virgin soil of the reclaimed lands by the Subarnarekha, and in some parts of Ankura. The greater part of the district yields an average of 18 maunds in fair seasons; but taking good and bad lands alike, and with due regard to the floods and drought to which the country is periodically subjected, the average outturn is estimated to be very little more than 15 maunds. Excluding experiments not worthy of credit on the jail lands in the Balasore town, and excluding also those of the Public Works Department which are taken on one twenty-fifth of an acre, and that the best portion of the best field, I found that experimental cuttings gave an average of 20 maunds of paddy and 22 maunds straw per acre.

Biali rice is grown in small quantities, but in almost every part of the district. The average area under this crop is 5,400 acres or not a hundredth part of that under *sarad*. It is sown upon high lands in the month of May, and reaped in August and September. Being thus an early crop, although the cost of raising it is high and 50 seers of seed are requisite for an acre, it is grown on a portion of his holding by the tenant who has no store of rice or who is being pressed by his landlord for payment of rent. The yield is 10 or 12 maunds of paddy to the acre.

Dahua—The area shown under this crop is only 8000 acres, but varies considerably from year to year. There is little ground suitable for its cultivation, for it requires a low level and facilities of irrigation. Sown, or more commonly transplanted, in December and January, it is harvested in April and May, and the field is from 8 to 12 maunds. The crop is scarcely grown except in Dhamnagar, Bayang, Senaut, and Bhera in the south of the district, and though the normal area under it is small, it is largely sown after a failure of the *sarad* rice. Thus after the drought of 1895, when the *sarad* crop was destroyed, no less than 2,000 acres were put under irrigation from the high level canal, and the area irrigated from other sources was probably as great.

Other food-grains grown include *mug*, *birhi*, *Kulthi*, *chana*, *arhar*, all of which are pulses, *make* (maize) and *barguri*, a description of bean, but which may rank as a pulse. The total area under these crops is only 8,000 acres; they are generally grown on twice-cropped lands, and are named in the order of their importance.

Mug is of three kinds—*dhala*, *kala*, and *jai*, the latter being in the greatest demand on account of its superior flavour. It is sown broadcast in August and September and reaped in December and January, the average outturn being from 2½ to 3½ maunds. It is eaten as *dal*.

Birhi is similar to *Mug*, and is sown broadcast during the rains.

Kulthi, grown chiefly in Senaut, Randia Orgora, and Dhamnagar is sown in November and cut in February. It is the cheapest of the *rabi* crops, and is commonly eaten as *dal* by the poorer classes.

Chana is sown in August and September and reaped in December. It is eaten as *dal*.

Arhar is sown in June on *kala* lands and reaped in December. The plants grow to a considerable height.

Maka is a crop grown in homesteads only. It is sown in July, and in September; the cobs are plucked and eaten fried. It is chiefly produced in Senaut, Kundi, and Sahabunder.

Barguri is very similar to *chana*. It is eaten as *dal* and is also used for the preparation of sweetmeats.

Oilseeds, include mustard (*sarisa*), castor oil (*gaba*) linseed (*tisi*), and sesamum (*til*), and the area covered by these crops is 600 acres. Mustard is sown broadcast on *pal* lands and in homesteads during October and November and reaped in February. It is grown chiefly in Senaut, Sahabunder, Bhograi, Kundi, Phulwar, and Sunhat. Generally a tenant puts only a few *gunths** under this crop, and the yield is about 10 seers per *gunth*. Mustard oil is used for cooking purposes and by the better classes for anointing the body after bathing. Four seers of seed yield one of oil.

* One twenty-fifth of an acre.

The castor oil plant is grown in similar fashion, it prefers a dry soil, and requires water only when the fruit is ripened. The yield is about 3 maunds per acre, and a maund of seed will yield seers of oil. The oil is cheaper than that of mustard, and is used by the poorer classes for the same purposes.

Spices, including coriander seed, (*dhania*, *Joani* * and aniseed *panamohure*) cover an area of about 100 acres and are grown on *pal* lands or in homesteads, being sown broadcast in November, and reaped in February.

Miscellaneous crops.

Sugarcane—The area is recorded as less than 500 acres, but this figure does not represent actual facts. The crop is chiefly grown in Dhamnagar under irrigation from the High Level Canal, and no less than 500 acres were irrigated this year in the pargana named. The acreage now under sugarcane may be estimated at 700 acres. The two varieties are *kantari* and *bansia*, the former of which gives a better yield. The crop needs careful attention and a plentiful supply of water. The cuttings are planted in rows during January and February, and the crop is reaped in October and November. The cane is crushed in wooden mills worked by oxen, and the process of extracting the *gur* is a wasteful one.

At Bhadrak there are also some fifteen or twenty mills of a more modern make, which are let out to the cultivators. The yield of *gur* is from 25 to 60 maunds per acre, value Rs. 125 to Rs. 300 at Rs. 5 per maund; but the cost of cultivation † is Rs. 60 or Rs. 70 per acre and the crop is, therefore, not to be grown except by well-to-do raiyats who can afford the expenditure of capital. Moreover, the crop is thought to exhaust the soil, and the same land is not put under cane for more than two consecutive years, after which it lies fallow another year.

Cotton and jute cover 200 acres. The latter is grown in small quantities throughout the district, and generally in homestead lands. In the north it is found most frequently on the bank of the Subarnarekha. Of cotton the two varieties are *bara* and *chota*. The former is grown on homestead land and attains a height of 7 or 8 feet, yielding a crop for several years. The latter is grown on riverside lands, the seeds being mixed with cowdung and sown broadcast during November. The harvest is taken during April, and the yield to the acre is about a maund of cleaned cotton which may sell from Rs. 20.

Tobacco is grown upon some 20 acres of riverside lands in Dhamnagar and Senaut, and the yield is said to be 8 maunds, which may be value at Rs. 160. The cost of cultivation does not exceed Rs. 60 per acre.

Pân, or betel leaf, is grown on 120 acres, chiefly in Bhograi, where, however, the area has decreased since last Settlement. One village, Kalyani produces the crop in the centre of the district, and some is grown in the neighbourhood of Bhadrak. The plant is a creeper grown on a raised garden, one or two *gunths* in size, carefully fenced in and covered with a thatched roof. About 6,000 plants grow on a garden of two *gunths* and the leaves are thrown out in pairs at regular intervals, about four being plucked from each stem every month.

The leaves sell at an average price of 1,500 per rupee and the value of the yearly out turn is Rs. 190; the expenditure is Rs. 50 † and the profit is therefore Rs. 140. The average life of a garden is eighteen years. The cultivation is in the hands of a special caste, the *Baraji* or *Bauri* of Bengal.

Inkar covers an area of 100 acres. This is a reed generally found growing on wet lands in the vicinity of *pân* gardens, and is used in thatching the outer fence and as a support for the plant.

Miscellaneous vegetables are largely grown on the homestead lands which cover an area of 41,700 acres. An area of 1,300 acres is shown under *Brinjal*, and other vegetables, include pumpkin (*boital*), cucumber (*phuti* and *Kakuri*) and melon (*tarbuj*).

These are grown most largely in Remna, Phulwar, and Kundi, for the supply of the Balasore market, and in Randia Orgara, Senaut and Dhamnagar, for that of Bhadrak.

* I do not know what the name is.

† Mr. Arnott makes it Rs. 218.

‡ See Paragraph 154.

CHAPTER IV.

STATISTICAL AND PHYSICAL DESCRIPTION OF THE SADAR SUBDIVISION OF THE PURI DISTRICT.

(This chapter was entirely written by Mr. H. McPherson in 1898-99.
Only the figures have been revised.)

71. Puri, the southernly district of the Orissa Division, is also the most southernly district of the Bengal Presidency. It lies between 19°28' and 20°26' north latitude and between 85° 00' and 80° 30' east longitude. The District is divided by physical feature, historical tradition, and administrative arrangement into two distinct portions. The hill country to the north-west included in the Government estate of Khurda occupies two-fifths of the total area of the district and is known as the Khurda Subdivision. The remaining three-fifths of the district known as the Sadar subdivision consists of a deltaic alluvial plain stretching from the base of the Khurda hills to the Bay of Bengal.

The Sadar subdivision is situated between 19° 28' and 20° 22' north latitude and between 85°12' and 86° 30' east longitude.

Its general shape is triangular. If we take the point where the Bengal and Bombay Presidencies meet on the coast line of the Bay to be the apex of the triangle then the base is the Cuttack boundary, a line 40 miles in length. The shore of the Bay forms the south-eastern and longer side about 90 miles in length, and the north-western and shorter side about 80 miles in length is the Khurda boundary.

Puri town, the head-quarters of the district, stands on the sea-shore about half way down the south-western side of the triangle, at 19° 48' 14" north latitude and 85° 51' 39" east longitude.

72. The total area of the Puri district is 2,499 square miles. The area of Khurda subdivision is 971 square miles and of the Sadar subdivision 1,528 square miles. The present report is concerned only with the temporarily-settled parganas of the sadar subdivision. To ascertain the area of this portion it is necessary to exclude from the total the following items:—

I.— Permanently-settled parganas —		Square miles.
(i) Marichpur	....	53.29
(ii) Andhari	....	16.10
(iii) Malud	....	15.35
(iv) Parikud	....	67.52
(v) Bajrakote	....	17.08
(vi) Manikpatna	....	24.14
		193.48
II.— Chilka Lake, so far as included in the Sadar Subdivision		310.35
III.— Lands of Khurda <i>Killa</i>		42
Total		546

There remains a balance of 982 square miles. This is not entirely temporarily settled. A large number of villages, portions of villages, and parcels of land are held revenue-free and are altogether excluded from the areas of temporarily-settled estates. The area of these revenue-free lands amounts to 145 square miles.

There are also 10 square miles of permanently-settled tenures within the Kodhar Khas mahals.

Lands occupied by various departments of Government and excluded from revenue-paying estates cover an area of 6 square miles.

If these items be excluded, the area of revenue-paying estates falls to 821 square miles* though the revenue returns show only 818 square miles temporarily settled.

* For explanation, See Chap. XXI.

Puri estates have land in Cuttack district and some Cuttack estates have lands in the Puri district. For the former an addition of 5 square miles, and for the latter a deduction of 5 square miles, has to be made, so that no change is made in the temporarily-settled area.

73. There are two recognised divisions of the Sadar Subdivision the first Administrative Divisions of the Sadar Subdivision. Magisterial by Thanas, and the second collectorate by Parganas. The former was originally made for purposes of Police administration, whereas the Pargana was the old fiscal division obtaining from the days of the Hindu Rajas. It is now proposed in Orissa, as in Bihar, to extend the application of the Thana and to make it the general unit for all administrative work. The Pargana Division will subsist only in certain estate registers and records for which an arrangement by Parganas appears to be indispensable. Puri is divided into three Thanas, viz, Gope, Pipli, and Puri, and into 24 Parganas. The areas of the Thanas are respectively :—

		Sq. miles.
Gope	....	339
Pipli	....	331
Puri	....	858
		Total 1,528

This total includes 42 square miles of the Khurda Subdivision, which for Police purposes, is included in Thanas of the Sadar Subdivision.

The following is a statement of the areas of Parganas arranged alphabetically :—

Name of Pargana	Area in Sq. miles.	Name of Pargana	Area in Sq. miles.
Andhari	 16.10	Total brought forward	 579.22
Antrodh	 53.20	Kurelo	 20.18
Astrang	 8.97	Lembai	 89.86
Athaisi	 52.13	Malud	 15.35
Bajrakot	 17.08	Manikpatna	 24.14
Banchas	 30.33	Matkatpatna	 10.48
Chaubiskud	 100.32	Marichpur	 53.29
Dumarkhand	 29.49	Oldhar	 41.12
Kanman (Tappa)	 6.50	Parikud	 67.52
Khodar	 27.46	Paschimduai	 26.01
Kotdes	 182.08	Purbaduai	 32.63
Kotrahang	 55.56	Rahang	 150.34
Total carried forward		Serai	 67.32
		Total	 1,177.46

The Pargana and Thana totals do not tally, because Thanas Pipli and Puri both include detached portions of Khurda Subdivision and Thana Puri in addition comprises a large expanse of the Chilka lake, which is not included in any Pargana.

It will be seen from the above figures that Thanas Gope and Pipli are of nearly equal size and are much smaller than Thana Puri, but the latter includes, besides the Chilka Lake, Puri town, for which there are separate Police arrangements. Puri town is comprised in 16 survey villages, and has an area of 2.92 square miles. If the town and the Chilka be excluded from the Sadar Thana, then we have for its true dimensions an area of 545 square miles with 786 villages. Even so reduced, it is much larger than either of the other two Thanas.

Of the Parganas, Kotdes is the largest, with an area of 182 square miles, and Tappa Kanman, the smallest, with an area of 6.50 square miles. The average size of the Pargana is 49 square miles.

74. There are 2,145 villages in the sadar subdivision, grouped as follows under their respective Parganas and Thanas.

Division into villages.

The area of the Parganas in acre and the average size of a village in each Pargana have been added :—

Name of Pargana.	Area in sq. miles.	No. of Villages.	Average area of Village in acres.
P. Andhari	16.10	18	572
Antrodh	53.20	127	268
Astrang	8.97	16	359
Athaisi	52.13	70	477
P. Bajrakot	17.08	21	521
Banchas	30.33	58	335
Chaubiskud	100.32	180	357
Damarkhand	29.49	74	255
Kanman (Tappa)	6.50	18	231
Khodar	27.46	45	391
Kotdes	182.08	355	326
Kotrahang	55.56	190	187
Kurelo	20.18	52	248
Lembai	89.86	234	246
P. Malud	15.35	10	982
P. Manikpatna	24.14	12	1,288
Matkatpatna....	10.48	8	839
P. Marichpur	53.29	56	609
Oldhar	41.12	49	537
P. Parikud	67.52	61	720
Paschimduai....	25.01	62	269
Purbaduai { Puri Town	2.92	16	....
{ Rest of Pargana	32.63	73	286
Rahang	147.42	236	400
Serai	67.32	104	414
Total	<u>1,177.46</u>	<u>2,145</u>	<u>351</u>

The Parganas marked P (p) are the permanently-settled Parganas. A similar statement to the above is given *Thanawar* (including detached villages of Khurda, excluding Chilka Lake)—

Name of Thana.	Area in sq. miles.	No. of Villages.	Average area of Village in acres.
Gope	339	614	353
Pipli	331	794	264
Puri { Town	2.90	16	118
{ Rest of Thana	545	786	443
Total	<u>1,218</u>	<u>2,210</u>	<u>351</u>

These figures show that in the District as a whole there are nearly two Villages to every square mile of country. Kotraheang is more thickly studded with villages than any other Pargana. The permanently-settled Parganas are the most sparsely populated, as they all comprise large unculturable areas of river, marsh, and shore sand.

75. At the beginning of last Settlement there were 263 temporarily-settled estates in the Sub-division. Their number has been increased by partition in the

Division of Estates. course of the Settlement to 475. The distribution of estates by Parganas according to the Collectorate registers is as follows :—

Name of Pargana	Number of estates at ast settlement	No. of estate at present.
Antrodh	3	5
Astrang	1	1
Athaisi	7	14
Banchas	18	41
Cahubiskud	13	16
Damarkhand	13	16
Kanman (Tappa)	2	2
Khodar	2	3
Kotdes	16	35
Kotrahang	50	78
Kurelo	8	8
Lembai	7	7
Masrud	3	3
Oldhar	16	21
Paschimduai	36	109
Purbaduai	31	64
Rahang	21	22
Serai	8	8
Sultan-nager	1	3
Saidabad	7	19
Total	263	474

Partitions have been most numerous in Paschimduai, Purbaduai and Kotrahang. In these Parganas the process of subdivision has ben carried to such a ridiculous extent that prior to re-settlement they contained 57. estates paying less than Rs. 10 of revenue and three paying less than Re. 1.

A limit to the partition of temporarily-settled estates of the nature of that provided in Section II of the old Partition Act VIII (B.C) of 1876 for permanently-settled estates has been provided for all revenue-paying estates in Section II of the new Act V (B.C) of 1897.

Allowances were originally granted to zamindars on the theory that they relieved the State of the trouble, expense, and risk of collecting the small sums payable by individual raiyats. When by excessive partition the amount payable by the zamindar becomes less than the amount realisable from the average raiyat, the State gets no *quid pro quo* for the allowance it makes to the zamindar. This has been recognised in the new Act, and the line has been drawn at Rs. 10.

76. The extent to which estates differ in size may be judged from the fact that the largest estate in the District, viz., Kotdes, tauzi No. 44, paid before re-settlement a revenue of Rs. 81,082 and the smallest, viz., Salpuradang, tauzi No. 479, a revenue of Rs.14.

A classification of estates by former revenue yields the following results :—

Rs.	Rs.	No. of estates.	Rs.	Rs.	No. of estates.
1 to	10	64	1,000 to	5,000	31
11 to	50	131	5,000 to	10,000	1
50 to	100	75	10,000 and	over	5
100 to	1000	177			

The average amount of revenue was Rs. 604 per estate, the estates which paid a revenue exceeding Rs. 2,500 may be especially mentioned; they are given in order of magnitude :—

Kotdes, tauzi No. 44	 81,288	Kotdes and Antrodh Pargans
Delang, tauzi No. 257	 33,754	Lembai Pargana
* Rahang tauzi No. 268	 25,895	Rahang "
* Krishnagar tauzi No. 270	 19,583	Serai "
* Krishnachander, tauzi No. 270	 12,661	Chaubiskud Pargana

Kotsahi, tauzi No. 61	5,392	} Kotrahang Pargana
Pipli, tauzi No. 62	4,523	
Khodar, tauzi No. 251	4,189	Khodar Pargana (a Government estate)
<i>Killa</i> Kokal, tauzi No. 421	4,163	} Chaubiskud -do-
<i>Killa</i> Rovang, tauzi No. 130	3,383	
<i>Killa</i> Gobra, tauzi No. 189	2,514	<i>Athaisi</i> -do-

The three estates marked with an asterisk were, during the late Settlement, held *Kha's* on account of the recusancy of the proprietors. The amount shown against them represents the average net income derived from them by Government over a series of eleven years.

77. The information that has been given above has reference to the old *jamas* payable by estates previous to the present revision of Settlement.

In writing the assessment reports of the new Settlement it has been found convenient to adopt an arrangement which differs slightly from the *Parganawar* arrangement obtaining in the last Settlement.

In the first place what may be called the obsolete or paper Parganas—

Mahal Musrud, Saidabad, and Sultan nagar—have been discarded. These were not territorial divisions of the District, but merely names given to small detached areas scattered over numerous Parganas and included within the bounds of certain estates. In some cases they extent to the adjoining district of Cuttack. They have never been recognised as territorial units by the Survey Department either at last or the present Settlement, and their areas have always been included within the Parganas to which they geographically belong.

In the next place it has been found convenient in a few cases to group together and re-arrange Parganas because they have possessed some important feature in common. The new division have been styled "Blocks", and are as follows :—

Name of Block.	Parganas included.	Reason for arrangement.
Kotdes	Kotdes Antrodh	Because more or less conterminous with Kotdes estate, tauzi No. 44.
Khodar	Khodar Kurelo Kanman (Tappa) Astrung	Because alike liable to inundation from the Debi and Prachi rivers.
East Athisi & Damarkhand.	East Athaisi & Damarkhand.	Because more or less conterminous with <i>Killa</i> Gobra, and alike liable to inundation from the Prachi and Kadua rivers.
West Athaisi and Matkatpatna	West Athaisi Matkatpatna	Because alike liable to inundation from the Kushbhadra rivers.
Lembai	Lembai	Single Pargana
Kotrahang	Kotrahang	-do-
Paschimduai	Paschimduai	-do-
Purbaduai Oldhar	Purbaduai (include Oldhar, portion of Matkatpatna and Athaisi.)	Because alike liable to inundation from the Bhargabi (Adlabad breach), the Dhauna and Kushbhadra rivers.
Rahang	Rahang	Single Pargana.
Serai	Serai	-do-
Chaubiskud	Chaubiskud	-do-
Banchas	Banchas	-do-

To these have been added the miscellaneous items—Scattered estates.

The distribution of estates over blocks is as follows :—

No.	Block.	No. of estates.	Area in acres (fractions omitted).
1.	Kotdes	39	1,23,300
2.	Kodhar	14	25,900
3.	East Athaisi and Damarkhand	26	39,000
4.	West Athaisi and Matkatpatna	10	16,800
5.	Lembai	7	53,100
6.	Kotrahang	78	28,000
7.	Paschimduai	109	12,500
8.	Purbaduai Oldhar	87	31,700
9.	Rahang	22	68,800
10.	Serai	9	40,300
11.	Chaubiskud	16	56,600
12.	Banchas	41	12,700
13.	Scattered estates	27	14,600
Total		<u>485</u>	<u>5,23,300</u>

The average size of an estate is 1,079 acres. But the largest, Kotdes, has an area of 1,10,562 acres; and the smallest, Kharidagi Mahura, tauzi No. 487, an area of 43 acres. Under the new settlement the classification of estates by revenue will be :—

Rs.	Rs.	No. of estates.
1 to 10		46
10 to 50		106
50 to 100		78
100 to 1,000		211
1,000 to 5,000		37
5,000 to 10,000		2
10,000 to 1,00,000		4
Over Rs. 1,00,000		1

The variations in revenue will be from Rs. 1,04,324 (Kotdes) to Re. 1-2 and the average amount of revenue per estate Rs. 777.

78. To ascertain the average sizes of a holding and of a plot two different

Division into Holdings and Plots. sets of figures must be considered.

As the number of revenue-free holdings and plots cannot be separated out from the number of revenue-paying without an amount of trouble incommensurate with the object, the average size of a holding may be ascertained by dividing the total assessed area by the total number of holdings according to the Settlement reports, while the average size of a plot may be ascertained by dividing the total area of the temporarily-settled Parganas by the total area of plots according to Survey records. The figures so ascertained are—

Total assessed area	....	3,73,300
Total number of holdings	....	2,04,400
Average size of holdings	....	1.8 acre

Name of pargana.	Total area in acres	Total cultivated area in acres.	Total number of plots.	Average size of plot 3÷5.	Average size of plot 4÷5.
1 Antrodh	34,054	26,909	98,084	0.34	0.27
2. Astrang	5,743	2,839	7,625	0.75	0.37
3. Athaisi	33,363	12,893	42,116	0.79	0.30
4. Banchas	19,413	14,804	50,051	0.38	0.29
5. Chaubiskud	64,207	37,471	90,236	0.71	0.41
6. Damarkhand	18,876	13,012	38,450	0.49	0.33
7. Kanman Tappa	4,163	2,335	7,354	0.56	0.31
8. Kodhar	17,579	12,215	50,759	0.34	0.21
9. Kotdes	116,325	92,504	404,724	0.29	0.22
10. Kotrahang	35,460	29,246	120,601	0.29	0.24
11. Kurelo	12,916	8,081	26,309	0.49	0.30
12. Lembai	57,597	45,184	162,766	0.35	0.27
13. Matkatpatna	6,709	2,382	7,453	0.90	0.31
14. Oldhar	26,319	12,195	28,117	0.93	0.43
15. Paschimduai	16,650	13,642	55,134	0.30	0.24
16. Purpaduai	20,888	16,559	45,959	0.45	0.36
17. Rahang	96,097	73,992	210,840	0.45	0.35
18. Serai	43,091	32,526	75,313	0.57	0.43
Total—	<u>6,29,550</u>	<u>4,48,789</u>	<u>15,21,891</u>	<u>0.41</u>	<u>0.29</u>

An alternative figure for size of plot has been given, the first inclusive and the second exclusive of the uncultivated area. The number of uncultivated plots is comparatively small, though the area is considerable. It would be difficult to separate out the number without elaborate examination of the records, and as it bears only a very small portion to the total number, its inclusion does much affect the value of the average.

It would appear from the above figures that the average holding comprises seven plots. The average being 351 acres in extent, will comprise on the average 92 holdings and 689 plots.

79. The sadar Subdivision of the Puri District is the south-western section of the Mahanadi delta. It is flanked on the west by the hill country of Khurda, a continuation of the low ranges which separate the Native States of Nayagarh, Khandpara, and Rampur from the valley of the Mahanadi. The boundary between the Sadar and Khurda Sub-division is a well-defined line running close to the foot of the hills and occupied by the Kawakhai and Daya channels. The valley of the Daya is crossed by the hills at two points only—at Dhaulagiri, an isolated peak standing in a detached village of Khurda in North Kotrahang below the bifurcation of the Daya and Bhargabi; and at Jagdalpur, where there is a line of low hills intersected by the new Puri Branch Railway. The highest peak in this range, rising behind the Jagdalpur bungalow and crowned by an ancient Hindu Temple, is about 500 feet above sea level. Dhaulagiri, famous for the *Asoka* inscription carved on a great slab of living rock near its base, is about the same height.

The Sadar Subdivision crosses the Daya at two places only—in North-west Lembai, where it encroaches on the Khurda uplands and encloses the small hills of Kanbagpara Anragarh; and again in West Serai, where it diverges from the river for a distance of 2 to 5 miles and encloses some high land and rocky mounds in Garh Sanput.

With these trifling exceptions, the Sadar Subdivision is alluvial deltaic country, stretching without break from the Eastern Ghâts to the Bay of Bengal.

The main portion of the delta is contained between the channels of the Daya on the west and of the Kushbhadra on the east. Beyond the Kushbhadra valley is a tract of high inferior land where cultivation is varied by stretches of moorland interspersed with patches of forest and scrub jungle. This higher belt forms the watershed between the southern Cuttack and Puri section of the Mahanadi delta. It stretches from the head of the Sadar Subdivision in North Kotdes through parganas Antrodh, Damarkhand, Banchas, and the Kodhar block to the marshes of Killa Marichpur. The Katjuri through its chief offshoot the Devi finds an outlet to the sea in Killa Marichpur through a network of creeks.

In the delta proper lying between the Daya and the Kushbhadra three more or less distinct areas may be distinguished. The Parganas at its head—Kotdes, Kotrahang, and Lembai—are marked by considerable diversity of level. The higher lands are occupied by small patches of forest, by extensive mango, jack, and *palang* groves, and by village sites concealed from view in the foliage of *banyan*, tamarind, and other umbrageous trees. Rice lands of varied levels fill up the intervals. The whole combines to form a pleasing picture, and the eye is nowhere wearied by dull flat expanses of plain country stretching unbroken to the horizon.

As we proceed further south we come to the second zone of the delta. There is here less diversity of level. Woodland scenery is rarer. The village sites are more exposed, and clusters of cocoanut, palmyra, and date palms take the place of the more leafy groves of the north. The only breaks in the monotony of the landscape are caused by the large rivers whose banks are fringed with trees and undergrowth. Parganas Athaisi, Purbaduai, Oldhar, Paschimduai, Rahang, Chaubiskud and Serai lie within this second zone. In the southern extremities of these Parganas where we approach the third zone the aspect of the country is dreary beyond description. The land is flat as the surface of a table; it is only a few feet above sea level, and is mostly subject to river flood which converts whole tracts by turn into inland seas or marshy swamps. The village sites are huddled on the top of isolated mounds, some provided by nature, others constructed or developed by art. The trees, if any, round the homesteads, are seldom more than a group of palms, so few that they can be counted on one's fingers.

The last zone is the area lying beyond the line of cultivation. On the south-east it is a belt of sand along the sea-coast varying from 1 to 4 miles in breadth; on the south-west it is the great expanse of water called the Chilka Lake. Along the coast is a line of sand hills which the rivers of the delta find it difficult to pierce. The Kushbhadra on the east finds an obstructed outlet to the sea; but the Bhargabi, after flowing due south for nearly 50 miles, finds it can make no headway through the shore sand, throwing off some of its volume into the Sar Lake and the Samang Pat, two shallow lagoons to the east and north of Puri town, then turns abruptly to the west and makes its way to the Chilka.

80. The Chilka Lake occupies about one-fifth of the total area of the Sadar Subdivision. It is the great basin into which the rivers of the southern delta empty themselves. On the west it is flanked by the Khurda hills. On the east it is divided from the sea by a belt of sand and a group of low islands formed by silt deposit. A small opening of two or three hundred yards connects its waters with the sea and admits the tide. The lake is fresh in the rains and salt in the hot weather. The depth varies from a few inches to a few feet, and its area fluctuates with the season, with the intensity and duration of the annual river floods, and with the ebb and flow of the tide. The normal area of the portion included in the Puri District may be taken to be 310 square miles and the average depth about 4 feet. An ornate description of the lake and its scenery may be found on pages 22 to 25 of Sir W. W. Hunter's "statistical Account of Puri" and in volume I of the same author's "Orissa."

81. Save in the west, where the Sub-division encroaches on the laterite uplands of Khurda and on the south and east, where the shore sand forms a belt of varying width, the soil of the Subdivision is of the normal alluvial type found in deltaic country. There is every variety of admixture from almost pure sand to almost pure mud. Generally speaking, the lighter soils, the sandy loams, are most abundant in the north of the district, where there is much diversity of level. The black soils are found more widely in the lower levels of the southern Parganas.

There are several native classifications of soils, as viewed from different points of view. Perhaps the most general is the division into.—

Pal land, the riverside silt-enriched soils on which miscellaneous crops of tobacco, sugarcane, *arhar*, *ku'thi*, etc., are grown, and

Jal land, the ordinary rice lands within the embankments.

In the *ruidad* of Pargana Rahang soils are divided into the following classes, which may be taken as typical :—

- (1) *Diha*, homestead land (including the garden as well as the house site).
- (2) *Kala* (black land) lying below the village site; the land over which the washing water of the village is poured and all village refuse is thrown.
- (3) *Gora* (light-coloured land), the ordinary crop land.
- (4) *Nadipatu* (river clay), the land on the river bank enriched by alluvial deposit. (*cf.* *Pal* land above).
- (5) *Sarpatu* (watery land), as for example in the *dahua* tracts of the Sar Lake and the Samang Pat.

There are numerous names again for the different varieties of ordinary crop land according to composition, colour and other peculiarities. I have found the following names in use :—

<i>Balichar</i> .—	Pure sand out of cultivation.
<i>Balia</i> or <i>Baliara</i> .—	Sandy soil just fit for cultivation.
<i>Balia matal</i> .—	Sandy loam, the most common of all soils and varying much in composition and fertility.
<i>Goria matal</i> .—	Soil mixed with pebbles and small stones, usually high land recently reclaimed.
<i>Dudhia matal</i> .—	(milk coloured.—White soil, very friable and fairly fertile; grows fine paddy.
<i>Telia matal</i> .—	A damp clay soil with an oily appearance; fairly common and not unfertile.
<i>Sudh matal</i> .—	Purely muddy soil.
<i>Chaulia matal</i> .—	Brownish soil, very friable; common and fairly fertile.

<i>Pansia matal.</i> —	Ash-coloured soil, not uncommon and also fertile ; very friable.
<i>Kimbhiria matal.</i> —	Slate (crocodile) coloured soil ; something like the preceding.
<i>Telia balia</i> —	Intermediate between <i>balia matal</i> and <i>telia matal</i> .
<i>Dhaulia matal.</i> —	Greyish-white soil.
<i>Nalia matal.</i> —	Red soil.
<i>Haldia matal.</i> —	Yellow soil.
<i>Janha matal.</i> —	An inferior variety of <i>chaulia matal</i>
<i>Hadua matal.</i> —	Coloured like bone, and of hard consistency.
<i>Khulthi matal</i> or	
<i>Khari matal.</i> —	A chalky soil ; fairly fertile.
<i>Chikta matal.</i> —	Sticky, muddy soil ; often found in the bottom of tanks.
<i>Kala matal.</i> —	Black soil, usually of low levels ; the most fertile of all (to be distinguished from <i>kala mati</i> —the land round the village site).
<i>Nunia matal.</i> —	A soil which from some peculiarity of composition becomes saltish in the hot weather. It abounds near the Chilka. The subsoil I suppose gets affected and the saline impregnation gradually pervades the upper soil and gives it a bluish-white apperance.
<i>Nunia.</i> —	(called <i>nuni char</i> while out of cultivation), soil which has been inundated with salt water and has not recovered; may or may not be in cultivation. This is also common in the Chilka side villages.

82. When village notes were compiled in camp, raiyats used to be asked to give estimates of the produce of different soils. These estimates were anything but correct, and always fell much short of the truth. They varied considerably from village to village. I give, for what it is worth, a table which shows for each class the number of times it is mentioned in the village notes and the average produce assigned by the raiyats.

Class of soils.			Number of times mentioned.	Average produce in <i>gownies</i> —4. 6 seer of 80 tolahs.
Balia or	Baliara	....	4	57
Balia	Matal	....	74	95
Goria	Do.	....	1	30
Dudhia	Do.	....	7	83
Telia	Do.	....	11	85
Sudh	Do.	....	25	106
Chaulia	Do.	....	53	95
Pansia	Do.	....	12	100
Kimbhiria	Do.	....	5	88
Telia	Do.	....	5	70
Dhaulia	Do.	....	5	110
Nalia	Do.	....	9	132
Haldia	Do.	....	4	115
Janha	Do.	....	3	90
Hadua	Do.	....	1	120
Khalli	Do.	....	1	80
Chikta	Do.	....	3	90
Kala	Do.	....	19	161
Nunia	Do.	....	15	66
Nunia	Do.	....	5	80

The average for 262 entries comes to 98.7 *gownies*—454 standard seers. This is of course an understatement; an addition of 50 per cent. at least would be required to make the estimates an approach to truth.

83. The range of hills which separate the Native States and the District from the southern valley of the Mahanadi is pierced by that river at Naraj, a village 7 miles above Cuttack town and about 10 miles from the northern angle of the Sadar

River System.

Subdivision of Puri. The Mahanadi, after emerging from the Naraj gorge, throws off to the south one of its chief affluents, the Katjuri, which in its main stream is the principal drainage channel of southern Cuttack. The Katjuri, opposite the town of Cuttack and only a mile or two below the point where it leaves the Mahanadi, is tapped by the Kawakhai which is the head stream of the Puri section of the delta. It has three main distributaries; at Bajiata, about 12 miles from its head; it sends off the Kushbhadra to the left, and at Sadaipur 7 miles lower down, it divides into the Bhargabi continuing south, and the Daya inclining to the south-west. The most easterly of the three rivers, the Kushbhadra, makes its way by a more or less direct line to the sea and forces a sluggish passage through the shore sand about half way between Puri town and the mouth of the Debi river, under which name the parent stream the Katjuri finds an outlet into the Bay. The most westerly of the three distributaries, the Daya, follows more or less closely the base of the Khurda hills and enters the Chilka Lake at its north-east end. The Bhargabi, the central stream of the Puri delta, flows almost due south in the direction of Puri town, and finding itself checked by the shore sand, curves rapidly to the west and seeks the Chilka, into which it discharges itself by a network of channels, some of them linked with the Daya.

84. The remaining rivers of the District are either tributaries and affluents of the three main streams, or local drainage channels. Beginning from

the east corner of the District the following names may be noted. *Killa* Marichpur is drained by the

North-eastern Rivers. Debi and its offshoots the Gadokont, the Magranal and Kotai rivers. The Prachi carries down to the sea the drainage of the border country between the two districts. It is joined at its mouth by the Kadua, another local stream which flows midway between the Prachi and Kushbhadra basins. The Kadua and the Prachi enter the sea between the two Parganas Athaisi and Kurlo. The Kushbhadra receives no important contributions from the east; but, on the west at a point 6 miles from the sea, it receives the whole of the drainage to the Parganas lying between its own and the Bhargabi channels. The Dhanua, with its sub-tributary the Mugai, conveys this large addition of volume to the Kushbhadra, and the point of junction is said to be the lowest point in the delta. The distance of this point from the sea by a direct line is only 6 miles, but as the fall is very gradual, the river adopts a winding course and does not reach its destination till it has carried twice that distance. There is a constant struggle at the Kushbhadra mouth between the river current and the tide. The struggle has resulted in the formation of a sandy bar which effectively checks the river discharge in time of heavy flood.

85. The Bhargabi, which is heavily embanked throughout, receives no tributaries of any note from the point of bifurcation at Sadaipur to its turning point north of Puri town.

Southern Rivers. On the other hand it gives off some of its volume to the Sar Lake by the Bengai and Kanchi *nalas*, and to the Samang *Pat* north of Puri by the Dhauria, East Kania, and Athara *nalas*. The excess spill water of these escape basins is carried by the Harichandan of Suna Mahi river through the sand in a line parallel to the sea front for a distance of nearly 20 miles, when it enters the Chilka near the Chilka mouth. About 10 miles from Puri this channel was joined by a small stream from the north called the "Naya nadi" or "Mew". This small stream was, some forty years ago, artificially connected with the main stream of the Bhargabi, and now as the "Naya nadi" is one of the escape channels of the great river. The Bhargabi after turning to the west thus gives off two affluents to the south-east, viz., the East Kania and the "Naya nadi". The rest of its progress is westward and north-westward towards the Chilka. It sends one offshoot, the South Kania, due west to the Chilka. The main stream then turns north and receives the Rathanchira, a tributary which conveys to it the drainage of the south-eastern half of the country between the Bhargabi and the Daya. Its course is again deflected west, and a network of channels carry its waters to the Chilka at the very point where the Daya enters the lake. The country between the two rivers Bhargabi and Daya has two chief drainage channels, the Rathanchira on the south and east, and the Nun on the north and west. The Rathanchira as remarked above joins the Bhargabi. The main stream of the Nun enters the Daya a few miles above its mouth, but it has

numerous independent creeks connecting it direct with the Chilka. On its left bank the Daya receives several hill streams running down from the uplands of Khurda. The chief of these is the Gangua on the north and the Madagui on the south. The Gungua enters about the 10th mile, and the Madagui about the 28th.

86. All the rivers of the District have one characteristic in common. In the hot weather they are beds of sand with tiny streams or none at all, while in the rains they receive more water than they can carry. This is only the common experience of an Indian river. The particular evils that result in the Puri District will be discussed in a subsequent section of the report.

In Mr. Taylor's report of 1871 on the Orissa Embankments are two statements that show at a glance the distribution of the deltaic rivers, and of the local drainages in the District; and though prepared nearly thirty years ago they give an accurate description of the present order of things.

87. The rivers of the District have from time immemorial been restrained within embankments, and the cultivated lands have been in a more or less efficient degree protected from the disastrous effects of inundation. Before attempting to draw parallels with former times, I will endeavour to give a brief description of the embankments as they exist at present. They are shown on map No. V to understand which it is necessary to know the recognised distribution under the following four classes :—

Class I.— Canal embankments which are intended to be above high flood level marked 0000. (There are none of these in the Puri District).

Class II.— Agricultural embankments mostly above present high flood level which will probably be permanently maintained at their present height; marked -o-o-o-o.

Class III.— Embankments which eventually it will probably be desirable to abandon, but which it is proposed to retain for the present; marked □—□—□—□

Class IV.— Embankments which it is undesirable to retain, as in some cases they are actually harmful and the remainder are of doubtful utility; marked * * * *

Zamindari and abandoned Government embankments used to be shown in the maps by a zig-zag line thus  and classed V, but they have, by recent orders, been expunged from our records and need not be referred to.

It will be seen from the map that only the three principal rivers into which the Kawakhai breaks up, viz., the Daya, the Bhargabi, and the Kushbhadra, are embanked. The Kawakhai has on its right bank a Class IV embankment which is continued for a few miles along the Daya. The embankment is not in good repair and no serious attempt is made to maintain it. For the rest of its course on the right bank the Daya is devoid of embankments. The Kawakhai on its left bank is defended by a Class II embankment up to Baliana, where the Kushbhadra takes off, and by the Pilgrim road which acts as a Class II embankment from Baliana to Sadaipur where the second bifurcation occurs. The Daya left has a Class II embankment from the point of bifurcation to within a few miles of the Chilka. The Bhargabi is defended on its right bank by a Class II embankment continuous from its parting with the Daya to a point a few miles from the Chilka. On the left the embankment is of Class III. Its line is first broken by the unrepaired Adlalad breach in the 6th miles. From Gabkand to the opening of the Kanchi river the embankment is of Class IV. Then follows a series of escape channels and openings near the westward curve of the Bhargabi. Three tracts of country enclosed by these escapes are protected by ring embankments of Class III. The largest is surrounded by the Bhargabi, the East Kania, the "Naya nadi" and the Harchandi river, forming an oblong about 15 square miles in extent. The rest of the left bank of the Bhargabi and its affluent the South Kania is embanked by Class III *bunds* to within a few miles of the Chilka. The last few miles both on the Daya and the Bhargabi are left open because in flood time there is always a heavy backwater from the Chilka, and embankments are useless.

Class IV, and a small stretch of Class III, embankments are shown along the north shore of the Sar Lake and the course of the Bengai river, but they have not been repaired for several years, and under present conditions are useless for the protection of the country lying to the north and east.

The Kushbhadra has a Class II embankment for 6 miles down the right bank, and Class IV embankment not repaired and not continuous for 12 miles down the left bank.

It has been stated in a previous paragraph of the report that the Debi river, an affluent of the Katjuri, enters the District in the extreme north-west corner. There is a short length of combined Class IV and Class III embankment along the right bank at the place where it skirts Kodhar Pargana. This is breached in many places, and it has been proposed, if not already decided, to leave it in disrepair.

From the above it will be seen that the present policy of Government is to effectively protect the large central tract lying between the Daya and Kushbhadra channels, and to leave the rest of the District to take its chance. The tract to the west of the Daya and to the east the Kushbhadra are practically unprotected. The mid tract between the Kushbhadra and the Bhargabi is one only partially protected in the northern half. In the southern half it is exposed to the mercy of the annual floods.

A list of the existing Class II, III, IV and of the abandoned Class V, embankments taken from the records of the Public Works Department forms Appendix G to this report. From this it will be seen that the distribution by classes is as follows :—

Class		Miles.	Feet.	
II	....	97	1,336	To be retained permanently.
III	....	113	3,494	To be retained temporarily.
IV	....	46	1,790	Probably to be abandoned.
V	....	62	1,405	Already abandoned.

The total length of the existing embankments (Class V excluded) is 257 miles 1,250 feet.

As it was only a few years ago that the present policy of abandoning embankments supposed to be useless or injurious was inaugurated, it would have been interesting to contrast the average cost of maintenance before and after, but I have not been able to get the figures necessary for comparison.

In 1896-97 it appears that 257 miles 1,340 feet of Puri embankments were maintained at a cost of Rs. 35,792 or Rs. 139 per square mile as against an average cost of Rs. 247 per mile in Cuttack and Rs. 182 per mile at Balasore. (See Government Resolution No. 209 I. D., dated the 18th February, 1898).

With this we may compare the statements found in the statistical account of Puri that the total length of embankments in 1866 was 316½ miles with 43 sluices, maintained at an annual cost of £7 16, or Rs. 156 per mile; that is, at a total cost of Rs. 49,413.

The figures of a single year taken at random do not however convey much information. In 1896 there were heavy breaches, which swelled the bill of costs.

It has not yet been decided definitely what will be the ultimate fate of the embankments of Class IV. From the revenue point of view, I do not think that it would be judicious to abandon those on the Kushbhadra left, on the Bhargabi left, on the Bengai and on the Sar Lake. But the embankments on the Bengai, the Bhargabi left, and the Sar are more or less useless if the Adlabad Gap remains open. If then it is decided to leave the Adlabad Gap in *statu quo*, there is not much to be gained by maintaining the others.

88. The volume of water poured into the Puri District by the Kawakhai Channel varies enormously from year to year. The carrying capacity of the embanked channels that conduct this water to the Chilka and the sea varies also with the distance from the head of the delta. To properly appreciate the condition of the problem we want to know first what is the estimated discharge from the Katjuri into the Kawakhai in years of high flood. We then want to know the carrying capacity of the distributaries of the Kawakhai at various distance from the head of

Effects of Floods
on Embankments.

the system. Distances of 25 and 40 or 50 miles would supply data from which could be estimated the effect of floods on the upper and lower sections of the District, respectively. The Superintending Engineer of the Orissa Circle has kindly given me some notes from which it appears that the estimated discharge of the Kawakhai at head in the exceptionally high flood of 1842 was computed to be 334,483 cubic feet per second, and that the high flood discharge may in future be estimated at 277,180 cubic feet per second.

In a report made by Major Harris in 1858 the discharge capacities of the Kawakhai distributaries at a point 25 miles from Cuttack were estimated as follows :—

			Cubic feet per second.
Daya	....	....	33,100
Bhargabi	....	....	59,220
Kushbhadra	....	....	9,853
Total	....	....	102,173

After the flood of 1872 it was estimated that in their lower reaches these rivers could only discharge 45,000 cubic feet per second. It is evident, then that even in a year of very ordinary flood when the discharge is, let us say, only half of the high flood discharge, the Puri rivers are unable to contain within their banks the volume of water passed into the District through the Kawakhai even within the first 25 miles; there must be a discharge of the excess. Under present conditions the spill in ordinary years occurs over the right bank of the Daya, through the Adlabad breach in the Bhargabi left, and over both banks of the Kushbhadra about 20 miles below Cuttack. The relief thus afforded prevents breaching of the embankments lower down.

As regards the phenomena to be witnessed in exceptional years we have ample evidence in the flood reports of 1892 and 1896.

The flood of 1892 was remarkable for its intensity, and that of 1896 for its duration. In 1892 the most serious breaches that occurred in the important embankments of the Daya, Bhargabi, and Kushbhadra were the following :—

On the daya Left (Class II) at Madhepur in the 8th mile.

On the Bhargabi Right (Class II) none serious. *Left* (Class III), at Adlabad in the 6th mile; Gabkand in the 23rd mile.

On the Kushbhadra Left (Class II) at Jogisahi in the 1st mile.

These breaches occurred at places that are always weak points in the embankments. The breaches in the Daya left are caused by the return to that river of the great volume of water escaping across the Class IV embankments of the Kawakhai and Daya right bank. The flood water takes the direction of the Gangua *Nala* and returning to the river at a point where the channel is contracted, impinges on the left embankment almost at right angles. After breaching the embankment and the Puri-Khurda Road, the water makes its way across Lembai Pargana. Some of its volume returns to the Daya south of the Jagdalpur hills and again imperils the embankment. The rest seeks the Chilka through the channel of Nu'n river. The left embankment of the Daya has not only to withstand the volume of this returning flood water; it is also endangered by the flood poured against it by the Mandagine, a tributary which in addition to its own volume receives by a sub-tributary called the Rajna much of the flood that has spread over the west Daya tract. Breaches in the lower left embankment of the Daya are thus inevitable in years of heavy floods.

The Bhargabi right (Class II) is the most efficient of the district embankments, probably because on account of the breaching of the opposite bank and the relief so afforded to the river it gets less work to do than any other. It rarely gives way, save in the lowest reaches of the river near the Chilka, where breaches have no serious results and flooding is inevitable.

The Bhargabi left (Class III) is the most troublesome of the embankments. Breaches have occurred so frequently at Adlabad in the 6th mile that since 1895 it has been decided to leave the gap open. The serious results that flow from this policy have been described in detail in the special report on Purbaduai, Oldbar Parganas, and it is hoped that the question will receive reconsideration in the right of its relation to land revenue. The next weakest point is at Gabkand. No breach

occurred here in 1896 because of the relief afforded by the Adlabad gap. The embankment from Gabkand to the head of the Kanchi outlet is shown in the maps as Class IV. I have not seen this portion of the embankment, but hope that it is not proposed to abandon it and intensify the misfortunes of the flood-afflicted Parganas to the east. The relief afforded to the river by the Adladad breach and the escape channels near Puri is such that no breaches occurred in the lower embankment during floods of 1896.

The Kushbhadra left embankment (Class II) is so aligned that breaches are inevitable in years of high flood. The embankments are funnel-shaped from the head of the stream downwards, and the contraction of the flood water volume can have no result but one. It is suggested by the Superintending Engineer in the report of 1896 that a gap be left at the point of breach. This, in my opinion, would be fatal to the prosperity of Kotdes, one of the richest Parganas of the District, accounting for over one-fourth of its total revenue. It cannot be argued that because an embankment is bound to give way in exceptional years, it should not be maintained in ordinary years when its beneficial effects are inestimable. Raiyats will cultivate their lands and pay their rents if they know that they will be protected in ordinary years. They are resigned to the misfortunes of exceptional years, but they cannot be expected to face cheerfully a certainty of calamity.

89. To complete the account of the effects of floods on embankments I make no apology for quoting Mr. Inglis' (Superintending Engineer's note of January 27th, 1897, State of Embankments in 1896. which sums up the existing situation and is to some extent a declaration of policy:—

"8. *Kawakhai Branch*.— The Kawakhai banch leaves the Katjuri on the right bank just below the Ganjam road, and flows though the Puri district. The chief peculiarity of this branch is that it has no large channel leading directly to the sea. The greater part of the water carried by it has to pass to the sea through the Chilka Lake. The channels by which the water is conveyed to the Chilka can in their lower portions carry only about 45,000 cubic feet per second, as compared with 324,483, the estimated discharge of the Kawakhai near its head in the flood of 1872. It is, therefore, obvious that whenever there is a high flood, a considerable part of the Puri district must become a lake for time being".

"The flood entering the Kawakhai is first guaged at Kajipatna. The reading here on 25th July was 81.68 as compared with 82.63 of 1892. Roughly, about three-fifths of the total discharge of the Kawakhai flows into it directly from the Katjuri main stream, and about two-fifths come into it a little lower down across the Ganjam road from the spill over the right bank of the Katjuri. The next guage is at Baliana, 14 miles below. At this place, the Kushbhadra branch leaves on the left bank. The highest reading of the year here was 71.35, that of 1892 having been 73.05. The Kawakhai in this length is embanked throughout on the left bank. There was a small breach in the 10th mile which caused no damage and which was soon closed. On the right bank the Kawakhai is not embked for some distance from its head; lower down there is a more or less continuous marginal embankment, but it is not of much importance, and it is among those which have been scheduled in Class IV. This was overtopped and breached in several places. The Kawakhai continues beyond Baliana for 7 miles as one stream. It then, in Sadaipur, splits up into the Daya, which is the larger stream on the right, and the Bhargabi on the left. This was not breached or overtopped, but some injury was caused by erosion. The highest reading of the gauge at Sadaipur was 53.67 as compared with 55.67 in 1892".

"9. *Daya Branch*.— The Daya branch, commencing at Sadaipur, continues as one stream until it reaches the Chilka Lake. It has a continuous embankment on the left bank which is able to stand a moderate flood such as that of 1895, but is bound to be overtopped and breached in a high flood such as that of the present year".

"10. *Kanti Breach*.— The first breach occurred in the 11th mile. It is 960 feet in length and the scour at the deepest part went down to 34 feet below the crest of the embankment. The gap will be closed either in the former line of bank, or by a ring bund, as may be found more economical. Breaches occurred here in 1872 and 1892 and as the flood way of the river narrows owing to high ground on the right bank just below this place, a breach here is inevitable in very high floods. It does not appear to be within the bounds of practicability, nor, if it were, would it,

in my opinion, be desirable to raise the left embankment to such a height that it may pass all floods without breaching. This being so, there would appear to be only two alternatives—the one to leave things as they are, making good breaches when they occur; the other to construct at suitable sites on the left bank, escapes or overflow weirs, which would give the required relief to the river. The water from this breach passed off along the course of the Nuna river. It is reported to have caused damage to the Khurda-Pipli road, to have breached the newly-constructed railway embankment close to the bridge over the Nuna river, and to have brought down many huts in the villages.

“11. The next breach occurred in the 18th mile. It is 340 feet long and 16 feet deep from crest of embankment. This is said not to have caused much damage. The water passed off down the Nuna river.

“The third breach took place some days after the first two in the 28th mile, and did not cause much damage as the country had already been flooded by the water from the first breach. It was 300 feet long and 16 feet deep”.

“In addition to the above breaches, some damage was caused at several places by erosion, which will have to be made good either by slope cutting with stone pitching or by retired lines of embankment.

“12. At the Kanti gauge, which is 11 miles below Sadaipur and just below the first breach described above, the highest reading of the flood of this year was 37.95 as compared with 37.35 in 1892. In the latter year there were, however, in addition to a breach of 930 feet at the same place as the breach of this year, two other breaches above in the left banks aggregating 700 feet in length.

In this case, as in all others where the gauges are situated below the points at which the embankments breach, the readings are in themselves no criterion of the magnitude of the flood. They are useful as indicating the volume of water passing at a particular point in a particular flood. The right bank of the Daya is now, except for a few miles near the head, open to flood throughout.

“13. *Bhargabi Breach*.—We may now return to Sadaipur and consider the Bhargabi branch. This runs as one stream for 29 miles when, near the point where it is crossed by the Puri road, it throws off on the left bank the Kanchi branch. Further on it throws off also on the left bank the East Kania, the Naya nadi and the South Kania branches, and what is left of the Bhargabi finds its way to the Chilka lake in conjunction with the Daya.

“When I say that the Bhargabi flows as one stream up to the point where the Kanchi takes, I refer rather to past than to present condition. For several years in succession, a breach occurred at Adlabad in the 7th mile of the Bhargabi on the left bank; it was decided last year to leave the breach open. About half the discharge of the Bhargabi passes out through this gap, and will take the course of the Dhanua river, which lower down joins the Kushbhadra. Part of the combined discharge passes directly into the sea through a channel much obstructed by sand, and the remainder has to pass through the Sar Lake and on past Puri parallel with the coast, till it finds an exit through the sand ridges to the sea. With the exception of this gap the water in the Bhargabi was within its banks (natural and artificial) till near its end, where, owing to the water escaping from the breaches in the left bank of the Daya river overtopping the banks, it joined in the general inundation.

“14. *Kushbhadra Breach*.—As has been mentioned above, the Kushbhadra branch takes off from the Kawakhai at Baliana. This channel is now embanked for a few miles at its head, only the embankments lower down having been abandoned as useless.

“The present declared policy is to maintain the embankment on the right bank for a little over 6 miles, and on the left bank only for about half a mile, where it protects a village. As was mentioned in the report on the flood of 1895, there is a weak place in the right embankment closed to the head, where a breach has occurred for several years in succession. This breach was closed by a strong bank in the early part of this year and would probably have stood an ordinary flood. The unusually high flood of this year rose to the crest of the old embankment and broke through a short distance above the new bank. This breach quickly spread and the whole of the old gap was opened out again. It seems a little doubtful whether we should not accept the situation and allow for an escape here. The water escaping

at this place joins that from the Adlabad breach on the Bhargabi and takes the course of the Dhanua river to the Sar Lake. In the meantime the gap will be closed by a strong bank, which is likely to be effective for some years at all events".

90. The notes that have been given in the preceding section refer chiefly to the effects of flood on embankments and take little note of the effects on the country at large. To Mr. Inglis' report is attached a map which shows roughly the area affected by floods and the areas free from flood and is reproduced as map No. I appended to this report. The area which is coloured blue represents the area which was submerged in 1896. The portion of the blue which is shaded with lines represents the area which under present conditions is liable to inundation in years of ordinary flood. The facts may be put briefly thus. In ordinary years the tracts liable to inundation are—

- (1) The West Daya tract, including West Lembai, West Serai and Balbhadrapur (of Khurda Subdivision); results serious.
- (2) The Dhanua basin, including the greater portion of Parganas Purbaduai, Oldhar, Matkatpatna and a small portion of Kotdes and Rahang Parganas; results serious.
- (3) The Samang *Pat*, north of Puri, suited for *dahua* cultivation. The inundation is a necessity, not an evil.
- (4) The lower reaches of the Kadua and Prachi rivers; damage slight.
- (5) Portions of Parganas, Kodhar, Kurelo, Tapa Kanman. This is due to the inefficient state of the Khas Mahal and Public Works Department embankments on the south bank of the Debi.

The effects of inundation are most disastrous in tract (2), where the water lodges for a longer period than elsewhere on an account of the inability of the Kushbhadra to discharge its volume quickly. It is also by far the largest of the tracts, and the annual loss of Government revenue, if the existing policy, is continued, cannot be estimated at less than Rs. 4,000. The loss of zamindars and raiyats is many times that amount, but cannot be gauged and reduced to figures.

In years of extraordinary flood the only portions of the District not liable to inundation are —

- (1) Kotrahang.
- (2) Paschimduai
- (3) East Rahang.
- (4) South-East Chaubiskud.

The whole of the rest of the District is converted into a lake for the time being. The effects are least disastrous in the northern Parganas where the ground fall is sufficient to carry off flood water before irremediable damage has been done. Kotdes, Lembai, Antroth, Damarkhand and Banchas may be placed in this category. The Parganas further south are liable to suffer very heavy loss of crops. The loss in bad years is unusually total in those Parganas which even in ordinary years are subject to flood.

The problem of protecting the District from river inundation is a difficult one. It cannot, I think, be said that the present situation is very satisfactory, and it will not I believe be accepted as final. The problem is to conduct a given amount of water from the head of the district to the Chilka and the sea by channels that reduce to a minimum the chance of danger to the cultivated area.

In ordinary years the embanked channels of the Kawakhai distributaries are equal to the task. In extraordinary years they are unequal to it. The object to be aimed at is to conduct the excess water in directions by which it will do least harm. At present it is allowed to spill into low-lying areas, where the results are most harmful, while on the other hand complaints are made that where flood water is wanted on the shores of the Chilka to neutralise the salt impregnations of the hot-weather tides, a sufficient supply of river water is not now obtainable.

I make the above remarks with all due deference to the opinion of experts, as the problem is surrounded with professional difficulties which I have not the technical knowledge to estimate. It is further complicated by the claims of other tracts and by the want of funds. My chief object is to draw attention to the extent of the damage that is caused in certain areas by the present arrangement.

A careful perusal of the Departmental Reports of recent years leads me to think that the damage in these areas has not been fully realised and considered.

91. A word should be added about the liability of certain tracts to salt inundation. All the rivers of the District, whether they enter the Chilka or the sea, run dry in the hot weather and are then liable to have salt water forced up their channels by the action of the tides and the strong breeze which blows from the south for several months of the year. When the rivers are embanked and the tides high and the breeze strong, the salt water overflows and does much damage to the cultivated fields. The tracts specially liable to this misfortune are a belt of about 5 miles round the shore of the Chilka in Parganas Chaubiskud and Serai and the lands situated on the lower reaches of the Kushbhadra, the Prachi, the Kadua and the tidal creeks of the Kodhar block.

Fields deeply submerged do not recover fertility for a period of three or four years. The crops are therefore precarious in tracts liable to this visitation. For such areas river inundation is highly beneficial. The saline impregnations get washed out of the soil by river flood, and the effects of tidal flood are counteracted. But for this happy contingency many large stretches of country would doubtless lie west along the Chilka shore. There have always existed salt embankments in a more or less fragmentary condition. An attempt was made in 1896 to improve these *bunds*, but the work was not completed. The subject has been fully discussed in the Khas Mahal reports of Serai and Chaubiskud Parganas, and I understand that an effort will be made in the cold weather of 1898-99 to complete the line of empankments. (Written in July, 1898).

92. Mr. Taylor's embankment report of 1871 supplies a mass of interesting information regarding embankments as they existed then and as they were shortly after the last Settlement. His report embodies the results of enquiries made at the suggestion of the Embankment Committee which sat after the great famine of 1866-67. The object of the enquiry was to ascertain what obligations had been imposed on Government by the Settlement of 1837 as regards the up-keep of embankments, and to report how these obligations were being fulfilled. Mr. Taylor found as regards Puri that Government had now here covenanted to either construct embankments or to maintain them in repair, but he states that as a matter of fact "it has always been the custom for the Government to construct and keep up any embankment that might be required."

All the existing embankments were elaborately measured, described and detailed and suggestions were made for their improvement. It does not appear that save in the matter of the Adlabad breach, the embankments of 1870-71 were in a better or worse condition than at present. The Daya right had practically been abandoned; the Daya left, the Bhargabi right and left were maintained in good repair. The Kushbhadra right for about 13 miles was in good condition and the left was in great disrepair. The embankments on the smaller streams, some described as Government and some as zamindari embankments, were all in a state of great neglect; the Chilka embankments were in a condition almost exactly analogous to that of the present year.

Mr. Taylor gives some interesting extracts from a report made on the Puri embankments in 1858 by Captain Short, Superintendent of Bengal Embankments (pages 73-76). The Parganawar statements prepared by Captain Short show that the condition of the District in his times was worse than it is at the present day. It is curious to note that in discussing the case of Pargana Kotdes he uses the words—

"Before such large volumes of water found their way down the Kawakhai (via the Katjuri river), this Pargana could be irrigated and drained at pleasure, but of late years it has suffered in the extreme from the floods breaking the embankments and topping the Puri road, but when the equilibrium is restored at the head of the delta and a supply of water given commensurate with the channel the prosperity of this tract will be restored."

This indicates that a few years before the words were written (probably before the great flood of 1855) the volume of water carried through the Puri District was much less than it was in 1858 and than it is now. Both in 1858 and later in 1871 there was under consideration a plan of erecting a weir across the head of the Kawakhai to regulate the Puri water-supply.

The cost was estimated in 1871 at one lakh of rupees, equal to two years' cost of the annual repairs which then amounted to Rs. 50,000. The project has long ago been abandoned.

From Captain Short's statement it may be gathered that the Kodhar embankments were much neglected, and the country seriously liable to inundation.

Kotdes suffered from breaches in the Kawakhai and Kushbhadra embankments.

Paschimudai was suffering from breaches in the Bhargabi embankments.

Purbaduai was two-thirds lying waste, and of *Oldhar* only one-seventh was cultivated on account of the disrepair of the Bhargabi, Sar Lake, Bengai and Dhanua embankments. (The condition of these two Parganas was worse if possible than at present).

Rahang was liable to serious inundation, and the only remedy suggested was the regulation of the Kawakhai discharge.

Kotrahang had suffered serious damage of late years and there could be no remedy save that suggested in Rahang.

Lembai was in the like condition to Kotrahang and Rahang.

Serai and Chaubiskud were very unfavourably placed on account of the absence of salt embankments.

Astrang } Were beyond the influence of the embanked rivers.
Kanman } but not protected from the local streams, and various
Damarkhand } improvements were suggested. Compared with the above,
Banchas } present conditions show considerable advance and improve-
Matkatpatna } ment. From the hopeless way in which Captain Short speaks
Antredh } of any policy other than that of regulating the supply at the
head of the delta, it would appear either that the volume of water passed by the Kawakhai is now less than it was in 1858 or that the plan suggested was of his own devising and was commended to the exclusion of others. Whether it is a solution applicable to the present situation, it is for others to say; my intention in examining these old records was merely to ascertain whether zamindars and raiyats have any grounds for making the suggestion that in the earlier years of Settlement revenue and rents pressed less heavily than now, because of the greater efficiency of the embankments. Whatever may have been the position prior to 1855 it would seem that at least since that year the reverse has been the case, and that with the exception of the single tract affected by the Adlabad breach, zamindars and raiyats are much better off now than they were thirty or forty years ago.

93. There are three stations for the registration of rainfall in the Sadar Sub-division, viz, Pipli, Puri, and Gope.

Rainfall and Temperature.

The following table shows the distribution of the rainfall month by month at the three registering stations, (1) normal, (2) for 1897:—

Name of Mont	Puri.		Pipli.		Gope.		Average.	
	Normal.	1897.	Normal.	1897.	Normal.	1897.	Normal.	1897.
January		·28	....	0·33	Nil	0·25	0·28	Nil
February		0·78	4·25	0·38	·30	0·51	0·55	1·87
March		0·61	2·55	0·82	4·78	0·62	0·68	3·58
April		0·45	0·08	0·20	Nil	0·11	0·25	0·10
May		3·02	1·40	3·56	0·96	4·40	3·66	0·78
June		8·06	5·12	8·17	4·35	7·81	79·6	4·50
July		9·80	19·91	10·92	14·06	10·53	10·41	17·44
August		10·38	9·57	13·58	8·61	12·06	12·20	8·33
September		10·36	6·59	10·59	4·54	11·65	10·86	5·25
October		8·90	8·17	5·60	8·38	6·92	7·14	8·83
November		3·48	7·58	2·05	2·03	5·08	5·53	4·57
December		0·80	0·14	0·22	0·29	0·24	0·32	·17
Total		56·92	65·36	56·42	48·30	60·18	57·84	55·42

It will be seen that in normal years the variations are very slight between one station and another. This is as one would expect in a flat country where the interval from one station to another does not exceed 25 miles. In 1897 there

was excess rain at Puri and a slight defect at Pipli and Gope, but the rain was well distributed and a bumper harvest all over the District was the result. In 1896 the rainfall was heavier than normal, but there was practically nothing after August. The heavy rains of June and August caused floods which injured the crops, and the subsequent drought completed their ruin.

Puri Town is situated on the shore of the Bay of Bengal and its temperature is equable all the year round. It rarely falls below 70° or rises above 90°. In the hot weather a strong fresh sea breeze blows up from the south and renders a temporary stay there an agreeable change from the accustomed heat of the plains. Puri cannot yet be styled a hot-weather resort or a favourite watering-place of Bengal. It has been, till lately, too much out of the world to be of much importance, but it is now connected with the East Coast Railway by a branch line, and already there are indications that Puri will be sought after in the hot weather. When railway communication with Calcutta has been established we may expect it to become a place of pilgrimage to seekers after health as well as to devotee Hindus.

Puri Town is situated in the South of the district, while Cuttack is only 7 miles from the northern extremity. The temperature of the district generally may be supposed to lie between that recorded at Cuttack and that recorded at Puri. I give in tabular form a note about the temperature of 1897 for which I am indebted to Meteorological Reporter of Bengal:—

MONTH.	PURI.			Variation between Puri and Cuttack.		
	Maximum.	Mean.	Minimum.	Maximum.	Mean.	Minimum.
January	 82.3	73.8	65.1	- 4.7	- 1.3	+1.9
February	 85.7	79.8	73.8	- 6.5	- 1.5	+3.5
March	 87.2	81.9	76.6	- 8.9	- 3.0	+3.0
April	 90.7	85.1	79.5	- 9.2	- 3.6	+2.1
May	 91.0	86.0	81.0	- 10.8	- 6.2	+1.5
June	 89.9	85.6	81.0	- 8.1	- 4.1	- 0.3
July	 88.5	83.9	79.4	- 3.1	- 1.6	+0.1
August	 87.6	83.4	79.2	- 0.3	+0.4	+1.0
September	 89.5	84.8	80.1	+ 1.6	+1.8	+1.9
October	 88.8	82.8	76.7	+ 0.7	+1.3	+1.9
November	 83.5	76.1	68.7	+ 0.2	+1.1	+2.0
December	 79.6	69.9	60.2	+ 0.5	+1.7	+2.9
Average	 87.0	81.1	75.1	- 4	- 1.2	+1.5

It will be seen that it is only in the daytime and for six months of the year that Puri has an advantage over Cuttack. During the months of August to October residence in Puri is very trying. The temperature is high, the atmosphere laden with moisture and the breeze which blows strong in the hot weather, is absent. It is curious that, taking the whole year round, Puri should have a maximum average 4 degrees below Cuttack, and a minimum average 1½ degrees above Cuttack. This alone shows within how narrow limits the Puri temperature ranges.

94. The climate of the sadar subdivision is generally salubrious; save in certain swampy tracts of the Chilka, it is free from malaria.

Perhaps the Subdivision can be divided climatically into four tracts—the northern Parganas, free from water-logging in the rains, are the healthiest; the flooded Parganas of the south are often submerged for over a month, and cannot but be unhealthy when the water is draining off and drying up; the coast belt, though always cool is often unpleasantly moist and is apt to be enervating after long residence; the Chilka belt is damp in the rains and the atmosphere is disagreeably saline in the hot weather. On the whole there is not much to complain of; I may add the testimony of personal experience by saying that I have been in the District

for the better part of the last six years and have been to every nook and corner of it without contracting illness of any form.

95. The total area of the temporarily-settled Parganas, excluding detached lands of *killa khurda*, is 651,300 acres. Of this
 Extent of cultivation. 463,800 acres are cultivated, 33,600 acres are culturable, and 153,900 acres are unculturable. A copy of the *milan khasra* statements by Thanas is given in Appendix E. As, from a Collector's point of view, the Pargana statements have most interest, I extract from them the following statements which show for each Pargana in Puri the proportional percentage of cultivated, culturable and unculturable land :—

Name of Pargana.	Percentage of cultivated to total area.	Percentage of culturable but not cultivated.	Percentage of unculturable.
1. Antrodh	79.	7.7	13.2
2. Astrang	49.4	23.8	26.8
3. Banchas	76.2	6.8	17.
4. Chaubiskud	58.24	5.57	36.29
5. Damarkhand	68.9	14.9	16.2
6. Kodhar	69.4	8.8	21.8
7. Kotdes	79.4	2.1	18.5
8. Kotrahang	82.3	2.5	15.5
9. Kurelo	62.5	15.5	22.
10. Lembai	78.3	4.1	17.6
11. Matkatpatna	35.5	6.3	58.2
12. Oldhar	46.3	3.7	50.
13. Paschimduai	82.5	2.	15.5
14. Purbaduai	79.2	5.4	15.4
15. Rahang	75.5	1.8	22.7
16. Serai	75.5	5.3	19.2
17. Tappa Kanman	56.	13.4	30.6
18. Athaisi	38.6	8.3	53.1
Total*	71.	5.1	23.9

The Parganas in which the percentage of cultivation most exceeds the average are Paschimduai and Kotrahang, which are both well protected by embankments from river flood. Kotdes, which is partially protected, comes next, and Purbaduai follows Kotdes. It must be said that the figures do not truly represent the present situation, and that, since the first Survey was made, much land has been thrown out of cultivation on account of the calamitous floods of recent years. Parganas Antrodh, Banchas, Lembai, Rahang and Serai are partly protected by embankments and partly exposed to flood. In Pargana Serai some of the land shown as cultivated has gone out of cultivation.

Of the Parganas in which the percentage falls below the average, Damarkhand, Kodhar and Kurelo run the average close. For the low percentages obtaining in other Parganas there are special reasons. Thus in Matkatpatna which has the lowest figure of all, and in Athaisi which is not much better, about half of the entire area consists of a belt of shores, and varying from 2 to 4 miles in width in which cultivation is a physical impossibility. The same reason applies to Oldhar, and in a lesser degree to Tappa Kanman, Astrang and Chaubiskud. In all these four last Parganas there is also considerable liability to inundation either from river or salt floods.

Of the Thanas, Pipli, which includes Kotrahang, Lembai, Paschimduai and Kotdes, is most highly cultivated. The percentage is 76. Thana Gope, which includes Athaisi, Astrang, Oldhar and Matkatpatna, as well as Antrodh and Banchas, is the least highly cultivated. The percentage is 62 as against 70 in Thana Puri, which contains Rahang, Chaubiskud and Serai.

* For all the cadastrally surveyed portions of the subdivision as in Appendix E.

The percentage of land that has been shown in the *milan khasra* statements as culturable is exceedingly small, only 5.1 per cent. for the Subdivision. This is probably an understatement. It may be expected that a large slice of the 23.9 per cent. entered as unculturable will gradually be reclaimed as the increase of population presses harder on the resources of the soil. It is noticeable that in the five Parganas situate in the north-east corner of the district, viz., Astrang, Damarkhand, Kurelo, Tappa Kanman and Kodhar, the highest percentages of culturable lands are shown. There is a considerable amount of low scrub jungle in these Parganas, and much of this has probably been entered as culturable. The differentiation between culturable and unculturable obviously depends much on the individual opinion of the officer in charge of the survey party. The amins working in the five Parganas were probably working under the supervision of one and the same Officer.

96. There are two sources from which the extension of cultivation since last settlement can be estimated. The first and less reliable guide is a comparison of the Survey records of 1837-41 with the present *milan khasra*. More reliable information is to be obtained by comparing the assessed areas of estates according to the records of the last and of the present Settlements. The Survey record of course refers to a larger area, to the whole of the temporarily-settled Parganas. The Settlement records refer exclusively to temporarily-settled estates situated within the temporarily-settled Parganas. I make the former comparison by Parganas and the latter by completion blocks.

The Survey comparison gives the following results :—

NAME OF PARGANA.	ACCORDING TO SURVEY OF 1837-41.		ACCORDING TO PRESENT SURVEY.		Percentage of increase of cultivation.	Proportion of present cultivated to total area.
	Total area in acres.	Cultivated area in acre.	Total area in acres.	Cultivated area in acres.		
1	2	3	4	5	6	7
1. Antrodh	33,926	26,352	34,054	26,909	2.1	79
2. Astrang	5,594	2,728	5,743	2,839	3	49.4
3. Banchas	12,329	14,294	19,413	14,804	3.5	76.2
4. Chaubiskud	67,498	20,341	64,220	37,484	84.2	58.24
5. Damarkhand	18,767	12,356	18,876	13,012	5.3	68.9
6. Kodhar	17,406	11,664	17,574	12,210	4.7	69.4
7. Kotdes	1,16,194	86,020	1,16,296	92,455	7.4	79.4
8. Kotrahang	35,728	17,913	35,666	29,346	63.8	82.3
9. Kurelo	12,806	7,033	12,916	8,081	14.9	62.5
10. Lembai	57,580	30,807	57,575	45,161	46.6	78.3
11. Matkatpatna	6,915	2,203	6,709	2,383	8.1	35.5
12. Oldhar	26,331	1,875	26,319	12,195	550.4	46.3
13. Paschimduai	16,589	5,613	16,650	13,642	143.	82.5
14. Purbaduai	20,802	4,283	20,888	16,559	286.6	79.2
15. Rahang	95,679	67,480	96,150	72,503	6.9	75.5
16. Serai	43,308	23,356	43,091	32,526	39.3	75.5
17. Tappa Kanman	4,208	2,024	4,163	2,335	15.8	56
18. Athaisi	33,289	11,975	33,363	12,893	7.7	38.6
Total	6,24,949	3,48,317	6,29,666	4,47,337	28.4	71.6

A comparison, however, of Survey figures with Settlement figures renders the distribution of areas in the former exceedingly doubtful. The Settlements were made within a year or two of the Survey. They were made by responsible officers working on the spot, and the mistakes of the Survey amins were cleared up before assessment was made. The Settlement records show a very different state of things from that shown by the Survey. I give below, by completion blocks,

a comparison with last Settlement, and add a column to show how widely the results differ from the figures of the previous statement :—

Name Block	Completion	AT LAST SETTLEMENT.		AT PRESENT SETTLEMENT.		Present age of increase in assessed area.	Percentage of present assessed area to total area.
		Total area in acres.	Assessed area in acres.	Total area in acres.	Assessed area in acres.		
1		2	3	4	5	6	7
1. West Athaisi and....							
Matkatpatna		10,612	3,405	10,660	3,883	14.0	6.4
2. East Athaisi and							
Damarkhand		32,507	13,397	36,453	18,027	34.5	49.4
3. Banchas		12,577	3,818	12,742	9,194	17.6	72.2
4. Kodhar		25,896	11,574	25,951	15,934	37.7	61.4
5. Lembai		54,926	35,131	53,123	44,327	26.2	83.4
6. Rahang		62,215	58,100	68,764	54,540	13.4	79.3
7. Kotdes, including							
Antrodh		1,21,006	78,020	1,22,981	97,552	25.0	79.4
8. Kotrahang		27,632	20,005	28,041	23,305	16.5	83.1
9. Paschimduai		11,093	7,704	11,578	9,431	27.3	81.4
10. Chaubiskud		43,345	23,990	56,570	30,873	28.7	54.6
11. Serai		41,653	25,398	40,310	31,384	23.6	77.8
12. Purbaduai, Oldhar		37,754	14,415	37,787	18,340	27.2	48.5
13. Scattered estates		14,916	11,247	15,217	13,780	22.5	75.0
14. Estates with lands in Cuttack.		3,024	2,237	3,086	2,751	23.0	74.0
Total		4,99,155	3,02,441	5,23,263	3,73,321	23.4	71.3

The Settlement figures are much more reasonable and much more intelligible than the Survey figures. While they show a total increase of 23.4 per cent., not differing widely from the total according to Survey records, they distribute the extension much more evenly over the whole district. The increase does not fall below 13 per cent. nor rise above 38, whereas according to Survey records, it ranges from 2 per cent. to 550 per cent. The Parganas in which there has been least increase have been west Athaisi, Matkatpatna, Banchas, Rahang and Kotrahang. These, except Kotrahang, are Parganas in which Survey records also showed little advance. It is worthy of notice that in Kotrahang, one of the first Parganas to be assessed, a considerable area lying fallow but culturable, was assessed to rent by the Settlement Officers of 1837. The Parganas in which the extension is notably above the average are Kodhar, Kurelo, Tappa Kanman, Astrang and Damarkhand. The area available for reclamation in all these Parganas was extensive.

At the last Settlement three-fifths of the total area of the temporarily-settled estates was brought under assessment. The proportion has now risen to over seven-tenths, and, as has been stated in paragraph 95 of the report, of the remaining three-tenths, only about one-sixth is capable of reclamation. The reclamation of new land during the sixty years of the last Settlement was a prolific source of advantage to zamindars and proprietary tenure-holders. In this district it was almost the sole cause of the increase of assets which has rendered the present enhancement of Government revenue possible. This source of increase has now almost been exhausted, and for at least fifteen years of the new Settlement proprietary income and estate assets must remain practically stationary.

Composition of the unassessed area at last and present Settlement.

in the following statement :—

97. The composition of the unassessed areas at the last and the present Settlement is shown

LAST SETTLEMENT.	Area in Acres.	percentage.	PRESENT SETTLEMENT.	Area in Acres.	Percentage.
Unculturable waste.	1,76,000	31.2	Unculturable lands	84,800	16.2
(<i>nalaiik padia</i>).			Jungle	13,800	2.6
Culturable waste	4,600	.9	Old fallow	20,100	3.8
(<i>laikpadia</i>)			Grazing reserve	19,800	2.3
Jungle	25,600	5.1	Cremation reserve	1,500	.3
<i>Minha</i>	3,400	.7	Current fallow	4,400	.8
<i>Jagir</i>	7,100	1.4	Tanks and miscellaneous	500	.1
Total unassessed	1,96,700	39.3	Orchards	1,400	.2
Total assessed	3,02,400	60.6	<i>Minha</i>	1,900	.4
			<i>Jagir</i>	1,800	.3
Total	4,99,100	100	Total unassessed.	1,50,000	27.0
			Total assessed.	3,73,300	73.0
			Total	5,23,300	100

Nalaiik padia appears to have been a description that was not applied with any pretence to accuracy. Nearly one-half of the area must have come under cultivation during the sixty years of Settlement. It is probable that in the same way, though to much more limited extent, the present term "unculturable" will be found to be a misnomer. The small areas under jungle and orchard will be noted.

98. Appendices E and F give, Thana by Thana, the crop statement of the Sadar Subdivision (the permanently-settled Parganas excluded). From this has been extracted the following statement, which shows for each Pargana the proportionate distribution of the principal crops :—

NAME OF PARGANA	Percentage of early rice.	Percentage of winter rice.	Percentage of spring rice.	Percentage of <i>mandia</i>	Percentage of <i>kulthi</i> & other pulses.	Percentage of <i>bari</i> .	Percentage of orchards.	Miscellaneous.	Percentage of double-cropped area to net cropped area.
1	2	3	4	5	6	7	8	9	10
1. Antrodh	7.4	70.8	0.3	3.7	11.8	3.3	1.8	0.8	9.7
2. Astrang	3.1	82.2	0.3	4.4	4.1	4.3	1.3	0.6	3.5
3. Banchas	2.6	78.8	1.4	3.8	6.5	3.6	2.3	1.0	5.7
4. Chaubiskud	0.7	88.0	2.6	0.8	1.9	1.7	4.0	0.3	1.4
5. Damarkhand	5.8	74.4	1.7	3.0	8.4	3.7	2.0	1.0	6.2
6. Kodhar	5.5	75.8	0.2	4.5	6.6	3.4	2.1	1.9	5.2
7. Kotdes	8.4	66.3	0.1	0.4	16.7	4.2	3.4	0.7	18.7
8. Kotrahang	10.1	61.7	0.3	3.5	14.9	3.6	4.7	1.2	15.9
9. Kurelo	8.2	61.4	1.5	7.9	10.2	5.9	2.7	2.2	7.0
10. Lembai	6.2	74.4	0.2	0.3	12.3	3.5	2.5	0.6	10.8
11. Matkatpatna	4.0	72.4	9.1	2.0	4.6	3.1	2.2	2.5	2.7
12. Oldhar	2.4	48.1	31.7	1.6	2.9	2.2	1.9	1.2	2.3
13. Paschimduai	19.1	44.7	1.2	0.9	24.2	3.5	4.7	1.7	30.9
14. Purbaduai	4.2	78.5	1.5	3.1	7.8	3.1	1.3	0.5	6.6
15. Rahang	1.7	72.7	8.8	1.1	4.4	2.3	8.1	0.9	3.1
16. Serai	1.5	89.5	4.2	0.4	1.8	1.5	0.8	0.3	1.6
17. Tappa-Kanman	7.9	68.0	0.3	6.1	6.7	5.1	1.8	4.1	9.2
18. Athaisi	6.1	69.6	4.8	4.7	7.2	3.4	2.4	1.8	6.9
Total	6.3	78.4	3.5	1.9	10.9	3.3	4.1	0.4	9.3

From the Subdivisional total it will appear that winter rice (*sarad*) is grown on 78.4 per cent. of the total cropped area. The proportions of early (*biali*) and spring (*dalus*) rice are very small. The pulses occupy 10.1 per cent. of the total area. The two chief pulse crops are *kulthi* and *mung*. It is unfortunate that separate figures have not been prepared for each of these crops. My impression gathered from touring about in the district, was that the larger area is occupied by *kulthi*, but some Assistant Settlement Officers were of opinion that there is a preponderance of *mung*. In estimating below the food-supply of the district, I have

assumed that the two occupy equal areas. The area grown with *mandia* is very small. *Bari* lands and orchards cover 3.1 and 3.4 per cent. respectively of the cropped area. The area that is double cropped is 9.3 per cent. of the whole. There is, however, considerable reason to believe that the area shown as double-cropped and consequently also the areas shown as grown with *mandia* and pulse crops are under-estimates. It has always struck me while on tour that a very much larger proportion than 10 per cent. of the cropped area was cultivated in the cold weather with *mardia*, *kulthi*, *mung* and *biri* crops, and this impression has been corroborated by statements of Assistant Settlement Officers and Kanungos, who say that when Survey operation was first commenced—that is, in 1889-90—*raiya*ts and *zamindars* combined together wholesale to conceal the double-cropped area, and for two or three years refrained from growing winter crops. It was fancied that the new assessments would be a *fasal-bandhi* assessment, and much was to be gained by concealing the *dofasali* land. As the assessment has been made on the basis of existing *pahi* rents, *raiya*ts and *zamindars* have gained nothing by the fraud, but we have been deprived of data from which the true food-supply of the District can be estimated. Varying estimates of the true *dofasali* area have been given to me by different officers. Some have placed the proportion as high as 33 per cent. I do not think that it can be much less than 20 per cent.

Keeping these general remarks in mind, we may now look at the distribution of crops by *Parganas*. The figures which disclose most striking divergence from the normal have been in the statement put in bold figures and may be briefly noticed as follows:—

Early rice is grown in largest quantities in *Parganas* Kotrahang and Paschimduai. These are both protected *Parganas* of very varied level with a considerable proportion of high land. The *Parganas* in which least *biali* is grown are Rahang, Serai and Chaubiskud, which are all situated round the lower reaches of the great rivers at the point where they enter the sea and the Chilka. The lands of these *Parganas* are low-lying and flat and consequently not suited to early crops.

Winter rice is the principal crop in all *Parganas*, but the most striking preponderance is in the two *Parganas* Serai and Chaubiskud which grow least *biali*.

The proportion is lowest in Oldhar, which contains extensive *dalu*a lands, and in Paschimduai with its larger *biali* and pulse-cropped areas.

Spring rice is grown in very small areas except in *Parganas* Oldhar, Matkatpatna and Rahang, Oldhar *Pargana* includes the Sar Lake, a fresh water lagoon into which the Bhargabi discharges through its escape channels, the Bengai and Kanchi rivers. The lake is about 6 square miles in extent and very shallow, and a large portion is cultivated with *dalu*a in winter months. In Matkatpatna the presence of the Kushabhadra river which runs through the *Pargana* enables some *dalu*a lands to be irrigated up to February or March, after which date the river becomes tidal. In Rahang *dalu*a is grown chiefly on the Samang-pat, a large expanse of low lying country north of Puri town which gets flooded annually from the Bhargabi through the Dhanua, East Kania and Athar-nala escape channels.

Mandia is grown in comparatively small areas chiefly as a second crop. It will be noticed that it favours most the north-east *Parganas*, Kodhar, Kurelo, Tappa Kanman and Astrang (included in the Kodhar block), and Athaisi, which adjoin Cuttack.

Kulthi, *mung* and *biri*, the principal crops of the Pulse group, are grown chiefly on double-cropped land, and therefore most extensively in *Parganas* Kotdesh, Kotrahang and Paschimduai, which alone have exceptionally large double-cropped areas. The very small areas covered by pulse crops in *Parganas* Chaubiskud, Oldhar, Rahang and Serai are, as I have said above, probably less than actual.

Homestead lands and gardens are diffused more or less evenly over the Subdivision. The area is conspicuously small only in Chaubiskud and Serai. These two *Parganas* are situated close to the Chilka. I have noted in the general description how the village sites in this tract consist of bare isolated mounds rising only a little above the general level.

Orchards, like homestead, are more or less evenly distributed. The area is noticeably small in Serai Pargana. It is large in Chaubiskud, because there is a large tract lying between the cultivated land in the heart of the Pargana and the belt of sand to the south-east which is covered with scrub jungles and fruit trees.

Orchards.

Miscellaneous includes a multitude of crops which are all grown on areas so small that percentages if calculated would not be of any particular interest.

Miscellaneous.

The chief miscellaneous crops are castor oil, sugarcane, cotton, indigo, *pan*, tobacco and vegetables.

The castor plant is grown in small quantities in all Parganas. Its cultivation is most extended in Athaisi and least in Serai.

(i) Castor-oil.

Sugarcane is, according to Survey records, grown in all parganas except Chaubiskud, Serai and Matkatpatna. It is probably cultivated in portions of these three Parganas, but has escaped the notice of the Survey amins. The sugarcane areas in Parganas Athaisi, Kurelo and Tappa Kanman are relatively greater than else where.

(ii) Sugarcane.

Cotton is grown in small quantities in all Parganas except Oldhar. There is very little in Matkatpatna, Serai, Chaubiskud and Paschimduai. The area is relatively greatest

(iii) Cotton.

in Kodhar Pargana.

Indigo (included under "Dyes—other") is grown in very small quantities in 13 out of the 18 Parganas of the Sub-division. It is found chiefly in Kotdes Antrodh, Kotrahang and Damarkhand.

(iv) Indigo.

Pan (Betel) is grown in small quantities in ten Parganas—chiefly in Damarkhand, Rahang, Lembai and Kotrahang.

(v) *Pan* (Betel)

In north-west Damarkhand there is a *pan*-growing centre at a place called Narsingpur. Cultivation has extended much of recent years and the particular variety grown there has established for itself popularity in the Cuttack and Calcutta markets, and is known by its local name as "Narsingpur *pan*". The *pan*-gardens of Kotrahang, Lembai and Rahang are to be found chiefly close to the Jagannath Road. The *pan* grown in these gardens is sold to pilgrims and exported to Puri town.

Tabacco is grown in 11 Parganas. The largest areas are in Kotdes, Rahang and Paschimduai. The tabacco grown is for the most part consumed locally.

(vi) Tobacco.

Vegetables (included under "Miscellaneous crops—Food—others") are grown everywhere on riversidelands and lands adjoining the village sites. The areas are relatively large

(vii) Vegetables.

in Rahang, Kotdes, Kotrahang, Lembai and Paschimduai which are traversed by the principal rivers of the district and have extensive village sites. They are infinitesimal in Damarkhand, Astrang, Kurelo, Tappa Kanman, four of the north-eastern Parganas. The chief varieties are mentioned in Mr. Nathan's note quoted above.

99. Mr. Nathan gives the following estimate of outturn per acre of the different classes of paddy :—

Outturn of crops.		Gauni.		Standard seers
<i>Biali</i>	....	20 to 120	average	322
<i>Chota laghu</i>	....	50 to 60	"	253
Medium <i>laghu</i>	....	100 to 120	"	506
<i>Bara laghu</i>	....	140 to 160	"	690
<i>Sarad</i>	....	200 to 220	"	966
<i>Bara dhan</i>	....	200 to 240	"	1012

Very few crop experiments have yet been made in Puri District, and it is therefore impossible to say how far these estimates which are based on enquiries made from cultivators can be accepted.

The only Puri experiments of which I could find records are the following:—

		Average
Four made by Assistant Settlement Officer Babu	Jatindra Mohan Sinha.	outturn in seers.
	....	669
Five made by Assistant Settlement Officer Babu	Sudarsan Das	....
	....	882

The general average of these experiments is nearly 800 seers.

As the Puri lands are none of them irrigated by canals, we may compare the averages found on irrigated lands of Cuttack and Balasore in the field season of 1895-96. In Cuttack the average of 28 cuttings was found to be 961 seers per acre, and in Balasore the average of 21 cuttings was found to be 936 seers.

In view of these estimates and experiments I think the produce of average *sarad* land may safely be taken at 900 seers per acre *.

The produce of *biali* lands varies within very wide limits. Some *biali* land is as good or better than first class *sarad* land, while on the other hand some is very poor. For want of exact information I think we may take the average of Mr. Nathan's estimates for *biali* and the three *laghus* as an approximation. The average is 443 seers, we may say 450 seers. For estimating the produce of *dahua* lands there are no Puri experiments to assist, but I take the following from the statement published with the Director of the Department of Land Records and Agriculture's No. 356A., dated 3rd March 1898. The average of experiments in the Cuttack and Balasore Districts was 1,226 lbs or 613 seers; 600 seers may be taken for simplicity.

About the outturn of crops other than rice there is at present absolute uncertainty, as will appear from a comparison of Mr. Nathan's estimates with averages entered in the above statements. I give them side by side:—

Outturn per acre in seers.

Name of Crops.	Mr. Nathan's estimates	Director of the Land Records and Agriculture's statement of 3rd March 1898 (lbs. converted into seers.)		
		Approximately		
<i>Mandia</i>	92	616	600	Mr. Nathan's ave- rage for <i>mandia</i> , <i>mung</i> and <i>kulthi</i> appear to be inex- plicably low; esti- mates based on experiments are more reliable.
<i>Mung</i>	92	376	400	
<i>Kulthi</i>	184	545	550	
<i>Arhar</i> ....	....	510	500	
<i>Biri</i> ....	....	375	400	
<i>Chana</i> (grain)	....	467	450	
<i>Gabo</i> (Caster oil)	92	....	....	
<i>Rasi</i> (Til)	69	....	....	
Mustard	....	215	200	
Sugarcane	....	1,735	1,700	
Wheat		355	360	

Of Cotton or Jute I can find no estimate. An acre *pân* garden yields about 7,200,000 leaves a year, according to an estimate made by Mr. D.H. Kingsford, Assistant Settlement Officer in charge, Balasore.

An acre of tobacco land yields about 12,500 leaves (Mr. Nathan says five *jori*s per *gunt*, each *jori* consisting of two strings with 50 leaves on each).

100. In the last section I have endeavoured to throw together some information on the subject of average outturns. It will be

seen how imperfect and incomplete are the data available, but they are the best we have and I propose to use them in order to prepare a rough estimate of the food supply of the Subdivision. The crop statement of the Sub-division is confined to the temporarily-settled Parganas, that is to about 1,000 square miles out of total of nearly 1,200 (excluding the Chilka Lake).

The food-supply in this area may be estimated thus:—

Crop.	Area in acres.	Average outturn per acre in seers.	Total in maunds.
Rice—			
<i>Biali</i>	28,000	450	3,15,000
<i>Sarad</i>	3,56,000	900	79,65,000
<i>Dahua</i>	16,000	600	2,40,000
Total—Rice	4,00,000	....	85,20,000
Pulses—			
<i>Mandia</i>	9,000	600	1,35,000
<i>Kulthi</i> †	24,700	550	3,40,000
<i>Mung</i> †	24,700	400	2,47,000
<i>Sugarcane</i>	560	1,700	24,000
Total-Pulse, &c.	58,960	....	7,46,000
Grand Total	4,58,960	....	92,66,000

* This is Mr. Mcpherson's estimate. It is higher than that adopted by me in chapter VI of this report.

† There are not separate figures for *kulthi* and *mung* but as noted above, I have assumed that they are grown over a more or less equal extent of country.

The areas under wheat, maize, *chana* and other miscellaneous food crops are inappreciably small, and it is unnecessary to include them in the estimate. The total area under oil-seeds is only 1,000 acres, and the outturn varies so much according to the situation of the land and the variety of crop that an estimate of the total yield is impossible. It is unnecessary to allude here to the non-food crops, which also occupy an infinitesimally small proportion of the cultivated area of the District.

101. The information that is procurable regarding the earlier fluctuations in the district population is very meagre and unreliable. The first regular census was made in 1872. Prior to that we have only rough estimates made by the Police and Survey Departments and based on the numbering of houses. At page 232 of the Famine Commissioner's Report of 1866 there is a statement of the population of the District by Parganas compiled by the Police in October 1866. It shows the number of inhabitants before the famine and the number that died during the famine. From the Survey office, I have obtained a statement of the number of houses and number of inhabitants compiled in the Survey operations of 1837-42 for all Parganas of the District except Malud, Bajrakote, Parikud, Manikpatna, Chaubiskud and Serai. I find that for the Parganas for which the figures of both periods are available, the increase of population for 1837 to 1865 amounted to 16 per cent.

Assuming that the same increase occurred in the six Parganas mentioned we are able to construct the following comparative table for the three periods 1837-41-1865 (before the famine) and 1866 (after the famine):—

Name of Parganas.	Population in 1837-41.	Population in 1865.	Population after famine.
Malud	(2,870)	3,329	1,812
Bajrakote	(3,312)	3,842	1,947
Parikud	(8,823)	10,238	4,433
Manikpatna ...	(5,262)	6,104	1,679
Chaubiskud	(24,701)	28,654	9,727
Serai	(9,813)	11,384	3,966
Rahang	88,228	80,375	43,229
Lembai	29,979	41,896	37,896
Kotrahing	72,556	39,889	27,889
Paschimduai	14,636	18,326	16,828
Purbaduai	11,083	13,829	8,395
Kotdes	86,951	93,424	53,603
Banchas	10,280	10,067	5,781
Athaisi	6,926	13,447	7,561
Antrodh	15,900	20,683	10,663
Astrang	1,274	2,293	745
Kurelo	5,433	10,920	5,233
Kodhar	7,807	14,102	6,622
Marichpur	6,421	7,449	3,222
Damarkhand	7,930	12,445	5,532
Oldhar	6,318	8,400	4,296
Matkatpatna	1,062	1,039	603
Total	<u>3,77,559</u>	<u>4,52,133</u>	<u>2,61,610</u>

The increase of population in the first thirty years of the Settlement averaged as before mentioned 16 per cent. Then came the terrible calamity of the great famine, which according to the Police numbering reduced the population of the Sadar Subdivision by over 40 per cent. The population in 1866 remained about 30 per cent. below what it had been thirty years before.

The first regular census was made in 1872. In this, as in the Census Reports of 1881 and 1891, the statistics that were compiled are *Thanavar* and it is impossible to extract figures for each Pargana without an amount of expenditure and trouble incommensurate with the object. Looking however, for the present, to the Subdivision as a whole, we find that in 1872 the population had gone up to

488, 751. In 1881 it rose to 564, 759 and in 1891 to 613, 575. The fluctuation may be shown briefly thus :—

Period of numbering of census.	Population.	Percentage of variation on previous period.	Percentage of variation on last settlement Survey numbering.
1837-41 (Survey)	377,559	....	....
1865 (before Famine)	443,133	+16	+16
1866 (after Famine)	261,610	-40	-30
1872	488,751	+87	+30
1881	564,759	+15	+50
1891	613,575	+8	+62

The most remarkable fact in the history of the district population is the celerity with which it recovered after the violent interruption of the Famine year. In six years the population nearly doubled itself, but this can scarcely be regarded as within the bounds of possibility and the true explanation seems to be either that the population before the famine was very much under estimated or that the number of deaths was very much over-estimated. Both causes were probably at work. It is exceedingly likely that as the number of deaths was estimated from the number of empty and deserted houses, a great many people who had temporarily removed to Khurda and the *Garhjats* were counted amongst the dead. Leaving out of account the extraordinary disturbance of the Famine year, and comparing the population of 1872 with the previous population of 1837 and 1865 and with the subsequent censuses of 1881 and 1891, it will appear that there has been a steady advance in the population. The growth from 1872 to 1891 has been 25 per cent. It is not improbable, then, that the advance from 1837 to 1872 amounted to 30 per cent., and I am therefore inclined to place considerable reliance on the result of the Survey count of last Settlement.

The statistical records of the censuses of 1872, 1881 and 1891 being *Thanawar*, I have endeavoured for the sake of comparison to build up Thana totals from the Pargana figures of 1837 and 1865. For Parganas not contained entirely within one Thana a division has been made according to the existing number of houses as counted in the present Survey and Settlement Operations. An attempt has also been made to estimate the present population of the District. The number of houses in each thana being known, it has been multiplied by the *Thanawar* average number of persons to each house according to the 1891 census. In this way the following comparative table has been prepared :—

Name of Thana.	Population in 1837-41.	Population in 1865.	Population in 1872.	Population in 1881.	Population in 1891.	Present number of houses.	Multiplicand per house according to census of 1891.	Estimated Present Population	Variation of present estimated population and Population at last Settlement.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
Gope ..	74,796	106,844	96,096	116,167	134,038	23,868	6.0	143,208	91	Thana Puri includes the town of Puri and Nabha thana of the 1872 census.
Pipli ..	144,493	171,642	204,375	226,782	241,470	45,655	5.3	241,971	73	
Puri ..	158,270	164,647	188,280	221,310	238,067	38,302	5.6	214,491	55	
						6,927 (Town)	4.4	30,479		
								244,970		
Total ..	377,559	443,133	488,751	564,759	613,575	114,752	....	680,149	66	

The present estimated population is only 2.7 per cent. in advance of that ascertained in 1891. The advance of 1881 on 1872 was 15 per cent., and of 1891 on 1881 8 per cent. It may be that the pressure of population on the resources of the soil has gone almost as far as it can go and that this is the cause of the slowness of the advance made during the last decade. On the other hand the Survey count of houses may be incorrect and this method of estimating the population does not in any case pretend to be very exact. The table shows that the growth of population has been greatest in Thana Gope. This is not unnatural, as that Thana was at Last Settlement and still is the least developed of the three. It is still much more cut off from the rest of the world by absence of communication than Thanas Pipli and Puri, which have in addition to the Trunk road, recently acquired the convenience of Railway communication. Looking to the general result of the above enquiries it may I think be safely assumed that the increase in the population of the Sadar subdivision during the term of the last Settlement has been not less than 60 per cent. The importance of this conclusion from the revenue and rent point of view will be discussed below.

The number of males as shown in the census returns is slightly in excess of the number of females, especially in Puri Town. The proportions are-For the Subdivision, males, 50·6; females, 49·4. For Puri Town-males, 55·3; females, 44·7.

Puri being one of the chief strongholds of Hinduism it is not surprising to find that Hindus compose 98·6 per cent. of the total population. Musalmans represent 1·3 per cent. The proportion of Hindus is highest near the precincts of the sacred city, viz., in Puri Thana and Puri Town. There are a large number of Musalmans in village Gope, accounting for the high proportion in that Thana.

The general proportion of Hindus to Musalmans throughout Bengal in 1891 was 64·07 and 31·70 per cent., respectively; in Cuttack 97·00 and 2·73; in Balasore, 97·90 and 2·10. Puri is thus pre-eminently a home of the Hindus.

It will be seen from the census statements that nearly 7 per cent. of the resident population in 1891 consisted of immigrants. By far the largest number came from Cuttack District, and of these most settled in Thanas Gope and Pipli; where it

may be presumed they engaged in cultivation and its accessory occupations. The settlers in the southern portion of the District came chiefly from Madras. The recorded immigrants of Puri Town were probably for the most part pilgrims. There is no emigration from the District in the more special sense of the term. There is a constant influx and efflux of pilgrims and labour between Puri and the neighbouring districts of Ganjam and Cuttack, but there is no cooly emigration. The difficulty of communication with Calcutta has been hitherto a well-nigh insuperable obstacle. Now that it is shortly to be removed we may expect to find the cooly recruiter in the District. The year 1896 was a year in which there was more movement of population than usual. The scarcity prevailing in the flooded Parganas Purbaduai, Oldhar, Serai and Chaubiskud drove many of the poorer agricultural labourers to seek work on the East Coast and Bengal Nagpur Railways. Many of these labourers have not yet returned to their homes as the prospect of cultivation in Purbaduai and Oldhar is still by no means bright.

PART II.

CHAPTER V.

IRRIGATION AND PROTECTION IN ORISSA.

103. In the last three chapters an account of the effects of flood and drought, and of the measures adopted in each of the three districts to mitigate such effects, has already been given, and I now propose to give a summary of the history of irrigation in Orissa and of the influence of canals and embankments on rents and revenues.

The correspondence on this subject ended with letter No. 1764 S. of the 4th October, 1899 from the Director of Land Records and Agriculture to the Secretary to the Board of Revenue in paragraph 7 of which it was promised that the question should be dealt with in the final report on the Settlement, that in order to make this part of the report complete in itself a good deal of valuation that may also be found elsewhere is here repeated.

104. The Orissa canals were begun by the East India Irrigation Company, on the failure of which the works were taken over by Government at a valuation.

History of the canals.

The present project was commenced in 1868 at an estimated cost of Rs. 3,23,15,845 including Rs. 2,94,089 for loss by exchange, and the construction estimate was closed on the 31st. March, 1895. Two estimates aggregating Rs. 61,858 were sanctioned by the Bengal Government in 1893 and 1895, and the total expenditure to the end of 1895-96, against the old and current sanctions, amounted to Rs. 2,62,21,846 including a sum of Rs. 2,68,070 for loss by exchange; the expenditure of a lakh-and-a-half in the next two years raised the total to Rs. 2,63,73,151. As the result of this out-lay*, the Province of Orissa has been provided with the following works, which are for the most part situated in the Cuttack District:—Seven weirs across river channels with an aggregate length of $3\frac{1}{2}$ miles, and constituting, with the canal head sluices and entrance locks, the most extensive system of headworks of any canal system in India. There are $204\frac{1}{4}$ miles of canals, which are navigable in addition to carrying water for irrigation; there are also 75 miles canal for irrigation only. Besides, there are $109\frac{3}{4}$ miles of distributaries and village channels. The maximum discharge of the canals in 1895-96 was 6,058 cubic feet per second and the area shown as commanded is 56,20,000 acres.†

The Orissa canals have never paid their way; the water rate is only Re. 1-8 per acre and the receipts for big navigation and irrigation barely cover the working charges and do not touch the interest. Thus it was natural that the responsible officers and Government should cast about for a means of meeting the deficit. As early as 1874 Colonel Gulliver proposed an extra rate of annas 8 per acre for protection; and in 1877 a Bill was drafted and introduced into the Bengal Council with the object of imposing a compulsory cess upon the occupants of all lands irrigable from, or protected by, the Orissa and south Bihar canals, Mr. G. Toynbee, I. C. S., being deputed on special duty in the same year to make special enquiries in Orissa in connection with it. The Bill was, however, subsequently drafted, mainly on the ground that the prospects of irrigation in South Bihar were more favourable than had been expected. In 1881 some further suggestions were made by the officers of the Public Works Department for the enhancement, during the coming Settlement, of *pahi* rents by Rs. 2-8 per acre where efficient protection had been given (see Mr. Commissioner Smith's letter No. 326 I, dated 21st November, 1881). Eventually these proposals resolved themselves into a suggestion for the levying of a special rate in addition to the land revenue on the lines of the North-Western Provinces Act VIII of 1873.

The history of the enquiries made in Orissa for the purpose of deciding on the justice and expediency of such a tax are summed up as follows in a letter by Mr. Maude, the late Settlement Officer:—

* See also Paragraphs 56 to 63 and 72 to 78.

† See Revenue Report for 1897-98.

105. The last epoch of the history of the question of imposing an owner's rate on canal irrigated lands appears to have commenced from the date of a Minute of the Secretary of State in the year 1883, in which it was remarked with reference to certain irrigation reports of the Government of India in the Public Works Department, that no reference was made to the question of an owner's water rate, which it was said had been the subject of former correspondence with the Government of India.

It was further requested that the Secretary of State might be informed of the proceedings of the Government of India in this matter. The object of an owner's rate was at that time defined as the securing to the State of its shares of the higher rents which the landlords have, by reason of canal irrigation, been able to impose on the cultivators.

In letter No. 780 R., dated the 13th August, 1883, the Government of India called on the Bengal Government to consider the question with special reference to the temporarily-settled tracts of Orissa only, and at the same time recited some of the chief points in favour of and against the imposition of an owner's rate, namely, on the one side the unremunerativeness, both at that time and as far as could be foreseen for some time to come, of the Orissa canal system was the fact that an owner's rate could be imposed at once, whereas an increased land revenue was barred until the year 1897, and on the other the probable discouragement of zamindars from inducing their raiyats to take canal and the possibility of the zamindars handing the onus of the rate on to the raiyats so as to make it result in a mere increase of water rate. It was fully recognised that the imposition of an owner's rate depended on the assumption that rents had largely risen owing to the canal works, and in support of this an opinion was quoted of the then Commissioner of Orissa to the effect that the rise in rents had been not less than Rs. 2-8-0 per acre on areas merely protected by canal embankments, letting alone any rise due to irrigation itself.

The conclusions of the enquiry which resulted from the revival of the question in 1883 are set forth in a report from the Commissioner to the Board of Revenue, dated the 21st June, 1884. The Commissioner was of opinion that there was no evidence to show either that the increase in rents had been greater in irrigated than in non-irrigated tracts, or that such increase as there had been was due to the canals. In support of the former statement he referred to the rise in rentals as shown by the latest road cess valuations. From examination of a number of villages of both classes (within and without the range of canals) it appeared that, in the irrigable villages, the rise in ten years had ranged from 5.8 to 17.4 per cent, while in the non-irrigable villages it had ranged from 12.9 to 17.8 per cent. In view of the above facts, it was decided that, before anything further was done, the question should be discussed by the Canals Commission, which was then about to sit to enquire into certain complaints as to the administration of the Orissa canals. The Commission was appointed in the same year, 1884 and took up this question among others. Their decisions, which are given in paragraphs 50-67 of their report, are summed up in a letter from the Government of India, No. 492 R., dated the 13th September, 1887. The Commission held briefly that the evidence of a rise of rentals due to the canals was not sufficiently clear or separable from that of a rise due to other causes to warrant the imposition of any general or proportionate owner's rate, and that the proper apportionment of such a rate upon lands where rents have directly risen from canal irrigation would be a difficult and probably unremunerative task. They believed also that the *pahi* or ordinary unprotected raiyats in Orissa were so depressed that any rate thus imposed on the landlords would be passed on to the tenants, and thus increase the unpopularity of irrigation. They did not recommend that Government should attempt to levy an owner's rate. They suggested as an alternative the imposition of an insurance rate against floods and droughts. The local Government did not, however, see its way to recommend even this alternative proposal. The Government of India did not consider the information on the subject to be complete, and enquired whether the agency of the Kanungos of the Province could not be utilised to check zamindars' papers, so as to afford reliable information as to the best means of levying canal revenue.

During the year 1888 personal enquiries on the above point were made both by the local officers and by the Director of Land Records. The result of the

enquiries showed that it was hopeless to attempt to obtain correct returns by the agency of the patwaris and kanungos. The Director of Land Records accordingly suggested that in the coming Survey and Settlement operations, the irrigated parts should be first taken in hand and accurate data thus obtained on which a decision as to an owner's rate could be based. With this view, he suggested that a distinction should be made in the records between :—

- (1) Lands brought under cultivation *entirely* owing to irrigation from canal.
- (2) Lands which are only irrigated in years of drought and are therefore merely protected from a failure of crop.

The proposals of the Director of Land Records were recommended to the Government of India and were approved in that Government's letter No. 453 R., dated the 27th June, 1889. It does not appear, however, that they were ever reduced to any practical form in the records, although in a letter of the Bengal Government, No. 339 L. R., dated the 16th March, 1891, the following point among others was suggested as requiring statistical information :—

The effect of canal irrigation on the rent roll, and whether any increase due to irrigability has taken place which will justify Government in immediately putting an owner's rate on the landlord.

The instruction was subsequently followed by Government letter No. 1022 L. R., dated the 6th August, 1891, and by Government letter No. 282 L. R., dated the 26th July, 1892.

As the result of these orders, long notes based on *a priori* reasoning were written by Messrs. Sen and Mitra, Assistant Settlement Officers, and a detailed enquiry was made by the former officer into the extension of rents and cultivation in the permanently-settled estate of Darpan on the High Level Canal.

In 1893, Messrs. Sen and Mitra were placed on special duty to complete the necessary enquiries, and they submitted reports, the former on 29 villages on the Kendrapara Canal System, the latter on 14 villages on the Taldanda-Machgaon System. These reports, together with an abstract of Mr. Sen's report on Darpan, were submitted to Government along with Mr. Maude's letter No. 2399 of the 16th November, 1893.

The Government of India were not however willing to accept this report as final, and in their letter No. 342-343 of the 29th January, 1895, laid down the broad lines on which the Settlement Officers should proceed in their future enquiries. These orders were elaborated by the Director of Land Records and Agriculture in his letter No. 2201 S., of the 24th July, 1895, and his instructions were approved by the Board of Revenue in their letter No. 842 A., of the 12th August, 1895.

In 1896 a report was submitted by Babu Sri Gopal Bhattacharji on the effect of irrigation in Balasore; but as he found only 10 villages in the District with a substantial area irrigated, the report did not add very much to our information.

Nothing further was done until after the conference in Cuttack of January 1897, when definite instructions were issued to all officers settling rents in the field, for the compilation of statistics of the lines laid down by the Director.

At the end of the year, reports were received from seven officers dealing with the figures for 320 irrigated and a number of unirrigated villages, situated on all the canals except the Machagaon and Jajpur extension.

The figures were abstracted in a note by Mr. Webster, but were not considered to afford, in themselves, sufficient material for a final report to the Government of India.

Since then, reports dealing with the revenue proposals for almost all Parganas in Cuttack have been received, and in all cases where lands are either protected or irrigated the effect of such irrigation and protection on rent rates and extension of cultivation forms the subject of one or more paragraphs of the report. Lastly, the large permanently-settled Parganas of Derabisi has been attested in order to add to our information as to the effect of irrigation in permanently-settled areas, and two reports embodying the results of this enquiry have recently been submitted to the Director.

A preliminary report on the conclusion based on the reports for the settlement of revenue has also been submitted with this office letter No. 281 of 6th April, 1899 and forwarded to the Board of Revenue with letter No. 1764 S., of the 4th October, 1899 from the Director of Land Records.

106. The lines on which the present report should proceed are laid down in a note of the 8th December, 1898, by Mr. P C. Lyon, the Director of Land Records.

In this note it was enjoined that the report should deal separately with permanently and temporarily-settled areas, and that answers to the following questions should, if possible, given for both :—

- (1) Have rent rates risen in consequence of the facilities for irrigation ?
- (2) Has cultivation extended to lands only culturable with the help of irrigation ?
- (3) To what fresh areas will irrigation from canals now existing extend during the course of the Settlement ?
- (4) Has the protection afforded by canal embankments (as distinguished from agricultural embankments)—
 - (a) Raised rent rates ?
 - (b) Brought new lands into cultivation, and to what extent ?
- (5) To what extent has this protection improved collections ?

It is in the first place very difficult to observe the distinction here laid down between canals and canal embankments.

These embankments are said to protect from flood nearly 5½ lakhs of acres, while some 2 lakhs of acres are irrigated.

The lands of most villages and of the majority of tenants within this protected area comprise both irrigated and unirrigated lands, and the figures quoted by me must be understood to embody the results of protection accompanied by irrigation, though I shall endeavour to separate the results in the light of the criticisms of the local officers.

It appears to me that the first point to be considered is the extent to which Orissa stands in need of any artificial supply of water, and to this end I give here a short note on the rainfall. After reading this it will be easier to understand the variations in the area irrigated, and the uncertainty of the results.

107. Orissa is primarily a land of abundant rainfall. The table annexed show that since 1860 the average registered fall for the year has been 62.02 inches on the whole, viz., 60.87 in Cuttack, 66.34 in Balasore, and 58.85 in Puri, and the only occasions on which it was less than 50 inches have been in Cuttack the years 1864, 1869, 1870, 1876, 1877 and 1885; in Balasore 1873 and 1879, and in Puri 1864, 1865, 1869, 1870, 1876, 1877, 1885 and 1887.

It will be seen that the deficiency is more frequent in Puri, which is also the only district in which the fall is occasionally less than 40 inches. It is not, however, by any means the case, that a little shortage in the rainfall must entail loss of crops. The most serious famine of the century was caused by failure of the September and October rains in 1865, and in spite of the very scanty fall of 1876 and 1877 the rains of September and October saved the crops. In 1896 with a rainfall of but little below the normal, serious loss was caused by the cessation of the rains early in September, the effect of this being much aggravated by high floods in the early part of the year and in August.

It is evident that well-distributed rainfall of 40 inches with not less than 4 inches* in October is sufficient to secure the crop, though for a bumper harvest at least 50 inches with 8 inches in September and 6 inches in October is needed.

In the last 39 years the fall of October has been less than 4 inches fifteen times in Cuttack, twelve times in Balasore, and only six times in Puri: such failure is however most serious in this last district, which depends to a very great extent on the late rain. On the whole we may say that once in every four years the rainfall is less than the maximum compatible with ripening of the crop, and causes the loss of a fourth to a half of the rice in the unirrigated lands.

* See paragraph 429 of Famine Commissioner's Report of 1866.

Statement showing the rainfall in inches :—

Year.	CUTTACK.			BALASORE.			PURI.		
	Septem-ber.	Octob-er.	Total fall of the year.	Septem-ber.	Octob-er.	Total fall of the year.	Septem-ber.	Octob-er.	Total fall of the year.
1	2	3	4	5	6	7	8	9	10
1860	12.50	0.70	46.80	15.20	1.30	50.60	20.00	4.50	74.10
1861	15.68	4.56	76.28	7.40	4.70	76.50	14.10	6.10	73.00
1862	11.98	13.33	62.98	35.40 *	29.30*	111.90	16.60	42.20*	136.10
1863	7.10	2.00	69.77	14.95	7.70	86.80	15.30	7.80	60.90
1864	8.90	2.60	48.70	7.90	6.10	64.80	8.60	6.20	42.20
1865	7.44	....	51.40	9.30	0.30	52.60	5.20	....	36.30
1866	2.60	11.85	60.95	10.50	8.55	68.25	12.10	11.10	77.20
1867	10.11	5.40	50.75	15.22	9.00	67.62	10.60	14.30	70.00
1868	9.80	1.96	52.81	9.60	0.40	77.00	5.05	0.30	50.97
1869	9.23	5.35	48.14	13.19	6.74	49.77	12.48	6.69	44.87
1870	8.80	8.61	49.92	11.46	7.69	54.77	6.58	10.95	43.44
1871	9.67	0.91	50.39	14.82	5.13	63.41	12.39	1.40	56.32
1872	8.76	16.16	71.16	13.97	11.97	71.29	7.04	16.19	75.14
1873	6.27	2.54	38.61	7.61	4.69	48.35	9.21	12.53	52.72
1874	12.13	10.71	86.74	7.60	12.03	55.19	4.87	9.62	61.78
1875	19.26	10.25	91.92	12.69	2.37	59.45	11.37	15.01	64.16
1876	9.83	4.89	41.28	15.95	10.32	82.72	9.61	6.64	34.93
1877	6.25	3.05	41.13	5.51	3.32	67.40	6.70	4.51	35.15
1878	6.40	4.92	54.57	7.90	8.59	61.89	13.56	14.08	54.66
1879	9.44	4.98	60.62	17.09	6.10	49.62	12.11	4.56	53.57
1880	10.29	5.17	67.06	11.63	5.28	74.33	15.14	10.63	87.58
1881	11.27	2.33	59.33	14.72	8.35	79.71	6.30	4.37	49.83
1882	11.86	7.64	75.96	21.69	10.10	79.02	7.54	7.95	43.93
1883	12.93	0.55	67.24	3.76	1.70	63.21	13.61	4.95	61.18
1884	8.68	2.40	59.42	13.57	4.48	76.24	15.10	17.13	65.01
1885	8.33	2.60	47.74	11.07	1.84	59.83	6.05	5.73	38.16
1886	13.99	11.77	79.70	17.82	5.65	73.96	14.78	6.14	56.55
1887	7.03	2.26	54.03	4.99	3.09	53.43	6.31	5.68	38.20
1888	8.81	1.34	56.93	12.32	1.64	59.34	7.89	1.66	44.22
1889	5.26	8.24	69.88	6.15	8.52	57.26	6.44	12.43	79.01
1890	17.53	7.39	65.31	18.68	10.16	66.57	14.77	10.61	72.02
1891	23.72	1.68	73.76	16.81	0.76	69.52	16.09	2.83	59.93
1892	10.35	7.39	50.34	11.40	7.93	55.24	8.34	5.87	46.57
1893	15.44	5.03	81.52	19.04	5.65	92.39	17.30	7.96	71.23
1894	6.45	7.76	60.82	6.86	4.70	61.69	7.54	7.50	52.38
1895	8.60	5.89	67.71	6.52	3.73	58.67	12.77	7.31	67.87
1896	9.49	0.03	58.52	10.59	....	62.17	6.83	0.31	53.13
1897	7.89	8.92	63.82	5.90	14.13	65.05	7.45	10.12	55.12
1898	8.56	9.01	59.85	11.33	10.31	59.62	6.57	9.75	50.55
Average:	10.22	5.44	60.87	12.26	6.56	66.34	10.52	8.55	58.85

Average of Orissa—Fall in September 11.00

Fall in October 6.85

Total fall of the year 62.02

* Cyclone.

Extent of Irrigation.

108. The areas irrigated by the Orissa Canals from 1870 up to date are as follows. :—

Year.	ORISSA PROJECT.						Total.
	Taldanda Canal and its branches.	Kendrapara Canal and its branches.	High Level Canal-Range I.	High Level Canal-Range II.	High Level Canal-Range III.*	Jajpur Canal.	
1	2	3	4	5	6	7	8
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1869-70	....	1,564	165	....	....	....	1,729
1870-71	999	8,967	12,162	....	....	....	22,128
1871-72	292	3,860	7,501	....	....	....	11,653
1872-73	198	4,318	287	....	....	....	4,753
1873-74	1,733	7,825	3,013	....	....	....	12,571
1874-75	4,095	11,105	7,259	....	....	....	22,459
1875-76	1,271	11,577	5,561	....	....	....	18,409
1876-77	5,157	17,206	8,019	....	....	....	30,382
1877-78	32,604	53,769	12,122	....	....	....	98,495
1878-79	36,097	61,083	14,070	....	....	....	111,250
1879-80	37,279	57,641	13,715	189	214	....	109,038
1880-81	39,400	61,871	14,023	182	51,745	....	117,221
1881-82	43,941	70,627	15,588	283	1,839	....	132,278
1882-83	44,131	72,468	13,955	289	1,585	....	133,028
1883-84	10,300	23,685	11,937	323	2,515	....	48,760
1884-85	10,546	33,022	12,270	....	3,104	....	58,942
1885-86	15,489	36,375	13,404	265	6,806	....	72,339
1886-87	18,685	39,714	12,412	407	6,491	....	77,709
1887-88	31,277	54,404	15,312	994	7,569	....	109,506
1888-89	40,391	72,796	18,092	2,385	25,628	....	159,292
1889-90	40,246	77,874	26,599	2,563	39,345	....	186,627
1890-91	41,806	74,970	21,984	2,503	39,036	....	180,299
1891-92	41,906	74,180	22,423	2,513	36,211	452	177,685
1892-93	36,591	67,728	21,225	2,329	32,201	878	160,952
1893-94	12,054	61,259	10,491	2,052	15,802	1,868	103,526
1894-95	24,606	65,482	13,771	2,581	14,432	1,689	122,561
1895-96	25,672	63,936	3,859	892	10,105	4,996	119,460
1896-97†	52,048	81,300	23,042	3,330	31,215	16,080	207,015
1897-98†	50,304	75,811	22,052	3,243	29,193	14,999	185,602
1898-99†	51,175	74,371	22,232	2,937	28,685	10,466	189,866

(These figures are given by the Public Works Department, the totals in column 8 are not in all cases correct.)

To explain the variations from year to year is a very difficult task. When the canals were first opened the people hung back, being timid and averse from any innovation, and they were also afraid that irrigation would be made an excuse for the enhancement of rents and revenue. To allay their apprehensions a proclamation ‡ was published by Government in 1866, declaring the water rate to be wholly distinct from land revenue and promising that at the next revision of the Settlement no increased rate of assessment would be imposed on any lands by reason only of their being irrigated. These promises failed to produce much effect, and in 1877 they were withdrawn by the issue of a revised proclamation.§

A more effective inducement to take water was the gradual reduction of the rate from Rs. Rs. 3 per acre to Re. 1-8, a measure which was described by the lieutenant-Governor, Sir George Campbell, as resembling a Dutch auction.

The result of the reduction in the rate may be seen in the steady increase of irrigation up to 1874-75, but why there was a falling off more 1874-75 to 1878 is not clear. The quinquennial system of five-year leases at Re. 1-8 and annual leases at Rs. 3 (and Rs. 2 for lift), and high prices and scarcity of water in 1878,

* In Balasore District.

† Figures for actual irrigation; in previous years the assessed areas are given.

‡ Notification of 19th July, 1866.

§ See despatch No. 43 of 10th August, 1876 from the Secretary of state for India.

the year of the Madras famine, account for the large area irrigated from 1878 to 1883. In the latter year most of the leases expired and were not renewed, so that there was a drop from 1,33,028 to 48,766 acres. Various reasons are assigned for the objection of the people to execute the leases, but I cannot do better than quote the opinion arrived at by the Commissioners appointed to enquire into the abuses of irrigation in 1884* :—

"In Orissa the normal rainfall being ample, the value of canal irrigation is exceptionally dependent on the character of the season. Cultivators frequently allege that they were in the first instance partly induced to take water leases by assurances of increased outturn, which have not been fulfilled; but in the opinion of many and certainly in that of the Uriya peasant, the chief value of canal water lies not in any improvement which it may render possible in the outturn of an ordinary year, but in the protection which it affords against total or partial failure in years of drought. In the case of these high lands which cannot grow a late rice crop without canal water, these remarks do not apply."

"This being so, it is but natural that when water leases expire the cultivators should be disposed to put off renewing their engagements till a period of drought occurs; and when the hour of need does come there is a sore temptation to take water, without leasing, from neighbouring leased fields or other available sources, and so to avoid the necessity of paying Rs. 3 per acre for a single year or engaging for a period of five years is order to secure the lower rate of Re. 1-8. When a small number of leases expire the difficulties arising from this tendency can be more or less readily met; but in Orissa, with the year 1882-83 the so-called five-year leases all expired together, and that under circumstances tending to increase the usual reluctance to renew. In three out of the preceding five years the rainfall had been sufficient and timely, and consequently the benefit derived from canal irrigation had been comparatively small."

Cultivators, penny wise and pound foolish as they are, soon began to realise that the loss of their crops from drought more than counterbalanced the saving of the water rate; the area slowly rose, and with the next quinquennial period a much large number of leases were executed and the maximum of 1,86,627 acres was reached in 1889-90. A few years of abundant and excessive rainfall brought the irrigated area down to 1,19,460 acres in 1896, when the drought of September to November created an universal demand for water and the irrigated area rose at a bound to 1,82,029 acres, and in the Irrigation Returns of 1897-98 is shown as 1,92,676 acres † out of a total irrigable area of 3,03,750 acres. In the following year there was a falling off in the area irrigated, due to less irrigation of *rabi* and *dahua* on the High Level and Jajpur canals. This is accounted for by the success of the *sarad* crop, which sufficed to support the cultivators in idleness through the cold and hot seasons.

The difference between leased, assessed, and irrigated areas is shown in the following table for 1898-99 :—

		Leased. Acres.	Assessed. Acres.	Irrigated. Acres.
Long leases	....	1 91,019	1,86,058	
Season leases-Sugarcane	....	624	624	
Autumn rice	....	113	113	
<i>Rabi</i> and <i>dahua</i>	....	5,122	5,054	
Total	....	<u>1,96,878</u>	<u>1,91,849</u>	<u>1,89,866</u>

The irrigated area excludes fields for which leases were executed, but to which water could not be, or was not, supplied. The assessed area excludes also *chaukidar jagirs*, to which water was supplied free of charge.

In the Settlement records the total area recorded as leased for irrigation is in Cuttack 1,37,888 acres, and in Balasore 28,856, a total of 1,56, 744 acres. The discrepancy is due partly to the exclusion of a large irrigated area in Darpan and partly to the fact that some of the Settlement figures are for the years 1895-96, some for 1896-97, and some for 1897-98, and that during every year the irrigated area has been rapidly increasing. It is likely to continue to increase until 1901-1902 when many leases fall in, and their immediate renewal will depend to some extent on the character on the season.

* Report; paragraphs 4 and 5.

† This is assessed area, which is less than the leased area shown above.

109. Enquiries into the comparative outturn of rice on wet and dry lands have been carried on for many years past. Mr. Boothby and Mr. Shore, of the Irrigation Company, estimated the yield of clean rice from irrigated land at 1,200 lbs per acre, or nearly double that from the unirrigated. These estimates were based on the results in the Godaveri delta, and were hardly applicable to Orissa. In 1872 Colonel Haig, one of the most eminent engineers who have made a study of the Orissa canal System, estimated the average yield of the year on well irrigated light soils at 25 to 29 maunds of paddy per acre, while that of similar unirrigated lands was from 12½ to 14 maunds only. He also found the raiyats admit that on lower and stiffer soils irrigation, even in a year of heavy rainfall, would have raised the outturn from 27½ to 32½ maunds, because in the first place the crop would have been planted earlier and have been strong enough to withstand the heavy rain of June; and secondly, because the silty canal water would have enriched the soil.

Again, Mr. Wylly, the Canal Revenue Superintendent, gave the following abstract of his experiments; the figures are somewhat obscured by the nature of the year, crops on the lowest and best lands having suffered from excess of rain.

Place.	Class of land.	Irrigated.		Unirrigated.	
		Mds.	Srs.	Mds.	Srs.
High level canal.	First Class	Highest	18 0	17 0	
		Lowest	11 24	8 0	
	Second Class	Highest	13 8	9 24	
		Lowest	12 8	7 28	
	Third Class	Highest	8 12	6 25	
		Lowest	8 4	5 28	
Taldanda canal	First Class	"	36 0	32 0	
	Second Class	"	35 16	19 8	
	Third Class	"	21 0	11 8	
Kendrapara.	First Class	Highest	25 24	20 22	
		Lowest	18 13	11 0	
	Second Class	Highest	37 32	24 0	
		Lowest	21 21	18 0	
	Third Class	Highest	34 32	28 0 (a)	
		Lowest	13 37	12 24	

The results are expressed in standard maunds of paddy.

(a) Doubtful.

In Colonel Haig's note of 1877 * he gives as the result of 783 experiments in 1878-79 the increased value of the paddy on irrigated land at Rs. 16-4-9 the equivalent of 15.69 maunds of grain. In the Mahanadi Division the difference in yield was 9.75 maunds of paddy, and in the next year the average difference was put down at 6.13 maunds of paddy.

The Irrigation Committee † of 1884, basing their opinions on the experiments of 1877 to 1884, assumed the difference between the outturn of wet and dry, i. e., unirrigated, land to be 5 maunds per acre, but were at the same time careful to guard themselves against generalising for the entire Province even on the large number of experiments before them.

It remains to see how far these conclusions are borne out by more recent enquiries.

In the decennial period of 1885-86 to 1896-97 the results of 428 experiments by officers of the Irrigation Department was to give an average yield for irrigated lands of 19.72 maunds of paddy and 28.17 maunds of straw, against an average for the unirrigated lands of 15.59 maunds of paddy and 22.02 maunds of straw. In the provisional estimate of the outturn of winter rice per acre submitted to the Government of India in 1898 ‡ the average yield of clean rice per acre was taken at 1,045 lbs. for irrigated and 902 lbs. for unirrigated lands. For the four years 1895 to 1899 the average of the experiments made by officers of the Collectorate

* No. 1028 I. of 21st March 1897, Colonel F. T. Haig, Joint Secretary to the Government of Bengal, in Public Works Department, to the Commissioner of Orissa, paragraph 34.

† Paragraph 41 of Report.

‡ Director of Land Records and Agriculture to Government, No. 356 A dated 3rd March, 1898.

and Settlement staff gave an average for irrigated land of 1,996 lbs. of paddy, and for unirrigated of 2,003 lbs. per acre.

It remains to be considered what the equivalent of paddy is in cleaned rice. This depends a good deal on how dry the paddy was when weighed. In Orissa it is the custom to give out the paddy in contract, the agreement being that for every 25 *gownis* of paddy 10 to 12 *gownis* of dry rice are returned. This rice, however, has a far greater specific gravity than the paddy, and in fact more than half weight is returned. The Irrigation Department have taken the weight of rice at two-thirds of that of the paddy, and in some experiments made by Babu Jamini Mohan Dass and Mr. Maude this weight was actually obtained; but as a rule, allowing for the paddy being slightly damp when weighed, I think five-eighths a safer proportion to take.

Thus we get as the result of those three sets of experiments last quoted :—

		Weight of cleaned Rice per acre	
		Irrigated. lbs.	Unirrigated. lbs.
Experiments of Irrigation Department, 1985-96	....	1,014	802
Estimate sent to Government of India by the Director of the Department of Land Records and Agriculture, Bengal	....	1,045	902
Civil Experiments of 1995-98	....	1,247	1,252
Average	....	1,102	985

The figures for the irrigated area in the first two sets of experiments are lower than those given in the earlier experiments of 1878-84, and I think that in the years 1885 to 1890 there must have been some confusion between weights of rice and paddy. On the whole we may, I think, assume the out-turn at 13½ maunds or 1,110 lbs. for irrigated, and 12 maunds or 986 lbs. for unirrigated. The difference, 103 lbs., is worth at the average price of the last ten years, which is 18.23 seers to the rupee, about Rs. 3-4. Add to this the difference in the straw, about 28 maunds per acre in the irrigated and 22 to 23 maunds in unirrigated fields and we get the additional value of the produce of irrigated fields at Rs. 4 in the case of *sarad* rice.

The much greater difference between the yield of irrigated and non-irrigated lands given in the estimates made by the Public Works Department as compared with the experiments made by other Departments may be put down to the fact that the former generally make their cuttings in an area where all the best lands are irrigated and where the exclusion of river silt, and systematic drainage have made an artificial supply of water most necessary. Outside this area the heaviest crops of all are those raised on lands rich in river silt; and in ordinary years the average outturn is not very much less than in the irrigated country. There is, however, a further correction to be made. The Commissioners appointed to enquire into certain abuses connected with the Orissa canals estimated the average annual loss from drought at one-twelfth of the crop; and that from floods at one-tenth.* Taking the minimum rainfall compatible with a successful harvest at 4 inches in October,† we find that in the thirty-nine years from 1860 to 1898 the fall in October fell short of this amount fifteen times in Cuttack, twelve times in Balasore, and six times in Puri, or an average of eleven times in thirty-nine years. We may assume roughly that once in four years a third of the crop will be killed by drought thus entailing a loss to the cultivator of not less than one-twelfth of the crop, or Rs. 3 per acre per annum on an average, equal to Rs. 6,00,000 on the whole irrigated area. The saving of loss from floods is not I think to be credited against the cost of irrigation, but it may, perhaps, be credited to canal embankments, and may be put at the value of Rs. 5,00,000 X 1½ maunds, or about 13 lakhs of rupees per annum.

The total value to the cultivator of the *kharif* irrigation thus estimated is Rs. 4 per acre per annum, or about Rs. 7,40,000 for the Province, besides another Rs. 6,00,000 which may be credited to insurance against drought.

* Report, paragraph 42 and 62.

† See Paragraph 107.

I have not said anything about the facilities for growing a second crop on the land afforded by the copious supply of water, for against it may be set off the loss of *rabi* crops formerly grown on the silt-covered lands. Besides the *sarad* crop some 7,000 acres of *rabi* and *dahua* rice and perhaps 1,000 acres of sugarcane are irrigated; to both of these crops the water is of great value, and, indeed, they would often not be grown at all without it, but have no sufficient material for estimating the effect of irrigation on the outturn. I think we should be safe in estimating the value to sugarcane at not less than Rs.15, and that to *rabi* at not less than Rs. 5 per acre; this would raise the total value to the Province of the canal water to Rs. 7,90,000, exclusive of the insurance.

Water rates.

110. The rates in force are as follows :—

					Per acre.			
					Rs. A. P.			
Long leases (five years) for <i>kharif</i> —								
Flow	....	....	....	....	1	8	0	
Lift	....	....	....	....	1	0	0	
Water-logged land			....	....	0	8	0	
Perennial crops (chiefly sugarcane)—								
Flow	....	....	....	....	6	0	0	
Lift	....	....	....	....	4	0	0	
<i>Rabi</i> —								
Flow					}	0	8	0
						to		
Lift					}	2	0	0
						0	5	0
						to		
						1	8	0

More than nine-tenths of the irrigated area is under long lease, and half of the sugarcane is said to be irrigated without extra charge. The total water rates for 1897-98 were nearly Rs. 3,15,000, which being deducted from Rs. 7,90,000 the estimated increased value of the harvest leaves a profit of Rs. 4,75,000.

111. The next question to be answered is, who ultimately gets the advantage of this increased value? Does the cultivator retain it all, or does the zamindar and therefore Government obtain a share? Amidst the mass of conflicting information on the subject of the increase of rent rates one fact alone can be held to be abundantly proved, and that is that the cases in which a zamindar has openly enhanced rents on the ground of the accessibility of canal water, or has imposed an irrigation cess of his own are very rare. I have heard of a few such cases, as in Taluk Raghunathpur of Kodinda, but they are certainly the exception, and I do not think that it is unreasonable to attribute this in some measure to the proclamation of 1866 to which the widest publicity must have been given.

At any rate the result is to reduce us to seek in a comparison of rates in different local areas and at different periods for circumstantial evidence.

The first figure to which we should naturally look is the incidence per acre of the rents of raiyats whose rents were liable to enhancement during the term of settlement, and it may be confidently assumed that the rents of the *pahi* raiyats of Orissa are so far competition rents that they would ordinarily be enhanced by the zamindars if there was any very decided improvement in the value of the land. I have therefore prepared the following table, placing oppsite to one another irrigated and unirrigated areas which I considered fairly comparable, and have added explanatory remarks showing the factors which appear to have conduced to the differentiation of rents.

I have added the rate *thani* rents of the last Settlement as showing what was then the high-water mark of assessment, and have prepared an explanatory map showing approximately the irrigated, protected, and flooded areas and the incidence of *pahi* rents in each.

PARGANA.	Percentage of area irrigated.	LAST SETTLEMENT INCIDENCE PER ACRE.						PRESENT SETTLEMENT.									
		Pani rents.			Thani rents.			Mafasal Jama.			Settled and occupancy				Mafasal Jama		
1	2	3			4			5			6			7			8
		Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	
Asureswar....	35	2	5	6	3	12	6	2	2	4	3	4	8	2	14	4	Group A.— Irrigated Parganas on the Kendrapara System.
Sungra	51	2	7	9	3	14	2	2	8	4	3	6	2	3	2	4	
Matkatnagar	38	2	10	5	3	14	1	2	5	8	3	11	3	3	4	2	
Nahakhand	15	2	0	5	3	6	3	2	7	5	3	3	5	2	15	8	
Balubisi ...	5	2	8	11	4	1	4	2	6	7	3	10	4	3	3	1	Group B.— Unirrigated and mostly unprotected parganas on the north of the Maha- nadi.
Suknai ...	1	2	3	8	3	2	2	2	3	3	3	5	7	3	0	4	
Abartak ....	....	3	2	9	4	13	0	3	0	5	4	0	11	3	10	9	
Kusmandal	....	2	13	10	3	11	10	2	12	9	3	2	0	2	14	8	
Paina		2	7	6	3	8	2	2	6	10	3	0	8	2	13	7	
Padampur	46	2	6	2	2	14	8	2	4	9	2	15	6	2	11	5	Group C.— Irrigated parganas on the Kendra- para Canal System.
Saraswati ...	53	2	7	9	3	6	2	2	6	0	3	8	1	3	3	0	
Karimul	56	2	0	1	2	12	11	1	14	10	2	15	9	2	10	10	
Suhang		2	0	9	3	6	1	2	0	11	3	0	11	2	10	11	Group D.— Inundated parganas at the head of Mahanadi.
Painda	4	1	14	11	2	15	6	1	9	11	3	1	5	2	6	3	
Kodinda	18	2	4	10	3	0	8	2	3	7	2	15	8	2	10	5	Group E.— Irrigated parganas on the Taldanda Machgaon System.
Hariharpur	54	1	15	11	2	15	10	1	10	1	3	4	11	2	10	1	
Jhankar	47	2	7	3	3	7	0	2	6	4	3	0	9	2	12	0	
Kurania	11	1	15	3	2	9	8	1	9	11	3	3	3	2	9	4	
Khandi	21	2	7	11	3	13	0	2	4	6	3	6	9	2	14	1	
Gandito	34	2	1	2	3	3	6	1	11	5	3	4	3	2	8	1	
Deogaon	?	1	15	5	3	8	3	2	0	10	2	6	8	2	4	7	Group F.— Unirrigated and partially- irrigated parganas on the Katjuri river.
Kate	2	1	13	0	2	1	0	1	11	3	2	6	2	2	2	1	
Saibir	14	2	12	10	3	8	9	2	8	4	3	0	1	2	12	7	
Benahar	11	1	6	11	2	7	8	1	3	4	2	13	11	2	8	10	
Tiran	2	2	4	1	3	3	10	2	13	0	2	4	3	2	12		
Sailo ...	Nil	1	12	6	2	10	3	1	13	11	2	2	11	2	1	1	
Kokhuakhand	57	2	4	3	3	9	6	2	2	8	3	2	2	2	14	0	
Keruakhand	26	3	1	1	4	5	10	2	12	0	3	6	2	3	1	11	Group G.— Irrigated tracts on high level canal.
Kanchikhand	79	1	14	11	3	7	3	1	15	10	2	15	6	2	11	9	
Kuhunda- Jaipur	4	1	8	3	3	2	2	2	1	5	2	15	11	2	10	7	Group H.— Unprotected or partly- protected parganas on Birupa.
Alti	9	1	15	10	2	15	1	1	14	9	3	4	3	2	14	3	
Dihi Arakh- pur	1	3	8	2	3	1	7	2	15	9	3	6	6	2	15	4	
Bargaon	Nil	1	11	11	2	6	4	1	14	2	1	14	4	1	14	1	Group I.— Irrigated parganas on the Jaipur Canal.
Jaipur	23	1	14	7	2	8	0	1	10	11	2	14	1	2	9	6	
Dolegram	46	1	8	3	2	4	9	1	4	7	2	10	11	2	8	9	
Tisania	10	1	12	9	2	3	5	1	7	3	2	14	2	2	5	2	
Katia	4	1	10	5	2	10	1	1	9	0	2	12	0	2	5	0	Group J.— Unprotected parganas on the Brahmani- Kharsua System.
Olas	1	2	5	0	2	15	8	1	12	0	2	11	2	2	6	8	
Beruan	1	2	4	8	2	13	7	2	0	7	2	12	0	2	7	8	
Kalamatia ....	....	1	9	11	2	6	4	1	10	4	2	6	4	2	4	7	
Hatimunda	....	1	7	3	3	1	3	1	9	1	2	15	8	2	9	9	
Jodh	15	1	13	9	2	7	4	1	8	9	3	2	2	2	12	0	
Tikan	11	1	4	5	2	7	10	1	5	6	3	4	0	2	11	8	Group K.— Irrigated Parganas on Gobari and Patamunda Canal.
Chaudakulat	29	1	11	6	2	14	7	1	15	3	3	6	7	3	3	1	
Ahyas	8	1	11	0	2	8	5	1	8	2	2	5	1	2	0	2	Group L.— Unprotected areas in the Baitarni Kharsua Delta.
Bautara	2	1	2	0	3	2	11	1	0	1	1	11	10	1	9	0	
Bara ....	....	0	13	8	1	9	5	0	14	3	1	9	6	1	5	9	
Kaima	1	1	14	6	1	12	10	1	3	8	1	9	4	1	7	7	

Groups A and B are fairly comparable, or perhaps more correctly the first three parganas of Group A should be compared with Balubisi, Kusmandal, and Suknai, and Nahakhand with the other two.

Group A contains some of the Parganas that have been longest and most completely irrigated; they have also been drained, and canal water is now indispensable to their cultivation. At the last Settlement they were partly protected from inundation and were thickly populated and prosperous tracts. The mean incidence of their *pahi* assessment was Rs. 2-6, and of the *thani*, Rs. 3-12 per acre. The mean incidence of occupancy raiyats' rents has now risen to Rs. 3-6 per acre, an increase of Rs. 1 per acre.

Babu J. N. Mitra, reporting on Asureswar, found no evidence of rise of rent rates directly due to irrigation, and considered that the protection had been of more value than the canal water. In Matkatnagar Babu N. C. Kar, while not finding any direct evidence of enhancement, was of opinion that but for irrigation so high a rate could not be paid. This is doubtless true, though at the last settlement *thani* raiyats were paying a higher average of rents than *pahi* tenants do even now. In Nahakhand the assessing officer, Babu Hira Lal Banerjee, wrote :—"There is not much reason to suppose that the rent rates have risen in consequence of canal irrigation. I consider, however, that it has benefited the zamindar by enabling him to bring lands under cultivation and by securing the crops from the bad effects of deficient rainfall."

The fact appears to be that this part of the country was already prosperous and highly assessed, and while some benefit has undoubtedly been caused, it is rather by insurance against loss than by direct enhancement of the productive power of the land, and this will be borne out by an examination of the figures of Group B.

Group B. These latter villages lie between the Mahanadi and the Kendrapara Canal. Only a small portion of them is irrigated, but they are, to a great extent, protected against ordinary floods, and it is only the lower end of Suknai and part of Paina that suffer seriously from inundation. They contained the homes of many well-to-do persons, and were at the last Settlement even more highly assessed than Group A. The mean incidence per acre of *pahi* rents has risen from Rs. 2-10 to Rs. 3-7, or by As. 13 as against an increase of Re. 1 in Block A. Considering that besides irrigation and protection, Block A enjoys far greater advantages in the form of roads, post offices, and communications generally, there is very little ground for attributing much of the increase in Block A to irrigation.

Further, in Balubisi itself, the southern half is protected and irrigated, the northern exposed to the floods of the Mahanadi and Nuna rivers. The extension of cultivation and increase of rent rates in the irrigated and unirrigated area are compared in the following table :—

	Percentage of increase of cultivation.	Incidence or <i>thani</i> rents.		Incidence or <i>pahi</i> rents.	
		Last settle-ment	Present settlement.	Last settle-ment	Present settlement.
Balubisi I. (48 unprotected estates).	66	4-8	4-8	3-3	3-8
Balubisi II. (unprotected)	8	3-14	3-1	2-12	3-2
Balubisi II. (Irrigated)	22	3-9	3-6	2-4	3-0

The increase of cultivation and of rent rates is greater in the irrigated than in the immediately adjoining unirrigated villages, but the rents are lower; while in the unprotected villages, a little further north, there has been a still greater extension of cultivation and rents are much higher.

There is nothing to show that irrigation has caused any great rise of rent rates or extension of cultivation, though it has affected, to some extent, the nature and number of the crops grown on the irrigated areas.

The third group consists of Parganas, which at the last Settlement, through favourably situated close to Cuttack were liable to flood. They are now, for the most part, protected and irrigable. Their condition has been greatly improved and the mean incidence of the *pahi* assessment has arisen from Rs. 2-5 to over Rs. 3-2 per acre or to a little more than the mean incidence of *thani* rents at the last Settlement.

In Saraswati the assessing officer, Babu Hira Lal Banerjee, reported that the incidence of rents varied generally according to the proportion of irrigated land and in Padampur Mr. Carey found evidence of a very marked rise in rents since the introduction of irrigation. He compiled the following figures for seven selected villages :—

			1276 U., corresponding to 1869 A. D. Acres.	1281 U., corresponding to 1874 A. D. Acres.
Total <i>pahi</i> area	....	....	543	558
			Rs. A. P.	Rs. A. P.
Total <i>pahi</i> rent	....	....	1,708-0 0	1,825-0 0
Incidence per acre	....	....	3 2 4	3 4 4

This shows a considerable enhancement of rents at the time when water was first introduced, but it is not said whether any distinction was then made between wet and dry lands.

The Parganas of Suhang and Paenda are, like those last mentioned, situated in the forks of branches of the Mahanadi, but unlike them, instead of being protected by embankments, form part of the spill area. Nevertheless, and in spite of their comparative inaccessibility, the mean incidence of *pahi* rents has risen from Rs. 2 to Rs. 3-1 per acre. That is more than in the comparable irrigated Group C.

In the group marked E, I have included all the principal Parganas between the Machgaon and Taldanda Canals, omitting only Benahar and Tiran, to which distributaries have so recently been extended that it is out of the question that irrigation should have much, if at all, affected rents. These Parganas were, at the last Settlement, partly protected but suffered much for want of roads. Now they are protected and irrigated, and have a better system of roads than almost any other part of Cuttack, to say nothing of the facilities for transport offered by the canal.

The mean *pahi* assessment on this block shows an increase from Rs. 2-3 to Rs. 3-3 per acre. *Thani* rents at the last Settlement averaged Rs. 3-3 per acre.

In Kodinda rents are slightly lower than in the other Parganas, because some villages are still unprotected and unirrigated and others have suffered from heavy deposits of sand due to the breaching of embankments from thirty to forty years ago. It is really in this Pargana that we find the clearest indication of rents having been raised by irrigation; and though the papers of the estate do not show it, it is said that in Taluk Raghunathpur some of the enhancements were in fact made openly on the ground of the introduction of canal water. Soil maps were prepared for this area and they showed that though some attempt had been made to readjust rents according to the altered classification of soils brought about by irrigation, still rents were far from being proportionate to the relative productive power of the best and worst lands.

In Hariharpur also more figures were available than in most parts, and very careful enquiries were made. The people themselves asserted that the injury due to the drainage cuts taken with the water rates more than swallowed up the whole profit of the increased outturn. This is manifestly untrue, but no enhancements of rent rates on account of irrigation could be found, and Mr. Carey, after an examination of the information collected, summed up the result in the following terms :—"I think we must consider the chief benefit of irrigation in this Pargana to be security from drought when the rain fails".

Much the same results were arrived at in Gandito and Kurania and Jhankar. In Khandi, formerly a remote and wild tract, there has been the most marked increase, but it is to be attributed more to protection and to improved communication than to irrigation. To sum up, while rents have risen largely in

this block, the reporting officers have failed to find any direct evidence of enhancements on account of irrigation. I am, however, satisfied that though protection and improved roads may account for most of the increase, some share in it must, at least in Hariharpur, Kurania and Kodinda, be attributed to irrigation.

To the right and at the end of the Machgaon Canal lie the Parganas of Group F. The first three are all partly protected and irrigated, but the irrigation is of so recent a date that it has as yet had no effect upon rents, and the bulk of this area is more heavily flooded than formerly owing to the restriction of the spill area by the canal embankments. The flooded area is, however, rather a *rabi* than a rice-growing tract, and comprises the poorest as well as the richest soils in the district.

On the group the mean incidence of *pahi* rents has risen from Rs. 2 to Rs. 2-11, while the mean of the *thani* rents at the last Settlement was Rs. 2-15.

As I have said, Kate and Saibir both contain a protected as well as an unprotected area, and in both there can be little doubt but that the construction of the canal embankment (the Daib left) has greatly benefited the protected at the expense of the unprotected area, though there is no evidence of an increase of rates of rent in either. The following figures bear out this conclusion :—

Pargana Kate —

			At last Settlement.			At present Settlement.		
			Acres.			Acres.		
Cultivated area—								
Protected	....	....	1,447			2,219		
Unprotected	....	....	1,697			3,091		
			Rs.	A.	P.	Rs.	A.	P.
Incidence of <i>thani</i> rents per acre—								
Protected	....	....	2	10	0	2	8	0
Unprotected	....	....	3	7	0	2	3	0
Incidence of <i>pahi</i> rents per acre—								
Protected	....	....	1	13	0	2	5	0
Unprotected	....	....	2	9	0	2	1	0

Pargana Saibir—

			Protected area.			Unprotected area.		
			Per cent.			Per cent.		
Proportion of the waste lands at the Settlement reclaimed up to now.			56.53			51.98		
			Acre.			Acre.		
Average size of a plot			.25			.34		
			Acres.			Acres.		
Average size of a holding			1.37			1.68		
			Rs.	A.	P.	Rs.	A.	P.
Average selling-price of land per acre during the past ten years—								
(a) <i>Lakhiraj Bahal</i>	....	....	132	6	4	97	8	0
(b) <i>Bazyafti</i>	....	....	98	10	5	80	1	10
(c) <i>Thani</i>	....	....	41	3	9	40	4	6

	Assessed area.	Rent.	Incidence.		Assessed area	Rent.	Incidence.	
	Acres Protected.	Rs. A.	Rs.	A.	Acres Unprotected.	Rs. A.	Rs.	A.
Development of rents (including <i>lakhiraj</i> <i>bazyafti</i> and lands held by proprietors) —								
At last Settlement	4,568.56	14,238 2	3	2	2,530.45	8,116 0	3	3
As now settled	7,047.58	22,671 7	3	3	4,847.23	13,820 12	2	13

Sailo is a Pargana in which more valuable crops were grown before the construction of the protective embankments, and that is the reason for the comparatively low rates and small increase.

Tiran and Benahar are partly protected and irrigated, but irrigation is too recent to have affected rents, and a considerable area in both is liable to inundation by the drainage cuts and the brackish water of the tidal creeks.

On the whole, it may be said that rents have risen more in Group E than in Group F, and though the difference is due rather to protection, to accessibility, and to the quality of the soil, than to irrigation, yet some credit for it must be allowed to the facilities for obtaining canal water.

On the left bank of the Birupa lie the three Parganas of Kokhuakhand, Keruakhand, and Kanchikhand. Even at the last Settlement they were, for the most part, free from inundation, and the rice lands could be watered from the hill streams flowing down through Dalijora.

Group G.

They are now partly irrigated by the High Level Canal and the mean incidence of the *Pahi* assessment has risen from Rs. 2-7 to Rs. 3-3 per acre.

In Keruakhand the average of rents was very high at the last Settlement, partly owing to the large area of homestead land, and a careful scrutiny of the village figures shows that where rents were already high, they have not been influenced by irrigation, and though they have risen largely in a few villages, the rise is almost the same for irrigated and unirrigated lands. In Kokhuakhand canal water is taken generally in the villages which were formerly most lightly assessed, the others being already irrigated from tanks and streams. In the former group the average incidence of rent has risen from Rs. 2-8 to Rs. 2-15 per acre, and in the others from Rs. 3 to 3-7. Mr. Carey, in his report, points out that within the canal irrigated area the rise of rents is greatest in those villages in which the percentage of the area irrigated is greatest, but this fact might, to some extent, be accounted for by the natural tendency of the lowest rents to rise most. On the whole I think that in this group the effect of irrigation has been to improve the worst lands and to level up the lower rents.

In Group H, I have included the Parganas lying on the Birupa and Kimeria rivers and forming the most disastrously flooded tract in the Province. The Birupa is confined by embankments, and in flood time is banked up against the waters of the Kimeria and the hills of Alti, so that the flood covers Kuhunda Jaipur, and part of Dihi Arakhpur and Alti for days at a time.

Group H.

The mean incidence of the *pahi* rents in the group has risen from Rs. 2-3 to Rs. 2-14, but we may exclude the two small Parganas of Bargaon and Dihi-Arakhpur, the circumstances of which are peculiar, and consider only the other two. They were both much over-assessed before the last Settlement, and though reductions were then made, it is probable that the assessment was still heavy. Nevertheless, we find the incidence of *pahi* rents in Kuhunda Jaipur nearly doubled, and that in Alti increased by more than Rs. 1-4 per acre. Part of Alti is indeed protected and irrigated, but rents are no higher in these villages than in the unprotected area, and Babu N. C. Kar, who spent two years in these parts, reported that he could find no evidence that in this Pargana irrigation or protection had caused any extension of cultivation or enhancement of rents.

In Group I are included the four principal Parganas protected by the Baitarni and Bura Kharsua embankments and irrigated from the Jajpur Canal.

Group I.

As a reference to the statement of irrigated areas will show, the extension of irrigation is too recent to have much affected rents, but the canal embankments have made a great change in the agricultural conditions of the country. The mean incidence of *pahi* rents in this area has risen from Rs. 1-12 to Rs. 2-13. The protection, though on the whole beneficial, has had its drawbacks, and it is not easy to say how much of the increase is due to it. No direct evidence of enhancement of rent rates on account of protection or irrigation was found, and I do not think much can have been made.

Block J contains the Parganas on the right bank of the Kharsua, the floods in which have been aggravated by the protection afforded to the last-named group.

Group J.

Nevertheless the rise in the mean *pahi* incidence is from Rs. 1-14 to Rs. 2-13, or almost the same as in the last block. At the last Settlement, indeed, the assessment of these Parganas was higher than in Group I, but in Olas at least the *thani* rents were too high, for the tenants refused to accept their *pattas*.

In Group K are two Parganas which have benefited by irrigation, but much more by protection and drainage. They show the largest increase in rent rates of any of the groups, but no evidence could be found of higher enhancements in the irrigated than in the unirrigated lands.

We may, however, safely assume the enhancement of rent rates in these Parganas on account of irrigation at not less than As. 8 per acre.

It will thus be seen that there is little, if any, evidence of general enhancement of rents on the ground of irrigation or of higher rates in irrigated than in unirrigated villages, though there is evidence that rent rates have risen more in the protected and irrigated tracts than in the unprotected and unirrigated. There is, however, some reason to think that irrigation causes the lowest rents to rise, and in fact has a tendency to equalise rents through out an irrigated area. Of course if there has been a greater increase of cultivation in the irrigated area, this would in itself serve to veil any rise of rent rates.

Extension of cultivation due to Irrigation. 112. The following figures may be examined :—

Name of Group.	Percentage of area assessed at last Settlement.	Percentage assessed at this Settlement.	Difference.	Name of Group.	Percentage of area assessed at last Settlement.	Percentage assessed at this Settlement.	Difference.
A	66	81	15	G	54	66	12
B	59	72	13	H	50	73	23
C	47	59	12	I	62	81	19
D	53	65	12	J	55	76	21
E	62	72	10	K	60	81	21
F	53	73	20	L	68	76	8

It will be seen that the increase of cultivation is certainly no greater in the protected and irrigated groups, and all the enquiries made have failed to elicit any evidence of a substantial extension of cultivation to lands which but for the canal water were not likely to have been reclaimed. It is of course certain that some lands, such as the sand-damaged areas in Kodinda have been reclaimed, which, without canal water, would not pay for cultivation, but on the other hand there are high lands which would probably yield better crops in flooded than in irrigated areas. Irrigation can only reach comparatively low lands, and these can almost always be reclaimed. The people are generally too lazy to use lifts for reclamation of poor lands. The effect of protection without irrigation is rather to restrict than to increase the extension of cultivation.

113. Up to date some 88,000 acres have been provided with distributaries, but of this only, some 229,000 acres are likely to be irrigated.* Out of this, some 195,000 acres are now irrigated, leaving a margin of 36,000 acres.

It is probable that there will be a large extension of irrigation in Parganas Benahar and Khandi on the Taldanda-Machgaon System, in Tikan, on the Kendrapara Canal, in Jajpur, Dolgram, Katia, and Ahyas on the Jajpur Canal. It is, however, very difficult to foretell what may happen when the existing leases fall in, and so much depends on the chance of the seasons that I will not venture to make an estimate of the area likely to be irrigated.

114. Whatever opinions they may have as to the effect on rent rates, all officers engaged on fair-rent work are unanimous in reporting that protection and irrigation have greatly improved collections. The committee appointed to enquire into various matters connected with the Orissa Canals calculated (paragraphs 42 and 62 of their report) that on an average one-tenth of the annual crop was destroyed by

See Revenue Report for 1898-99. Paragraph 12 of Report on Orissa Canals.

floods and one-twelfth by drought. This should entail corresponding remissions of rent, and we should accordingly find the value to the Zamindar of the protection by canal embankments to be 10 per cent. of the rental, and of protection and irrigation over 18 per cent.

This is clearly too high, for it is only in a very few areas that collections fall so low as 82 per cent.

The average collections, as calculated from the figures given in the completion reports, are in Cuttack 94 per cent., and in Puri, which is mostly flooded and liable to drought, 92 per cent. In Balasore, where rents are lower, Mr. Kingsford estimates collections at about 85 per cent: probably something less than 90 per cent. is collected, that is, 90 per cent. of a nominal demand, which is considerable more than the landlords expect to collect. Taking unprotected and partially-protected Parganas we find—(the figures are for a few estates only in most cases)—that the collections are returned as follows :— Paenda, 90 per cent.; Kate, 87 per cent.; Kodinda, 81 per cent.; Hatimunda, 95 per cent.; Apilla, 98 per cent.; Alt, 91 per cent.; Bardiala, 105 per cent.; Kuhunda-Jaipur, 43 per cent.; Suhang, 61 per cent. In the last two Parganas the figures are for one estate only and for a period when the crops were destroyed by floods. Bardiala is a problem as it is both highly assessed and heavily flooded; the management is exceptionally good.

Among irrigated and protected Parganas we find Matkatnagar, 98 per cent.; Saraswati, 96 per cent.; Kanchikhand, 94 per cent.; Tiran, 108 per cent.; Hariharpur 98 per cent.; Keruakhand, 94 per cent.; Khandi, 99 per cent.; Koronia, 94 per cent.; Padampur, 92 per cent.; Karimul, 94 per cent.

My general conclusion is that from 85 to 95 per cent. is collected or should be collected in unprotected and over 95 per cent. in protected and irrigated areas. The difference in collections may range from 5 to 10 per cent. on an average for the district of Cuttack. The balance of the loss appears to be borne by the cultivators.

In Balasore the area at present irrigated is too small to draw any conclusions.

115. To decide to what extent the Government has been recouped for its expenditure by the larger land revenue obtained at this Settlement, I would ask that the following table should be considered. The letters refer to the grouping of Parganas made for the statement of incidences in paragraph 110.

PROTECTED AND IRRIGATED.						UNIRRIGATED.					
Name of Group.	Land Revenue, last Settlement.		Land Revenue, present Settlement.		Increase per cent of land revenue.	Name of Group.	Land Revenue, last Settlement.		Land Revenue, present Settlement.		Increase per cent. of land revenue
	Percent.	Amount.	Percent.	Amount.			Percent.	Amount.	Percent.	Amount.	
1	2	3	4	5	6	7	8	9	10	11	12
		Rs.		Rs.				Rs.		Rs.	
A...	63	78,928	54	1,12,981	43	B ...	63	59,076	55	84,136	42
C...	63	23,918	55	34,220	43	D ...	65	19,984	53	28,798	44
E...	63	90,880	56	1,25,320	38	F ...	62	84,558	53	1,33,017	57
G...	66	19,583	56	24,497	25	H ...	64	45,538	52	74,300	63
I...	65	63,333	52	1,10,025	74	J ...	64	61,027	52	95,185	56
K...	64	20,417	52	42,905	110	L ...	66	50,175	54	75,583	51
Total	64	2,97,059	54	4,49,948	51	Total	64	3,20,358	53	4,91,019	53

There is apparently no great advantage to Government in the increase of revenue in the protected and irrigated tracts. There is a difference of only 1 per cent. in the percentage taken, while the gross increase is greater in the unprotected Parganas. This is due to two causes; firstly, the very narrow limits of the discretion left to the Settlement Officer in the percentage of the assets to be taken as revenue (50 to 55 per cent.) and the very strict interpretation by the Board of Revenue of the Secretary of State's orders; partly also to the limitation on enhancements of revenue imposed by the necessity of considering the proprietor's income. I am myself of opinion that if the zamindars of the flooded tracts

can pay an average of 53 per cent., as they can, those of the protected and irrigated Parganas could as well have afforded to pay 58 to 60 per cent., though a *rasadi* increase would have been necessary in many cases. My proposals for taking more than 55 per cent. in the irrigated and protected areas would have been much more frequent than they were, but for the fact that, in addition to the benefits of irrigation, I could not point out other reasons for taking more than 55 per cent. as revenue. As revenue has been settled we may, perhaps, credit one quarter of a lakh, or at the outside half a lakh, of the increase directly to protection and irrigation.

The other sources of profit to Government from canals and their embankments are three in number : (1) Irrigation receipts, (2) Navigation receipts, (3) Saving of remissions.

The first two sources of revenue attained their maximum in 1897, when for the only time since their construction, the receipts more than paid the working expenses of canals. Previous to 1866 the average annual remissions of revenue on account of floods and drought were in Puri Rs. 27,000 and in Cuttack Rs. 62,000. Since the great famine there have been none, but this I attribute rather to the smaller proportion now borne by revenue to rents than to protective measures. Were it otherwise we might have expected to find remissions of revenue in Puri, though not in Cuttack; but I think, we may put to the credit of irrigation and embankments an annual sum of Rs. 30,000 on this account. If the embankments were now abandoned, the loss would probably be many times greater, but the estimate represents what might have been expected to be remitted, had embankments remained as they were in 1860.

The account for irrigation works then stands as follows. I give both 1897-98 and 1898-99 :—

	1897-98.	1898-99.
	Rs.	Rs.
Working expenses : direct and indirect	5,39,900	4,95,200
Interest of 4 per cent. on capital	10,27,500	10,30,200
Total charges	<u>15,67,400</u>	<u>15,25,400</u>
Receipts for irrigation	3,14,700	2,72,400
Ditto navigation	2,11,300	1,72,700
Ditto miscellaneous	28,700	24,500
Deduct Refunds	<u>-2,800</u>	<u>-4,100</u>
Total Direct Receipts	5,51,900	4,65,500
Add estimated gain in new revenue due to the canals	25,000	25,000
Add estimated saving in remissions	30,000	30,000
Grand Total Revenue from canals	<u>6,06,900</u>	<u>5,20,500</u>
Nett deficit of the year	<u>9,60,500</u>	<u>10,04,900</u>

These figures take no account of agricultural embankments, nor of embankments in Balasore. On agricultural embankments the average expenditure from 1878-79 to 1897-98 was Rs. 1,04,600 and there are no direct receipts, though it may be taken that it was necessary to the security of the revenue. When the canals were begun it was anticipated that there would be a large saving in the expenditure on other embankments, but so far there has not been much, as will be seen from the following statement :—

Average annual expenditure on agricultural embankments in Cuttack.

Period.	Amount	Period.	Amount.
	Rs.		Rs.
1839-45	10,800	1867-76	88,400
1846-52	13,700	1877-86	48,800
1853-59	40,800	1887-96	53,900
1860-66	59,200		

It is clear that the amount expended can never be recovered by Government, although, as estimated in paragraph 109 above, the gain to the people may be taken as equal to over 13 lakhs per annum in the irrigated area and 26 lakhs on the whole districts of Cuttack and probably over 40 lakhs of rupees on the province.

116. The irrigated tracts which are permanently settled comprise Perganas
Permanently-settled areas. Madhupur, Darpan, Chhedra and Derabisi.

In Madhupur the irrigated villages differ much from the others, and rents had so long been left unadjusted and areas were so doubtful that no comparison could be made of rates for irrigated and unirrigated land.

In Chhedra records were attested long ago, and there are no figures from which any conclusion as to the effect of irrigation can be drawn.

In Darpan an enquiry was made by Mr. A. C. Sen, and his figures were criticised in Mr. Maude's letter No. 2399, dated 16th November 1893. Briefly, the results were that the extension of cultivation and rise of rent rates did not appear to have been accelerated by irrigation. This may be accounted for by the great impulse given to extension of cultivation by the opening up of communications through the unirrigated tract which obscured the effects of irrigation, and there is no doubt that the increase of rents in Darpan is due in no small measure to the canals.

Derabisi requires a longer notice, having already formed the subject of two reports by Babu Jamini Mohan Das.

In the former report Babu Jamini Mohan Das, basing his conclusions on the figures for a small group of villages in the south-west of the Pargana, came to the conclusion that the lands might be divided into three blocks.

(1) Directly improved by irrigation. These were formerly *chhota laghu* (see paragraph 128) and *biati* lands now growing two crops.

(2) Middle class *sarad* lands in which irrigation made little improvement.

(3) Lowlands, now overflowed by the canal water.

He analysed the present rates in the three classes, or rather the average rate for each class.

He assumed that, but for irrigation, the rates would have been equal, and on this doubtful basis argued as to the effect of irrigation. The premises being unreliable and there being no means in the absence of the old *Khasras* and *Khatians* of ascertaining the previous rate, the calculation was rejected by the Director of Land Records.

The Assistant Settlement Officer now reports that, with the exception of the south-western corner, the Pargana is unsuitable for irrigation; that more than half is too low or too high, and that there is little prospect of much extension of irrigation beyond the present area, which is 21 per cent. of the cultivated land.

I do not quite agree for I think some of the *pats* might be first drained and then irrigated, but the question is outside the scope of this enquiry.

The comparison of rates plot by plot before and after irrigation has been abandoned, the *bhaurias* (Khasras) not being produced and the *bhians* (rent-rolls) of different periods so variously prepared that they are not comparable (see paragraph 7 of the report). There remain therefore but two methods:—
(a) Comparison of the rental and incidence of rents in the same village at different periods; (b) comparison of the incidence of rents in irrigated and unirrigated villages.

To begin with (b), it is shown in Babu J. M. Das's report (paragraph 4 to 6) that rents are not now markedly higher in the irrigated than in the unirrigated villages.

For the purpose of comparison of rents at different periods the areas and rents in the *jamawasilbaki* (collection papers) and *ekpadia bhians* (rent-rolls) filed have been totalled and compared with the attested records.

The first point thus brought out is the very much larger areas shown in the *khatians* than in the zamindar's papers. The following villages taken at random are sufficient to show this:—

Village.		Per cent. irrigated.	Area according to Zamindar's papers.	Area according to Khatians.
			Year	Area
Arakhand	....	72	1878	163
Balbhadrapur	....	36	1878	313
Borpailo	....	30	1892	121
Benipur	....	37	1886	250
Nahang	....	31	1881	191
Jagannathpur	....	25	1887	180
Bilemgheri	....	16	1892	425
Despur	....	80	1898	107
Dhol	....	58	1893	467
				181
				338
				161
				281
				233
				232
				145
				119
				611

I conclude from this that there has been extension of cultivation, but that it was not generally shown in the *jama wasilbaki*, as it was very much to the interest of the *mustajir* (lessee) to conceal it.

As to rents I fear the figures are not such as to warrant any conclusion. Taking such as on the face of them appear reliable, we get the following instances of increase since the date of introduction of irrigation :—

Village.	Percentage of Irrigation.	Date of first introduction of canal water.	RENT BY ZAMINDAR'S PAPERS.		1898-99 Attested rental.	Approximate year of enhancement.	Remarks.
			Year.	Amount.			
1	2	3	4	5	6	7	8
				RS.	RS.		
1. Arakhand	72	1873	1870	344	512	1880-5	Rents low. The figures are a little suspicious
2. Despur	80	....	1876	393	506	1880	
3. Kanderpur	62	1878	1881	507	611	1885	
4. Barahilo	30	1873	1876	335	422	1891	
5. Chasakhand	52	1873	1882	307	372	1890	
6. Dhol	58	1878-91	1884	1,137	1,431	Continuous.	
7. Balia	47	1873	1872	501	559		
8. Dorbol	33	1873	1869	335	389	Possibly, before introduction of irrigation.	
9. Benipur	37	1873	1877	840	845	....	A much larger increase before 1877.
10. Waukhand	52	1869	1865	457	513	....	
11. Jagannathpur	25	1878	1877	452	538	....	
12. Nahang	31	1878	1881	556	573	....	A large increase before irrigation.
13. Nilkanthapur	50	1873	1879	894	879	....	Area also decreased.
14. Nurkhanpatna	20	1878	1869	124	122	....	
15. Bazan	43	1873	1888	271	253	....	-do-
16. Gopinathpur	71	1869	1892	418	407	....	Area increased.
17. Sunderpur	98	1873	1882	149	146	....	
18. Raipur	33	1877	1878	825	816	....	
19. Beruan	Nil	....	1885	930	916	....	Reached a maximum of Rs. 863 in 1882.
20. Nagaswarpur	Nil	....	1889	461	332	....	Marked decrease in area.
21. Mangrajpur	Nil	....	1879	133	133	....	

The largest increase is found in the first six villages, where irrigation is largely practised. The next six villages though irrigated show only a normal or less than normal increase.

The last nine are instances of an actual decrease.

On the whole the figures appear to bear out the theory that the increase is greater in the irrigated villages but there are marked exceptions as Nilkanthapur and Sunderpur.

The figures for Gopinathpur are too recent to be of much value.

It is impossible to estimate how much of the increase is due to irrigation, or would not have been but for irrigation. The Assistant Settlement Officer reporting does not consider that the facilities for obtaining canal water have caused a rise of rents, but it appears to me that the figures compiled do warrant a conclusion that some part at least of the increase in rents is due to irrigation.

How far the figures are reliable is another question : there is certainly reason to distrust some of them, and the Assistant Settlement Officer places no great reliance on any.

In conclusion, I would say that these reports have added very little to our previous information. It was not to be expected that they should, as in

temporarily-Settled areas, with far more reliable figures to work on, the officers employed had failed to prove anything definite.

117. Having set forth the results of the enquiries made, I am now in a position to answer the questions put by the Director.

Conclusions.

(1) Has there been a rise of rent rates due to irrigation ?

There has been a rise owing to the improvement in lands which previously suffered for want of water, but enhancements on the specific ground of the value of the lands having been increased by irrigation are very rare and in no case proportionate to the increased outturn. This is, in my opinion, to be accounted for—*firstly*, by the restraining effect of the proclamation of 19th July, 1866; *secondly*, by the fact that rates in Orissa are not calculated upon a strictly economic basis, so that they never do increase in proportion to the increased value of the produce, and a raiyat in possession of second class lands changed by irrigation into first class, will actually pay, in the form of rent and water rates, as much as the owner of unirrigated first class lands yielding an equal crop; *thirdly*, that a great deal of the irrigation is very recent and that zamindars have abstained from enhancements in view of the pending settlement; *fourthly*, that the lands on the Taldanda and Kendrapara Canal systems, in which irrigation first became general, were among the richest in the Province. They were in no great need of irrigation, and rents were already very high.

No estimate can be made of the amount of the enhancement due to irrigation, but in most cases it is certainly small in comparison with the total increase due to growth of population, higher prices, and improved communications.

These alone would suffice to account for the whole increase in rents and more. I may say that nominal rent rates have in hardly any areas risen above those shown in the *thani* raiyats' rent rolls (*bhians*) at the last Settlement. Rents are raised not by enhancement of rates, but by re-classification of lands; and to complete this enquiry, it would have been necessary to make soil maps and to show against the present fields the numbers and rent rates at the last Settlement. The attempt to indentify last Settlement fields was discontinued at an early stage of the Settlement, and though a comparison has actually been made in one or two selected villages, it has produced no definite result.

(2) Has there been owing to irrigation an extension of cultivation to lands that would not otherwise have been reclaimed ?

It is certain that in some localities there has been a small increase on this ground, but it is almost negligible in comparison with the general increase in the Province and no direct evidence on this point has been obtained. There are lands in many Parganas now cultivated with the help of canal water that apparently could not be cultivated without it, but the face of the country has been so changed by the embankments that it is impossible to say that if these had not been constructed, crops could not have been grown.

(3) To what new areas is water likely to be extended during the term of Settlement from canals now existing ?

There is likely to be a considerable extension in Jajpur and Tirtol Thanas and in the neighbourhood of Kendrapara, but the extent cannot safely be estimated.

(4) What enhancement of rent rates has been due to the construction of canal embankments ?

There has been an undoubted increase in certain areas, such as Tikan, Chaudakulat, Saibir, Kate, but it is in some measure at the expense of lands outside the protected area. Perhaps we may take annas 3 per acre as representing the increase on the 5,00,000 acres of country protected by these embankments which may be attributed to the protection and irrigation of the canals.

(5) What extension of cultivation has then been due to the canal embankments ?

Generally there is none. Probably in Tikan a good part of the increase may be attributed to this source.

(6) What effect have the canal embankments had on zamindar's collections ?

I think that to irrigation and protection, combined as they are, a difference from 5 to 10 per cent., or say annas 4 per acre, may be attributed; certainly not less on the whole than 5 per cent. and probably not as much as 10 per cent., but now that rents and revenues have been enhanced. I think that practically full rents will be collected in irrigated and about 90 per cent. in unprotected and unirrigated areas. I mean of course that these collections will be made on an average deduced from a number of years.

118. It appears to be the present intention of Government to be content with the enhancement of land revenue in the case of temporarily-settled estates, and to abandon both

Proposals. the original proposal to limit the term of Settlement to fifteen years in the case of lands accessible to canal irrigation (letter No. 1230 from the Government of India to the Government of Bengal) and the suggestion to extend the owner's rate to lands which may become irrigable during the term of Settlement (Government of Bengal to the Board of Revenue, No.90 T.-R., dated the 25th May, 1894).

As to this second proposal, I would, however, as it has not been definitely overruled, beg to point out that it is most unfair to the occupiers of the lands it would affect. There is but little, if any, difference between the incidence of revenue in the irrigated and in the protected but unirrigated areas, and, as I have shown, the enhancement of rents due to irrigation in the former is very small, and only a very small part of the increase in revenue in irrigated areas can be attributed to irrigation. If a rate is to be imposed at all, it would be better to take 5 per cent. on all estates in the protected area, even though this might in some cases press hardly. I think that it would not be unfair to adopt the original proposal of Colonel Gulliver and impose a cess of eight annas per acre on all protected lands. This would bring in about 2½ lakhs, and would represent but a fraction of the benefit enjoyed by raiyats and zamindars.

In the permanently-settled estates an assessment of four annas per acre protected by canal embankment would be more than covered by enhancement of rents, extension of cultivation, and increased collections.

CHAPTER VI.

AGRICULTURAL INFORMATION.

119. A comprehensive account of the Agriculture of Cuttack has been written by Mr. Banerjei of the Agricultural Department* and notes on the principal crops have been written by Mr. Arnott, of the Public Works Department, and by Messrs. Nathan and Walsh, when Assistant Settlement Officers in Puri.

There is therefore little new information to be given, and this chapter can be but little more than extracts from the existing reports, to which I would refer those requiring further details.

120. The first point to be considered is the nature of the soil. The cultivators of Orissa recognise a large number of different classes of soil, each having a name of its own which may vary in different localities. In an ordinary village the lands fall primarily under three main divisions, according to their situation, viz.—

Jala or wet lands, embracing all the rice lands of the village.

Kala, literally 'black', meaning the high lands about the homestead which, enriched by manure and household refuse, are used to grow vegetables, cotton, jute, and other valuable crops.

Pal, or riverside lands which receive a deposit of silt (*pattu*) and are suitable for growing tobacco, cotton, mustard, and other *rabi* crops.

Again, according to their elevation, the arable lands are known as *khal*, or low lying, and *dhipa*, or high lands. Very low lands in hollows almost always full of water, so that they can only grow crops in the dry season or very coarse varieties of paddy, are called *gahira*, while in hilly country the lands at the valley bottom are known as *garara*. High lands that suffer from want of silt and water are commonly contemptuously referred to as *thenga*, *thangi*, or *dangar*.

Again, according to their composition, soils † are classed as follows :—

- (1) *Matal* is the name given to all kinds of stiff clayey soils. Rice and sugarcane are the principal crops grown on them, but besides these wheat, *bir hi*, and *kulthi*, are also cultivated.
- (2) *Chikita*, is a strong sticky clay, which is almost too stiff to be used for successful cultivation, and grows for the most part coarse varieties of the *sarad* or winter rice. The outturn on such lands is said to be generally very poor.
- (3) *Chauria* is also a hard clay, which is very liable to cake on being exposed to the sun when ploughed. It generally cracks into hard blocks on getting dry, and is altogether an inferior soil.
- (4) *Dorosha* is a mixture of sand and clay in nearly equal parts. It is used for *biali* or autumn rice and for all *rabi* crops. It is easily worked and is retentive of moisture.
- (5) *Telbalia* is the name given to a loam which contains a larger admixture of sand than the *dorosha* lands. It is looser in texture, and being poorer requires more manuring than a *dorosha* soil.
- (6) *Baliamatal* is a loam with a large admixture of earth; in other words, a rich sandy loam.
- (7) *Rangamati* is a red ferruginous sandy loam occurring near laterite rocks. Like *telbalia* it requires a great deal of manuring before it can produce a good crop.
- (8) *Thengajami* is an elevated sandy laom, with very little moisture, which as a rule is allowed to lie waste, though sometimes ploughed up for growing

* Report on the agriculture on the district of Cuttack, 1893.

† Taken from Mr. Banerjei's report.

biali, paddy, *mandia*, and *kulthi*. The crops on such lands are necessarily very poor.

- (9) *Balia* is the name given to very loose sandy soils which grow poor specimens of *rabi* crops.
- (10) *Pattu* is an alluvial soil, formed from silt deposited by floods. It is used for tobacco, mustard, jute, coriander and cotton, and is taken advantage of to grow all kinds of miscellaneous crops.
- (11) *Pankua* is a black mud unmixed with sand, such as is found at the bottom of ponds and tanks.
- (12) *Rektimatal* is a stiff rich soil.
- (13) *Pansia* is a loose though comparatively fertile soil.
- (14) *Gangutia*, as the name would signify, is applied to a clay containing an admixture of *ganguti* or lime, to be met with near those river beds which abound with nodulous limestone. An admixture of clay and limestone dust is in some places known as *khali* soil.
- (15) *Nunajami* is land which is more or less of a saline nature. It is generally of very little use. A few varieties of *laghu sarad* rice are grown on it, when it does not contain an excess of salt.

According to their fertility, soils are divided into four classes : first (*aul*), second (*dayam*), third (*sayam*), and fourth (*chaharam*); but to hear the ordinary *raiayat* talk, one would not believe that there was any first class land in the Province, and might be inclined to put down all fields under one of three heads 'Water holes' (*pani-gahira*), 'uplands where the foxes have their earths' (*kenkshiali pasiya*), 'river sand,' the ordinary terms used by the cultivator in describing the fields of his holding.

121. Rice lands are generally manured with cowdung-ashes and house-hold refuse, more rarely with rotton cakes of unburnt cowdung. The cowdung is carefully gathered by the women and children, but, except in a few favoured localities, has to be used for fuel, and can only find its way to the soil in the form of ashes. It is spread on at the time of the first ploughing at the rate of about half a ton (dung and refuse) to the acre, except on flooded lands which are enriched by silt. Sugarcane, *pan*, and vegetables are more heavily manured, and oil-cake (*piria*) is often used in their cultivation.

Ordinary manure (*khata*) costs about two to four annas per cart load of 10 maunds, but it is rarely sold, except near the towns, each cultivator using the produce of his own home.

122. Water is wanted chiefly at three times of the year; in May-June for ploughing; in July and August for *bhiushan* or ploughing up of the young rice plants, and in October for the final ripening of the crop. In areas irrigated by canals, water is taken from April to December, but in most parts of the district irrigation from streams and tanks is only resorted to for paddy in October-November, and is generally confined to the more valuable crops such as sugarcane, tobacco, and cotton.

Irrigation from wells I have not come across, and the tanks which at one time abounded in certain Parganas have to a great extent silted up; but water is taken from the *nallas* or *jores* in the low-lying tracts near the coast by means of the *tenda* or bamboo water-lift. Where the water had only to be raised a few feet it may be scooped up in a *senz*, a sort of basket made of split bamboo which two men use. Holding by the ropes attached to either side, they swing it backwards and bringing it down sharply into the water, carry the forward motion of the swing through until the *sen*, now full of water, is raised to the level of the water channel, when the contents are poured out.

Another way of lifting water a short distance is with a *janta* (the *karin* of Bihar) made of a single piece of wood about six feet long, hollowed out and shaped like one-half of a canoe; the broad open end resting on the head of the water channel while the pointed closed end dips into the water. When this is raised the water pours naturally into the channel. It may be worked by one man either directly or with the help of a bamboo crane and counter-poise as in the *tenda*, but cannot lift

more than a couple of feet. It is not uncommon for two of these methods to be combined, the water being lifted by the *tenda* into a reservoir, and from that into the water-channel by a *sena* or *janta*.

I have seen tobacco being watered from earthen pots (*mathia*) carried a considerable distance by coolies, but this can only be done for very valuable crops, and where I saw it tried, it would have been such a simpler to have made a channel from the river. Mr. Banerjei estimates the cost per acre of irrigating a field once with hired labour at from Re. 1 with the *janta* to Rs. 3 with earthen pots.

Along the foot of the hills fields are often irrigated from the small streams, and, the lift being small, the expense is less.

123. A full description of the principal agricultural implements is to be found in Mr. N. N. Banerjei's report and in Mr. Arnott's notes.

The plough.

The plough (*nangal*) is made and kept in repair by the village carpenter for a yearly payment of a couple of *gaunis* of paddy, worth say two annas. The wood is sometimes supplied by the zamindar but more often has to be bought, and costs about eight annas. The share is made by the village blacksmith for another couple of *gauni* of paddy. The plough is light enough to be carried on the shoulder of a man, and with it a pair of bullocks can plough a third of an acre in a day. It is said to be a very indifferent instrument for turning over the soil, but its lightness and cheapness recommend it to the Uriya cultivator.

The *mahi*, or harrow, consists of two straight pieces of *sal* wood or bamboo joined together by rungs like a ladder. To this the cultivator harnesses his bullocks and standing on the middle of it is dragged across the ploughed field breaking up the clods under it, and giving the land a level surface. It is used both in preparing the soil to receive seeds or seedlings, and afterwards to give young plants a firm foothold.

The Harrow.

The *bida*, or rake, consists of a *sal* wood beam about 5 or 6 feet in length with twelve to sixteen iron tires or prongs about 14 inches in length. To this bullocks are harnessed by means of a pole and they drag it across the fields to loosen the soil and uproot the weeds. Generally it has to be dragged twice across, first in one direction and the second time at right angles to the first in order to completely get rid of the weeds. It is only used on fairly dry land.

The Rake.

For digging, a *kodali* or *kuri* is used, as in other parts of India. They are of varying sizes and weights according to the purpose for which they are intended.

The Mattock.

For reaping, a small toothed sickle or *dao* is generally used. Another form of *dao* with a straight and heavier blade is used for cutting jungle wood and fodder.

The Sickle.

Grass for cattle or horses is scraped off the slopes of river banks or waste lands with a sort of small trowel called a *khurpi*.

The grass Scraper.

Grain is generally husked with a *dhenki*, which consists of a beam of wood about 3 or 4 feet long hung at about a quarter of its length on a pivot between two uprights. At the head of the long end is a thick wooden peg that comes down like a hammer into a stone mortar. To work the machine the mortar is half filled with paddy: the woman (it is generally a woman) then places her foot on the short end of the beam and throwing her weight on it depresses it. The foot being removed, the peg at the other end falls like a hammer on the grain, and so *dacapo*. Less commonly a pestle and mortar is used for husking.

The Grain Husker.

Flour is little used by the Uriya, but for crushing pulses a *janta* or *chaki*, consisting of two circular millstones working one on top of the other in used, as in other parts of India.

Flour Mill,

The Uriya cart is peculiar. It consists essentially of two poles of *sal* wood or bamboo about 12 feet long tied together at one end about 3 feet apart at the other, and joined by cross bars at intervals. This framework rests on a pair of wheels about

Carts,

4 feet high and 4 feet apart, and there is as much behind as in front of the axlebar. The bullocks are yoked one on each side of the narrow end and will drag half a ton 15 or 20 miles a day on a metalled road.

From the Garhjats come heavy buffalo carts, shorter and broader, with low wheels of solid wood, and with the advent of the railway the light little Madras hackeries drawn by a single bullock have become common in Cuttack town.

For carrying grain a long coffin-shaped basket of spilt bamboo called an "odaro" is fitted on to the cart and will take some 10 maunds or more.

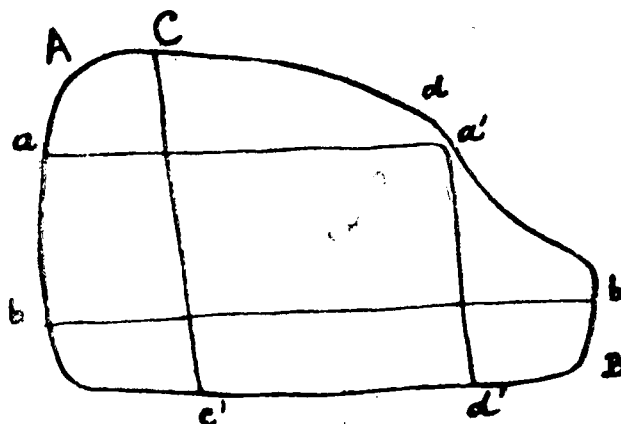
124. I propose to say as little as possible on this subject for fear that zamindars may again revert to the very inaccurate methods formerly in use. At the last Settlement the internal village measurements were made by Uriya amins with measuring rods of local length; these measurements were converted to standard measurement, and in the case of many estates were again reconverted to local measurements. It may be added that the external circuit of the villages as well as the area were surveyed and computed by professional surveyors. As a rule, the Uriya amins measured cultivated lands with fair correctness, but the most confusing mistakes were made in the measurement of large areas of waste lands. In order to fit the areas of waste lands as well as of the cultivated lands within the area ascertained by the professional circuits, the records of the last Settlement contain many ingenious devices, while in not a few cases the attempt was abandoned as hopeless. I may add that sometimes the length of the rod is not stated, so that such local measure as will fit the area of the professional circuit should presumably be used. We have also frequently found that the rod has changed in length since the last Settlement.

In the old Settlement records, the proceedings regarding area refer to the professional survey as "the surveyor's *sahib's* account," and the other is referred to as "the account of the Uriya *jarib*".

The Uriya measures with a *padika* or rod, and I have more than once inspected a village containing portions of two estates, each using rods of different lengths. These rods are supposed to be kept in the custody of the village *chaukidar*, and in theory should not be used by the *gomastha* or *sarbarakar* except in the presence of the *chaukidar*. In fact the latter is the "official measurer". We find, however, in villages where the *sarbarakar* and raiyats do not get on well, that the latter keep a rod of their own, generally several inches longer than that of the *sarbarakar*.

The following note by Mr. R. Nathan on the Uriya system of measurement and area calculation used at the time of the last Settlement is inserted by way of illustration.

Take any field A B



Calculate roughly average length and average breadth by measuring lines *aa'* and *bb'* (length) and *cc'* *dd'* (breadth) with the *padika*.

Let *aa'* = 12 *padikas*, *bb'* = 15 *padikas*, *cc'* = 13 *padikas* *dd'* = 8 *padikas*.

Then average length = $\frac{12+15}{2} = 13\frac{1}{2}$ *padikas* = 3 *kahans* 6 *pans*.

Average breadth = $\frac{13+8}{2} = 10\frac{1}{2}$ *padikas* = 2 *kahans* 10 *pans*.

N. B. 4 *Padikas* = 1 *kahan*; 1 *padika* = 4 *pans*.

To calculate the area multiply the average length by the average breadth omitting the term formed by the product of "*pan*" into "*pan*" and remembering that the area of a square of which the side is 1 *kahan* is 1 *gunt* and that the area of a parallelogram of which the length is 1 *kahan* and the breadth 1 *pan* is 1 $\frac{1}{4}$ *biswa*.

Thus, area, = (3 kahans + 6 pans) (2 kahans + 10 pans)
 = 6 gunts + 12 biswas + 30 biswas
 = 8 gunts 10 biswas.

The term formed by the product of 6 *pans* and 10 *pans* is omitted.

The error caused by the omission is 60 square *pans* or $\frac{60}{16}=4\frac{1}{4}$ *biswas*; i. e., about 3 per cent.

One result of the system is, therefore, that the area recorded in the old Settlement papers is, generally less than the true product of the recorded length and breadth of the plot, and therefore, other considerations apart, the recorded area is in general less than the actual area.

The maximum error that can occur is 15×15 *pans*, or rather less than one *gunt*.

To take an actual case—

MAUZA BHATBANDA—*Bhowria* No. 589.

As recorded—average length [calculated from three traverse lines]=3 kahans, 3 pans
average breadth=7 kahans, 8 pans.

recorded area=23 gunts, 13 biswa.

Area according to rule = (3 kahans + 3 pans) / (7 kahans × 8 pans)

$$= 21 \text{ gants} + 24 \text{ biswas} + 21 \text{ biswas}$$

$= 23$ gunts 13 biswas.

and the error = 24 square pangs = $1\frac{1}{2}$ biswas or 4 per cent.

The general explanation of the local land measure is as follows: Every *padika* is so many *dastis* in length, a *dasti* is supposed to be $4\frac{1}{2}$ inches or the width of a man's fist across the knuckles.

To account for inaccuracies of measurement, *e.g.*, the slipping forward or backward of the rod, and to give the raiyat every allowance for *hira* and *ahri* (the embankments within and the ridges on the border of his field) a *kani** is added to the number of *dastis* of which every *padika* is composed. A *kani* varies according to the number of *dastis* in the *padika*; in theory, at least, it is larger where the number of *dastis* is larger, but zamindars give *kanis* of different sizes, and some give no *kani* at all. It is for this reason that an 18 *dasti padika* in one local area may be of quite a different length from a *padika* of that name in another.

I need only give one instance of the *padika* to illustrate its use as a land measure. The so-called standard *padika* is 10 feet 5 inches and 1 *job* in length where a *job* is that fraction of an inch which will make a square *padika* equivalent to a *biswa* of size sufficient to be equal to $\frac{1}{16 \times 25}$ of a *man* or acre. The standard *man* therefore consists of 25 *gunts* and a *gunt* of 16 *biswas*, and a *biswa* is one square *padika* of 10 feet, 5 inches and 1 *job*. The standard *padika* is called the "24-dasti *padika*".

				Ft.	ins.	job.
24 dastis	Of $4\frac{1}{2}$ inches each	...	...	=9	0	0
Add a kani	...	...	...	=1	5	1
Total	...	...	...	=10	5	1

I do not attempt to describe the lengths of the different *padikas* because, as I have shown, the name is no certain indication of the length of any *padika*. It is only necessary to add that the *padika* varies so as to produce a *man* varying from .248 of an acre to 1.39 acres.

We have endeavoured to avoid any use of the local measure in the final records. This principle was very successfully followed in the Khurda Settlement of 1881, and at the present day raiyats now talk of their "*acres*" and their "*decimals*". At attestation, of course, every raiyat had his area explained to him in local measure as well as in acres and decimals, and was satisfied as to the area in his possession. It is hoped, therefore, that in a short time a uniform system of measurement may be in force throughout the Province.

* Not to be confused with the *kani*, meaning 5 gandas or one-fourth of a *biswa*.

125. The standard of weight for ordinary articles of merchandise is the **WEIGHTS AND MEASURES** seer which in Balasore is the standard *seer* of 80 *tolas* (a *tola* is the weight of one standard rupee=180 grains, Troy) equal to 2.0532 lbs. avoirdupois. In Cuttack and Puri the *seer* in common use is one of 105 *tolas* known as the "*Katki seer*" and weighing 2.7104 lbs. avoirdupois.

The parts and multiples of the *seer* are—

4 <i>chataks</i>	=	1 <i>pao</i> .
4 <i>paos</i>	=	1 <i>seer</i> .
40 <i>seers</i>	=	1 <i>maund</i> .

Salt is always sold by the Balasore *seer* of 80 *tolas*. Metals, vegetables, molasses, fish, and a few other articles are sold by the '*pal*' and *bisa*.

A '*bisa*' weighs 120 *tolas*, or one-and-a-half standard *seers*, and is divided into 20 to 30 '*pals*'. The explanation of the use of this measure is that the articles in question are commonly weighed on a steel yard (*bisa kati*), the interval between the point where it balances when the scale pan is empty and that where it balances with 120 rupees in the pan being divided into 20 or more divisions, each called a '*pal*'.

On the standard yard used for metals and molasses there are twenty such divisions and a *pal* is 6 *tolas*. For fish and vegetables the common division is into 25 *pals*, but 22, 28, and 30 *pals* are also found.

The divisions and multiples of the *bisa* are :—

4 <i>dhans</i>	=	1 <i>rati</i> .
4 <i>ratias</i>	=	1 <i>china</i> .
10 <i>chinas</i>	=	1 <i>marha</i> .
4 <i>marhas</i>	=	1 <i>karsi</i> .
4 <i>karsis</i>	=	1 <i>pal</i> .
20 <i>pals</i>	=	1 <i>bisa</i> .
80 <i>bisas</i>	=	1 <i>chhala</i> .

For the precious metals and jewels the standard is the *bhari* or *tola* of 180 grains, troy, which is divided as follows :—

1 <i>bhari</i>	=	10 <i>mashas</i> or 2 <i>marhas</i> .
1 <i>marha</i>	=	8 <i>ratias</i> or 2 <i>chinas</i> .
1 <i>rati</i>	=	4 <i>dhan</i> .

For the sale of rice, paddy, and other grain the standard of measurement is the *gauni*, also called in Balasore the *puri*.† This is a basket with a capacity varying locally from 1½ to 6 *seers* of rice and called accordingly "*tin sir gauni*," "*char sir gauni*" etc.

In a few markets the capacity is expressed in *seers* of *birhi*, so that the 3½ *seers gauni* of north-eastern Cuttack contains only 2½ *seers* of paddy; but rice is the common standard, and the ordinary 5 *seer gauni* holds about 3½ *seers* (Cuttack weight) of dry paddy. The measure for large sales of paddy, etc., is the *bharan* of from 80 to 200 *gaunis*, while petty retail vendors use a small measure called a *katha* or *kancha* which is generally a reputed *seer*, but in parts is one-tenth of a *gauni*.

The common multiples of the *gauni* are —

(1) 20 <i>gaunis</i>	=	1 <i>pauti</i> .
2 <i>pautis</i>	=	1 <i>chhela</i> .
4 <i>chellas</i>	=	1 <i>bharan</i> .

Found in Balasore where the *gauni* is 2 *seers* and the *bharan* 8 maunds.

(2) 10 <i>gaunis</i> (Puri).	=	1 <i>pautti</i>
4 <i>pautis</i> ...	=	1 <i>chhela</i> .
4 <i>chhelas</i> ...	=	1 <i>bharana</i> .

Found in Balasore with a *gauni* of 2½ *seers* and *bharan* of 10½ standard maunds.

(3) 10 <i>gaunis</i>	=	1 <i>pauti</i> .
4 <i>pautis</i>	=	1 <i>chhela</i> .
5 <i>chhelas</i>	=	1 <i>bharan</i> .

* In volume LXI part I the Journal of the Asiatic Societies page 43, there is a very interesting paper on "Troy weights and general Currency of Orissa" by Babu M. M. Chakraverti.

† Also called "*nauti*" in Puri, but elsewhere a *nauti* = 3 *nautis*.

Found in the Jajpur sub-division of Cuttack with a *gauni* of $2\frac{1}{2}$ standard *seers* and a *bharan* of $12\frac{1}{2}$ maunds.

(4)	10	<i>gaunis</i>	=	1	<i>pauti</i> .
	5	<i>pautis</i>	=	1	<i>chhela</i> .
	4	<i>chhelas</i>	=	1	<i>bharan</i> .

In northern and eastern Cuttack the *bharan* varies from 12 to 16 maunds.

(5)	20	<i>gaunis</i>	=	1	<i>chhela (or pauti)</i>
	4	<i>pautis</i>	=	1	<i>bharan</i> .

This is the genral measure in Cuttack, Khurda and Puri, and the *bharan* varies from 6 to 10 maunds, and is generally 8 Cuttack maunds or $10\frac{1}{2}$ Balasore maunds.

To sum up, a *bharan* is in Balasore 160 *gaunis* and varies from 8 to 16 standard maunds; in Cuttack and Puri it is generally 80 *gaunis*, in a few places 100 *gaunis*, and in north Cuttack 200 *gaunis* and varies within much the same limits.

The ordinary measure of distance is the *kos* = 2,000 *dhanu* or 4,000 yards, though the villager commonly uses such indefinite terms as a "stones throw" or "shouting distance."

Distances.

126. Appendix F shows, District by District and Thana by Thana, the areas under the principle crops grown in the Province. Rice occupies (including Khurda sub-division) about 21,82,000 acres, or nearly 88 per cent. of the cropped area. The next crop in importance is *mandia*, a millet grown on some 42,000 acres, or on rather less than 2 per cent. of the cropped area. *China* is a millet of but little importance, though the area sown with it is probably more than the 500 acres shown in the crop statements.

Other food-grains in column 10 are generally *rabi* crops grown on twice-cropped land. They occupy over 9 per cent. of the cultivated area, and include *kultha* (*dolichos biflorus*), *birhi* (*phaseolus radiatus*), *muga* (*phaseolus mungo*), *harar* (*cajanus indicus*), *chana* (*lathyrus sativus*), *barguri* (*vigna catjang*), and *makka* (*zea mays*). Of these the first four are the most important, and I should estimate that a third of the total area shown represents *kultha*, and not less than a sixth, *harar*.

Linseed, *til* (*sesamum*), and castor are grown on small areas, generally in riverside lands. Others, in column 13, represents chiefly mustard, grown after rice on valuable lands.

Condiments and spices include coriander seed or *dhania*, ginger or *ada*, turmeric or *haldi*, and some garden crops such as onions, chillies and arrowroot. The total area is only 850 acres, as most of these crops are grown in the homestead lands shown in column 27. Sugarcane is grown in rotation with paddy on well irrigated lands. Only 1,700 acres are shown under this head in the statement, but I am sure that in ordinary years the area planted with this crop is not less than 5,000 acres. As it is grown on rice land, and an extra rent is often payable for its cultivation, it would be natural that amins should have been persuaded to understate the area.

Cotton and jute are valuable crops, but the former is grown on less than 1 acre in a thousand, and the latter on less than 1 acre in two thousand. Other fibres include *dhaincha* and *sunni*, which are grown to a very small extent.

Many dyes are used by the Uriyas, and are prepared from earth and leaves, etc.

Kusuma or safflower is grown in homesteads chiefly in the Puri District. Indigo is grown in a few villages of Cuttack District and in small patches in Puri.

Pan is the betel vine grown for its leaves, in which the *supari* nut is wrapped before chewing. It is grown on only 500 acres but is an extremely valuable crop.

Tobacco is grown all over Cuttack on the silt-covered lands on the banks of rivers; the total area shown under this crop, 3,400 acres, represents about the area planted in an ordinary year. In favourable years there is much larger area under it.

Inkar is a reed grown to make supports, etc., for the betel vine. The area is certainly under-estimated, as 500 acres of *pan* gardens must represent at least as much *inkar*.

Homestead lands represent what is shown in the *khasras* as *bari* without mention of crop. It includes courtyards and threshing floors, waste lands at the