# 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 correspondece 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.

**History of the canals.**

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. 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 3½ 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 204¾ 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 109¾ 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 ehancement, 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.

History of enquiries down to 1892.

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 owne'r 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 Comissioner 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.

**Reports of 1992-95.**

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 Directore 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.

**Report of 1896-99.**

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.

Lines of present Report.

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 ?

Difficulty of following these lines.

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 5 ½ 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.

Estimated value of irrigation to the country.

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.

Rainfall.

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. | | |
|---|---|---|---|---|---|---|---|---|---|
| | September. | October. | Total fall of the year. | September. | October. | Total fall of the year. | September. | October. | 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. | | | | | | |
|---|---|---|---|---|---|---|---|
| | 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. | Total. |
| 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 | 237 | .... | .... | .... | 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 figurs 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.
‡ Notificatin 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 dropp 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 ***dalua*** 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 | |
| ***Rabi*** and ***dalua*** | .... | 5,122 | 5,054 | |
| Total | .... | 1,96,878 | 1,91,849 | 1,89,866 |

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.

**Increase in productive power of land due to irrigation.**

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 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. Mds. | Srs. | Unirrigated. Mds. | Srs. |
|---|---|---|---|---|---|---|
| High leval 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 avarage 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 that 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-eights 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 .... | 1247 | 1252 |
| 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 uuirrigated 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 thirtynine 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 $\frac{12}{10}$ maunds, or about 13 lakhs of ruppees 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 *dalua* 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. |
|---|---|
| Long leases (five years) for *kharif*— | Rs. A. P. |
| 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 |
| *Rabi*— | |
| Flow .... .... .... .... | 0 8 0 to 2 0 0 |
| Lift .... .... .... .... | 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.

**Effect of irrigation on rent rates in temporarily-settled areas.**

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 | Mafsal 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 onthe 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 Mahanadi. |
| 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 Kendrapara 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 | Group G.—Irrigated tracts on high level canal. |
| Kerualkhand | 26 | 3 1 1 | 4 5 10 | 2 12 0 | 3 6 2 | 3 1 11 | |
| 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 | |
| Jaipur .... | 23 | 1 14 7 | 2 8 0 | 1 10 11 | 2 14 1 | 2 9 6 | Group I.—Irrigated parganas on the Jajpur Canal. |
| 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 | |
| Olas .... | 1 | 2 5 0 | 2 15 8 | 1 12 0 | 2 11 2 | 2 6 8 | Group J.—Unprotected parganas on the Brahmani-Kharsua System. |
| 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 91 | 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 Patamundai 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.

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 Re. 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 *thani* rents. | | Incidence or *pahi* rents. | |
|---|---|---|---|---|---|
| | | Last settlement | Present settlement. | Last settlement | 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.

Group C. 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. There 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. | 1281 U., corresponding to 1874 A. D. |
|---|---|---|
| | Acres. | Acres. |
| Total *pahi* area .... .... .... | 543 | 558 |
| | Rs. A. P. | Rs. A. P. |
| Total *pahi* rent .... .... .... | 1,708-0 0 | 1,825-0 0 |
| Incidence per acre .... .... .... | 3 2 4 | 3 4 4 |

This shows a considerable enhacement 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.

Group D. 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 inspite 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.

Group E. 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.

**Group F.**

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

Pargana Saibir—

| | Protected area. Per cent. | Unprotected area. 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) Lakhiraj Bahal* .... .... | 132 6 4 | 97 8 0 |
| *(b) Bazyafti* .... .... .... | 98 10 5 | 80 1 10 |
| *(c) Thani* .... .... .... .... | 41 3 9 | 40 4 6 |

| | Assessed area. Acres Protected. | Rent. Rs. A. | Incidence. Rs. A. | Assessed area Acres Unprotected. | Rent. Rs. A. | Incidence. Rs. A. |
|---|---|---|---|---|---|---|
| Development of rents (including *lakhiraj bazyafti* and lands held by proprietors)— | | | | | | |
| At last Settlemet | 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 retes 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.

Group G.

On the left bank of the Birupa lie the three Parganas of Kokhuakhand, Kerualkhand, 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.

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 Kerualkhand 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.

Group H.

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.

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.

Group I.

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

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.

Group J.

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.

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*.

Group K.

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.

Summary.

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.

Extension to fresh areas during the term of Settlement.

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 ventuee to make an estimate of the area likely to be irrigated.

Effect of irrrigation on collections.

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 Orrissa 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 percent: 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.; Alti, 91 per cent.; Bardiala, 105 per cent.; Kuhunda-Jaipur, 43 percent.; 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.; Kerualkhand, 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.

**Profit of Government from Irrigation.**

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. Rs. | 1898-99. 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 | 15,67,400 | 15,25,400 |
| 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 .... .... .... .... .... | —2,800 | —4,100 |
| 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 .... .... | 6,06,900 | 5,20,500 |
| Nett deficit of the year .... .... .... .... | 9,60,500 | 10,04,900 |

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 inticipated 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 Rs. | Period. | Amount. 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.

**Permanently-settled areas.**

116. The irrigated tracts which are permanently settled comprise Perganas 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 ***biali*** lands now growing two crops.

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

(3) Lowlands, now overflooded 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 | 181 |
| Balbhadrapur .... .... | 36 | 1878 | 313 | 338 |
| Borpailo .... .... | 30 | 1892 | 121 | 161 |
| Benipur .... .... | 37 | 1886 | 250 | 281 |
| Nahang .... .... | 31 | 1881 | 191 | 233 |
| Jagannathpur .... .... | 25 | 1887 | 180 | 232 |
| Bilemgheri .... .... | 16 | 1892 | 425 | 145 |
| Despur .... .... | 80 | 1898 | 107 | 119 |
| Dhol .... .... | 58 | 1893 | 467 | 611 |

I conclude from this that there has been extension of cultivation, but that it was not generally shown in the *jamawasilbaki*, 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. |
| 2. Despur .... | 80 | .... | 1876 | 393 | 506 | 1880 | The figures are a little suspicious |
| 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 .... | 53 | 1873 | 1869 | 335 | 389 | Possibly before introduction of irrigation. | |
| 9. Benipur .... | 37 | 1873 | 1877 | 840 | 845 | .... | |
| 10. Waukhand .... | 52 | 1869 | 1865 | 457 | 513 | .... | |
| 11. Jagannathpur | 25 | 1878 | 1877 | 452 | 538 | .... | A much larger increase before 1877. |
| 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 | .... | -do- |
| 15. Bazan .... | 43 | 1873 | 1888 | 271 | 253 | .... | Area increased. |
| 16. Gopinathpur | 71 | 1869 | 1892 | 418 | 407 | | |
| 17. Sunderpur .... | 98 | 1873 | 1882 | 149 | 146 | | |
| 18. Raipur .... | 33 | 1877 | 1878 | 825 | 816 | .... | Reached a maximum of Rs. 863 in 1882. |
| 19. Beruan .... | Nil | .... | 1885 | 930 | 916 | | |
| 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.

**Conclusions.**

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

(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 reas 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 said 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 increease on this ground, but it is almost negligable 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.

**Proposals.**

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 the original proposal to limit the term of Settlement to fifteen years in the case of lands accessible to canal irrigation (letter No. $\frac{1280}{170}$ 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.