Mr. Trail-continued.

Tanks. This project was examined by the Chief Engineer for Irrigation in November 1875, and he then decided that it ought to be condemned on the ground that it would never prove remunerative to Government. Subsequently, during the famine, the permission of Government was obtained for the execution of the work, but the Collector objected to it on various grounds, and it was never taken up. The Kurli Ghaut was another large work commenced in the previous famine of 1866. An estimate was prepared for completing it, and both previous to and during this famine it was pushed on with, and is now nearly complete.

The formation of the country is one great drawback to the preparation of any large schemes or projects which would be useful in future famines. The general elevation of the division above the sea averages about 2,000 feet; the country is very hilly and studded with petty tanks, and there are no large rivers from which irrigation canals could be led. The division is intersected by roads, already so numerous that they cannot be nearly all maintained, and the construction of railways is out of the question. The division and taluks are large, and, as a rule, work is so heavy on all that, should any new and large project be devised, special establishment would be required for its investigation.

Partly answered above.

The most useful works would be road-repairs, deepening and clearing out of spring-channels and earth-work to tank-bunds, also the excavation of wells for irrigation purposes. With the exception of the first-mentioned, they are all open to the objection that the works are not of sufficient magnitude to employ any large body of coolies on one spot, and so greatly increasing the staff of supervising officers who would be necessary. With the exception of the excavation of wells, these works all resemble in character those for which provision is ordinarily made in our budget.

The local Government should be empowered to order the commencement of any of the above-mentioned works whenever the necessity should arise. They are all works of practical and permanent utility, and are not of sufficient magnitude to require sanction of higher authority.

If the estimates for any large work and also the plans have been prepared, the work could be commenced at a day's notice. It would be necessary to suspend entirely all ordinary works, so as to set the existing establishment free for purposes of supervision, &c.

The experience of the last famine showed clearly that there is a far too small proportion of upper subordinates (Overseers and Supervisors) available for any special work.

The responsibility should rest upon the Divisional Officer of maintaining schemes in a fit state to commence work upon them at a moment's notice, but, as before stated, this division is not suitable for the projection of any large scheme, and, as small works would have to be substituted, the necessity of having extra establishment of the upper subordinate class available becomes more apparent.

During the late famine, the numbers on relief-works rose to nearly 120,000 in the four taluks of this division, or about 33 to the square mile. A sufficient number of works should be fixed upon in each taluk, and two or three could then be commenced simultaneously in each,-giving the preference to the largest and most important.

Many of the works, which would have to be taken up, would not be sanctioned by Government in ordinary circumstances; most of them, however, would be useful, although yielding no direct return-road-works (repairs) for instance.

.Q. 7.

Q. 3.

Q. 2.

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Q. 5.

Q. 4.

Q. 6.

Mr. Trail-continued.

Q. 8.

Q. 9.

Q. 10.

Q. 11.

I think not.

There are no works in this division, in my opinion, which are of such magnitude that, if severe necessity arose, their commencement could not safely be left to the discretion of the Divisional Officer in consultation with the Civil Officer in charge. It should, I think, be sufficient that the Divisional Officer should inform Government what he intended doing, so as to give them the opportunity of countermanding the work if they thought proper. Estimates for famine-works are, in my opinion, of little use, as they are always exceeded, and nobody can be blamed if they are so.

It would, I think, be an excellent plan to make the Department of Public Works responsible for the bringing forward of suitable* projects whenever the necessity for them arose, and in this case they should be allowed to postpone all works in progress which are not suitable for relief-works. There would, I think, be no danger of the distressed population being allowed to starve while suitable projects were being prepared,-at any rate in this division.

There has been difficulty found in providing suitable large works for relief-labor in this district. Nobody was ever allowed to starve for want of work, however. Large stores of metal and gravel have been collected and broken, and, in the event of another famine, the spreading of these would form a useful and large work. Under ordinary circumstances, it will be very many years before the supply now stored can be utilised, and it would have been more economical if the metal, &c., had been spread as it was collected. I have already suggested in my answer to Question 3 what I consider would be the most appropriate works to take up in the event of another famine.

A very suitable work on which to employ sufferers by famine would be the improvement of the port at Cocanada and an extension of the canals and roads in the district. The laborers might be deported from the famine-stricken districts for this work, and would thus be placed in a province always well provided with food and to which, if the local supplies were insufficient, grain might be easily and cheaply brought from other places by sea.

It is thought there would be no risk whatever of the expenditure on the above work proving unprofitable.

I believe that the cost of labor as applied on relief-works is more expensive than that under ordinary Department of Public Works' rates, and that the only way to get value for the money necessary to keep the people alive during a famine is to provide them work at the usual tariff rates of the district sufficiently early in the season of scarcity to ensure that the workmen have not lost seriously in condition. The able-bodied workmen will then be able to find support for those of their people unable to work, relief-camps will not be required, and hospitals will only be wanted as usual where large numbers are gathered together. In conclusion, I would state that my experience this past year assures me that the only chance of saving life during Indian famines, without utter demoralisation and ruinous expense, is to provide work at fair rates to all that require it, before those thrown out of their ordinary occupations are too far reduced to benefit by the succour offered.

Mr. Simson. Q. 3.

Q. 7.

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Mr. Minchin. Q. 10.

PART II.-IRRIGATION WORKS.

QUESTIONS.

12. What is the capital expended to date in the construction of the principal canals in your Province, and what the yearly interest on that capital? What is the annual cost of maintenance? What is the present acreage irrigated? From this calculate the several corresponding rates per acre. What is the average local value per acre of the chief crops raised by irrigation from these canals? What is the • difference between this and the average value of such crops raised without irrigation?

13. What is the amount per acre paid for the use of water for the chief crops by the occupier in the shape of water-rate? What is the ordinary increased rent on irrigated over unirrigated land? What is paid by the proprietor per acre in the shape of land-revenue or owner's rate? Is there any reason why a proprietor, whether paying land-revenue or not, the yearly value of whose lands is increased by irrigation from canals constructed and maintained at the public cost, should not contribute to the State in return for the advantage he thus obtains? What seems to be the best way of obtaining such a contribution from him; first, where the land-revenue is liable to revision; secondly, where it has been permanently settled; and, thirdly, where land is not charged with revenue?

14. In what way, and under what law, are the canal dues recovered in your district? Has there been found to be any difficulty in applying the law in any particular, and, if so, how? And what better system can be suggested? It is commonly said that water is used in too lavish a manner by agriculturists when the charge is made on the irrigated area, or otherwise than by the quantity supplied. Is this the case, and what remedies can be applied? Will raising the water-rate have the effect of preventing this? To what extent is this likely to have a tendency to throw the poorer crops out of cultivation, or to confine irrigation to the more paying crops? Is water charged for by quantity, and can this be done? Is it ever charged for on a contract system, a whole village or the proprietors or cultivators of a certain portion of the village lands paying a lump sum periodically for the water supplied to those lands through a given aperture ?* Is this system a good one? What are the difficulties attending it? Where it is adopted, what arrangement is made for distributing the water among the cultivators? Have complaints practically arisen where the system has been in force, and how could they best be guarded against? Does there appear to be any objection to making such a system of contract compulsory where the general advantage of the cultivating community calls for increased economy in the use of a limited supply of water?

15. Having reference to the margin of profit on irrigated crops commonly left to a cultivator after payment of the existing water-rates, could these rates be increased without trenching unduly on that margin of profit? How would raising the waterrates operate on a cultivator under a lease, and how on the revenue-paying proprietor if it took place during the currency of the lease or settlement respectively.

16. How are the statistics of irrigation recorded, and are revenue reports of the chief irrigation works prepared by the canal administration, and in what form ? Do you think them necessary? To what extent do you think the record of such statistics valuable or necessary for the proper administration of irrigation works? To what degree of detail may the record usefully go, and how may the facts be the best collected and recorded?

17. What evidence is there as to any mischief being caused by canal irrigation such as by increasing sickness or injury to the land by raising the water-level, or production of efflorescent surface salts, &c.? To what extent has drainage accompanied, or ought drainage to accompany, canal irrigation? Has the provision of needful drainage been neglected? Is additional drainage needed to meet the effect of the increased quantity of water thrown on the surface, or to remove obstructions caused by canals, channels, water-courses, &c.

18. Has canal irrigation any where been combined with attempts to improve soils previously unfit for cultivation from the presence of noxious salts?

19. What has been the general effect of continued canal irrigation on the character of the cultivation? Has the irrigated area of the poorer grains which supply the chief part of the food of the people been gradually diminished, and has the area of the better crops been increased? If the area of poorer crops has been reduced, is this due to conditions of soil or position of lands and difficulties of access from the water-supply or to the relative profits in the one case being greater than in the other? State the general facts as to the changes in the areas irrigated during the last ten or twelve years, and make any comments that seems desirable. Is there reason to suppose that prolonged irrigation damages the land under any circumstances? Is there any evidence of a reduced production?

20. Under what conditions is an inundation canal, giving water only during the rainy season, found to be useful? To what extent is it probable that such irrigation could be usefully attempted in the North-Western Provinces, or elsewhere where not now applied, and where a water-supply is available? How far would such irrigation be useful for rabbi or kharif cultivation? How far may wells be depended on to supplement the deficiencies of supply in such a canal during the dry season?

21. What is the system of canal administration? Who is responsible for distributing the water and for collecting the dues? May the functions of the Engineer in charge of the works and the technical business of the water-supply, and those of the officer responsible for seeing that the available water is distributed equitably to the land that most requires it, and securing water to the extension of irrigation and the realisation of the canal revenues and their due assessment and increase, be best combined, or should they be kept separate? State the reasons for your opinions.

22. What system actually prevails in your Province, and if you think it susceptible of improvement, say how. Do you think a special canal law necessary to admit of proper administration? And have you such a law, and is it satisfactory?

23. Why has the extension of the use of canal water been commonly so slow? What has been the nature of the obstacles, and how can they best be avoided or removed? Are any of the canals now in an unsatisfactory condition in these respects, and can any sufficient explanation be given of the want of progress? This question would specially apply to the Orissa canals, and to the works of the Madras Irrigation Company with reference to which last see Question No. 30. Have any of your canals practically reached the state in which any further extension is not likely, or is likely to be small? Say how far this is the case in each. Are difficulties met with in preparing land for irrigation for the first time, in the way of sub-dividing fields or levelling the surface or formation of water-courses which require more time and money than can be supplied by a limited population otherwise than slowly? If such difficulties are met with, how may they best be removed? Does the existing system provide sufficiently for making advances to cultivators to adapt their land to irrigation, and if not what changes are desirable? Does shortness of supply during the hot season materially affect progress of canal irrigation ?

24. Where the financial prospects of projected irrigation works are not such as to appear to justify the outlay of public money on them in the expectation of the income being at an early date sufficient to cover all the expenses including the charge of interest on capital outlay, do you think that a special rate to make good the deficiency might properly be charged on the district for the benefit of which the works are designed, or on the land that would be protected, and if so, under what conditions? If not, what are your objections? How would you meet the case put in this question if not by some such special rate? Is it more equitable to place a compulsory charge on other districts which can probably derive no advantage from the works, or only on the districts or lands that can benefit? If the protection to be given by such works to particular districts is deemed of great importance under conditions such as have been above stated, what course do you think should be taken, having regard to the necessity for protecting the general finances of the country?

25. Have any customary claims or prescriptive rights in the use of water from tanks or canals or water-courses grown up in your district? What is their nature and history? Have they led to inconvenience in respect to the general utility of such works to the agricultural community that might benefit by them? Would it, in any

case that you know, be desirable to buy out such rights as exist, and to prevent the accretion of others? Have such claims or rights to the use of the water in the upper parts of rivers obstructed the application of the water in the lower parts to purposes of irrigation? or *vice versâ*? If this has happened in any case, could any remedy be applied which would be equitable? How should disputes on such points be settled? In cases in which the action of the ordinary Courts would be impossible or inapplicable, what principles should govern decisions in such disputes?

26. If any where it be found that the tanks, &c., are so small and numerous that Government cannot practically carry out their supervision and maintenance, would it be expedient that steps should be taken for imposing on the cultivators or proprietors who benefit by the water, the duty of carrying out all necessary repairs or works for securing the irrigation in an efficient condition? Do you think this principle should apply to all tanks, great and small alike? Might the obligation equitably be held to attach without any corresponding relief being given, or should any privileges (such as lowered rent) be conceded to the ryots, if they are charged with the duty of repair? To what extent should the liability go, whether only to minor works not requiring engineering skill, or to all work? How could such a duty be best enforced, and any neglect of repairs checked at its inception ? and what penalties should be legalised to punish such neglect when it does occur? Is there any local or other fund from which to pay for such work if it consisted of more than ordinary earth-work ? Could such a fund, in case of need, be established ?

27. How far do obligations rest on zemindars or other superior land-holders to maintain tanks or other irrigation works? Are such obligations properly recognised where they exist, or is any additional power called for to enforce them? Where they do not now exist, are there circumstances or localities in which it would be expedient to impose them on some such basis as that referred to in Question No. 26, and if so, on what general system should it be done?

28. What are the rules made under Madras Act No. VII of 1865? Give a statement of the works to which this Act has been applied, and what is the revenue realised by means of it? Give an illustration of the cases in which exemptions are granted under Section 4 of the Act. What is the nature of the receipts entered in the Miscellaneous Lard Revenue under the head "Cess for repair of tanks?"

29. How has the distribution of water been fixed where the supply is less than the demand? Do customary or other established rights interfere with the extension of irrigation from any Government canal, and if so, where and to what extent, and what remedy should be applied? Is it the duty of any one to see that the available water is made use of to the best possible advantage for the community as a whole, and on whom does the duty fall? Is there any difference in the system of supplying canal water to lands under ryotwari settlement and under zemindari settlement, where the two exist, and what is it?

30. Is there any special difficulty introduced into the spread of irrigation by the intervention of the agency of a company in the management of a canal, and how could such difficulties be best overcome?

31. In reckoning the return obtained from the outlay on canals or other irrigation works, is full credit given them under the existing system of accounts? Where separate water-rates are charged on the cultivators is the indirect profit obtained by the increase of land-revenue properly taken into account? Where there has been no distinction made in the payment to Government between the charge made as landrevenue and that for the supply of water, is the canal revenue fairly estimated at present, and if not, how do you think it would be best reckoned?

REPLIES.

Sir W. Robinson.

Q. 12 to 30 indicate the intention to conduct a very valuable inquiry into the irrigational conditions of the country, which will exercise a most beneficial effect on future general administration and advancement of the country in wealth and population. But as a practical famine

Sir W. Robinson-continued.

question it may be doubted whether rice-markets can feed the poor and famine-stricken of South India. I believe that the agricultural question as affects them is :--how to improve and secure their dry crops and the village stocks of dry grain from which they earn wages.. Of course, one of the most important direct auxiliaries is to bring the sub-soil water to the surface under famine drought conditions (Question 20).

Amongst so exceptionally experienced an agricultural population as that of South of India the causes of reluctance to take water under all conditions and convert dry land into rice flats has probably a well founded agricultural reason. Regur or cotton soils, saline soils, and even some heavy loamy soils (ex. gr., in Kistna) do not stand constant flooding. At all events, I would earnestly advise the Commission not to assume that the non-acceptance of irrigation projects and constant floodings arises from reprehensible obstinacy and the like wanton reasons.

A system of bonuses, to whatever object applied, defeats, I believe, its object in the long run. I should hold that the offer of a bonus to promote some doubtful project of irrigation at the expense of rating large areas of the dry land in South India with what is meant to be a beneficient special rate, would prove an unfair and unpopular measure, as well as a very serious temptation to professional men to start more or less questionable projects on the strength of some mutual benefit rate. I am entirely averse to the policy as respects South Indian irrigation. Any system of the kind will prove offensive to the great bulk of cultivators, especially of dry land.

Practically the use of water from the tanks, river-channels, &c., of the country is ruled entirely by custom and prescriptive rights in South India. The thing is as it were an unwritten law in every village and the less we interfere with it the better. The vast agricultural property in tanks, water-courses, river-channels, &c., of this Presidency-excluding works constructed by the State-is communal in its origin and construction and in its devolution. It belongs in the main to the villagers and other communities severally interested in these ancient works; and the right of the people over this property ought to be increasingly respected. But not only so, their relative obligations in regard to their maintenance and improvement should be enforced. A good deal of misapprehension has, I hold, crept of late in regard to this matter. We hear of this "Tank property inherited by Government." Tanks, &c., are written of as "Government sources of irrigation," and so on. I hold this theory to be absolutely without foundation. The property is, and ever has been, that of the people, in respect to which the only State claim which can be urged is the right to share the wet crop under all tanks, &c., in the country. A serious consequence arises out of this error of principle-a quasi-assumption of the property carries with it in a manner the exclusive obligation to keep it in repair, and a right to remission of the revenue demand if this self-imposed obligation is not fulfilled. The rights and obligations alike lie, however, the other way. The property is the people's and the obligation to keep it in • repair—subject possibly (?) to certain contributions to maintenance, &c., in proportion to the interests of the State in the crop-is also the people's, and ever has been so. And they should now be required to pay directly and locally for that maintenance and repair by a cess levied on all land irrigated from communal tanks; channels, &c., under which consolidated revenue demand is made. I include the irrigated area of the district of Tanjore. I believe that the error of principle-as respects property and obligation," which underlies our

Q. 23.

Q. 24.

Q. 25.

Sir W. Robinson-continued.

607

more recent management of this thing, is alike costly to the State and restrictive of the advancement of the country. A fair irrigation cess honestly and well spent as a Local Fund for the improvement of the tanks and communal irrigation proper of any district would prove a real boon to the country as well as to the State. Of course no cess should be imposed except as a Local Fund Cess strictly limited to the district and applicable *only* to the object for which it is raised. Care should likewise be taken not to interfere with, or rely upon Kudimaramat (cultivators' repairs) as a matter against which the State has any claim. It constitutes the mere communal annual clearance, &c., required by the cultivation of the year, and is not intended for the larger works of improvements. The ryots should be enabled to commute this (Corveé) obligation amongst themselves into a mutual cess for the special clearance, &c., of individual channels and works.

On this question I beg to refer to my note appended to the Report of the Department of Public Works Commission which sat in 1869-70. Government ought not and need not carry out the superintendence, &c., of the work of small communal tanks in the country, much less lose revenue on the relinquishment to local management. Leave the whole thing—including the largest district system of tanks—to the Collector and Local Fund Boards (including the District Engineer) with power to raise a cess *ad hoc* on the irrigated area under each tank and place the Local Engineer's Establishment at the disposal of the local authorities for the ordinary work of the district—Tank repair, &c., included—and shortly little will be heard of defect of supervision and maintenance of small tanks, &c. The confusion is self-made, and can be righted by reverting to the sound principles of the agricultural common law of the country and by placing the administration in local hands.

I would myself be inclined to allow zemindars to levy a tank cess—with contribution by them of an equal sum—for the repair, &c., of their irrigation works under the supervision of the District Establishment, much on the same principle as I would propose in the case of ryotwari lands; and I would take powers to extend the Cess Act which I contemplate to zemindaris under orders of Government and arrangements to be made between tenants and zemindars.

Mr. Sullivan. Q. 12.

The answer to this question so far as the Godavari, Kistna, Palar, Strivaiguntam, and Cauvery irrigation works are concerned will be found in the financial abstracts forwarded to the Government of India by the Madras Government with their Proceedings, under date 28th July 1876, No. 1923, Public Works Department. The information is succinctly tabulated below :—

Name of the Work.	Capital outlay on the Work up to 1874-75.	Interest on the Capital at 41 per cent.	Working Expenses.	Area irrigated.	Charge for interest per Acre.	Working Expenses per Acre.
1	2	3	4.	5	6	7
Godavari Delta Kistna " Cauvery " Strivaiguntam	RS. 69,10,549 44,93,902 13,48,900 10,60,597	R8. 3,10,974 2,02,226 60,701 47,727	R8. 1,53,343 1,35,875 1,06,805	AC8. 513,143 226,226 923,737 26,255	RS. A. P. 0 9 8 0 14 4 0 1 1 1 13 1	RS. A. P. 0 4 9 0 9 7 0 1 10

* Information not available.

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Mr. Sullivan-continued. .

Paddy and cholum may be taken as fair samples of the chief crops * Equal to 1,740 lb. raised with and without irrigation. The estimated produce per acre is 753 Madras* measures of paddy, value according to the average of prices obtaining during the decade ending 1875, Rupees 33. The produce + Equal to 875 lb. per acre of cholum is estimated at 296 measures,† valued at Rupees 20.

Q. 13.

(a).—The following are the standard rates charged for water from Government sources of irrigation :—

	Teras		10000
For a single crop per acre	4	0	
For second crop on the same land per acre.	2	0	
For special crops, such as sugar-cane, betel,			
&c., requiring irrigation for a longer			
period than an ordinary wet crop per			
acre	6	0	

. 2 0 For irrigation of dry crop per acre The above rates are charged in addition to the assessment payable on dry lands when such lands are brought under irrigation by means of water supplied from Government sources. But under the old irrigation works of the country there is a vast extent of land permanently classed as wet and bearing a consolidated wet assessment, i.e., the land assessment and the water-rate are merged, and the figures given in the appended statement would at first seem to indicate the extreme difficulty of determining with any approach to accuracy the money-value of water applied to land throughout the Presidency. The two columns give the average rate of assessment per acre for unirrigated and irrigated land, respectively, in all districts except the Godavari and Kistna, and the difference between them may be assumed to be the value of the water in each locality. It will be observed, however, that the variations in the wet rates are very considerable. They range from Rupees 2-4-0 per acre on the Nilgiri to Rupees 9-7-10 in Tinnevelly, and excluding the former district, the circumstances of which are exceptional, the figures show that where the assessment on the dry land is lightest (whence it may be inferred that the quality of the soil is inferior) there the value of the water is the greatest, and curiously enough the average water-rate of the seventeen districts (that for each being calculated in the manner above indicated) comes out within a triffing fraction as Rupees 4, the amount levied under the water-rate rules in addition to the assessment on all lands irrigated from Government sources, which are not permanently classed as wet.

Average Dry and Wet Rates. Averagy Dry Average Wet

Distri	cts.			Assessment per Acre.	Assessment per Acre.
A State State State		San E		RS. A. P.	RS. A. P.
Ganjam	See. 20		and the second	1 4 5	2 14 4
Vizagapatam				1 2 1	5 3 11
Nellore				1 2 9	574
Cuddapah				0 12 5	6 12 8
Bellary	••		• •	0 9 11	4 15 2
Kurnool		0051-16	1 il	0 14 7	6 2 7
Chingleput	1 · · · · ·	Edd by	in the second	1 6 7	3 10 5
North Arcot				1 6 2	5 12 4
South Arcot	19			1 11 3	5 5 5
Tanjore	A. A.			1 3 11	4 13 11
Trichinopoly				0 14 11	4 2 9
Madura			A	146	4 2 9
Tinnevelly				0 12 7	9 7 10
Coimbatore		••		0 14 3	0758
Nilgiri				0 9 4	2 4 0
Salem	•••	e		1 2 1	5 10 3
Malabar				1 9, 1	3 0 1
	a charle star		S. C. S. S.	and the second second second	

609

Mr. Sullivan-continued.

(b).-No reliable information available.

(c).—The meaning of this question is not understood. The average land assessment exclusive of water-rate is given in the foregoing statement.

(d) and (e).—None whatever. Act VII of 1865 (Madras) makes ample provision for the levy of such contribution from all descriptions of landholders.

Q. 15.

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(a).—This question it is thought may safely be answered in the affirmative, for, as shown above, the present water-rate of Rupees 4 is not in excess of that which it was thought equitable to impose when the consolidated wet assessment was settled early in the century, when agricultural profits were far below what they are at the present day. Taking the Kistna as a sample district, the profits per acre of land irrigated from an unfailing source are given below, the value of the crop being calculated on the average of the prices ruling from 1866-1875:—

	PRODUCE PI	ER ACRE.	EXPENSI	ES PER ACRE.	
Grain.	Madras Measures.	Value.	Labor, &c.	Assessment, including Water-rate and Local Cess.	Profit per Acre.
Paddy	753	RS. 33	6.6	6.69	19.71

N.B.—The value of the straw is not taken into account, as this ought to return to the land in the shape of manure.

The only difficulty that presents itself in regard to raising the waterrate where it is charged in addition to, and separate from, the land assessment is that the districts where those conditions exist would, for some considerable time, be called upon to contribute more largely to the public revenues than those where a settlement of the consolidated wet assessment has been, or is in process of being, concluded for thirty years. Until the time comes round for a revision of this settlement no further demand can be made on the agriculturists holding under it.

(b).—The cultivator would, of course, be bound by the conditions of the lease alone, and the raising of the water-rate by the Government would not affect him, unless his landlord had inserted a clause in the lease to provide for the contingency. In the second case, as the water-rate is not dealt with by the Settlement Department, except where the assessment on irrigated lands is consolidated, the Government have the power to enhance it during the currency of the settlement, and the proprietor would have to pay it.

Q. 17.

(a).—In 1871-72 it was reported to Government that fever of a low type had appeared in the Godavari District, which was attributed to the extension of canal irrigation, and the late Surgeon-Major Wright was specially deputed to investigate the matter. That officer's report is not at the moment available, but it is known to the undersigned, who was at the time Collector of the district, that Mr. Wright, after very careful local inquiry throughout the delta taluks, came to Martin and a second

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Mr. Sullivan-continued.

the conclusion that the sickness then prevailing was not attributable to the canal irrigation. He inclined to the opinion, which was shared by the Sanitary Commissioner, that it was, in a great measure, due to an excessive consumption of opium. A good proof that he was right in his conclusions may be found in one of the oldest of our Military Cantonments. Trichinopoly, which is considered one of the healthiest stations for troops, is traversed by a large irrigation canal taken off the Cauvery, and is almost surrounded with wet cultivation. This work was in existence when the country came into the possession of the English, so that there has been ample time to settle the question as to whether it has a malarious influence or not.

> In regard to the efflorescence of surface salts, locally known as "chavadu" or Anglicised "soud," there is no doubt that in certain descriptions of soils this effect is produced, in a more or less degree, when irrigation is first applied. The salts present in the soil deliquesce, and are held in suspension in the water until evaporation takes place, when a saline deposit is left on the surface. But fortunately the water which has the effect, above described, of making sterile, lands which previous to its application were fertile, brings with it a remedy in the shape of a rich alluvium, and, if the floodings are continued, this deposit combined with the application of leaf manure reduce the excess proportion of salts to their proper limits, and the land again becomes fit for cultivation.

> (b), (c), and (d).—This portion of the question will doubtless be dealt with *in extenso* by the Chief Engineer for Irrigation. So far as the experience of the undersigned goes, so patent a necessity did not escape the attention of the able men who planned and executed the great irrigational works of the Presidency, and wherever any defect showed itself a remedy was promptly and efficiently applied.

In this Presidency it is believed that no such attempt has been made, but as it has been practically demonstrated, as stated above, that the alluvial deposit brought down in the floods of the great rivers can, and does neutralise the effect of earth-salts where they are found in excess, it would be well worth while trying the experiment of flooding the large saliferous tracts which are to be found near their mouths. Saturated as they are with saline matter, it would, of course, take some time before their sterility would be overcome, but of the ultimate success of the experiment there can be but little doubt. Such tracts, which now produce nothing, might be granted on favorable leases, and water for flooding supplied gratis during the time the rivers were in fresh. Were such inducements held out, it is believed that ten years or so would suffice to convert these sterile wastes into food-producing areas.

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(a), (b), and (c).—The information on this point is not quite positive, but on the whole points to a diminution of the irrigated area of the poorer grains and an extension of that cultivated with the better sort. Where this occurs there is no doubt that the effect is due to the latter yielding a better return of profit.

(d).—There does not appear to have been any marked change in the areas irrigated during the last ten or twelve years.

* See Appendix A. A statement, A,* showing the area of wet cultivation in each district from 1866-67 to 1876-77 is appended. From this it will be observed that in 1875-76 the irrigated area was 3,366,255 acres against 3,240,236 acres in 1865-66. It touched the highest figure in 1874-75, when it was 3,510,165 acres. There was a marked falling off when the drought declared itself in 1876-77, and the total irrigated area then was only 3,010,584 acres. The

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Mr. Sullivan-continued.

decrease is distributed amongst all the districts of the Presidency.

• Nellore. Cuddapah. Bellary. Kurnool. Chingleput. North Arcot. except two, and notably in those* where the famine was most severely felt. The figures prove that where means for irrigation are available the people are not slow to make use of them, and, as its application ensures a certain and lucrative return, whilst the cultivation of

crops which are dependent on the local rainfall is more or less a hazardous speculation, it would seem to be good policy to extend its benefits as widely as possible. It is appalling to think what might have been the fate of the people of this Presidency during the recent famine if the produce of these three millions of artificially-irrigated acres had not been forthcoming in their hour of need.

(e) & (f).—When once the natural salts in the soil have been reduced to their proper proportion, irrigation cannot injure the land; on the contrary, the silt which the water brings with it must tend to fertilise it. Bad farming in wet, as in other cultivation, may serve to impoverish the land, but this cannot be charged against irrigation. No evidence, it is believed, is forthcoming of prolonged irrigation resulting in reduced production.

In all large irrigation works, such as the Godavari, Kistna, and Cauvery systems, the rule is for the main supply of water to be under the control of the officers of the Public Works Department. To quote from a Note by the Chief Engineer for Irrigation printed with Proceedings of the Madras Government in that department, dated 5th March 1873, No. 713: "The duty of the Public Works Officer is, or should be, confined really to regulation, which includes, of course, distribution in bulk, if I may so term it, but not distribution in detail. The regulation of the water-supply in the Kistna, the Godavari, and in all systems of irrigation in which any such regulation at all is practicable, should, down to the sluices which supply the lands of one village only, be vested in the Public Works Officers. It appears essential that such should be the case so far, because an independent authority is required to manage the supply until it passes into the hands of the village community. If a channel supply two villages, it would not do to let each village manage the sluice at the head of its channel, otherwise the other village might and probably would suffer." The Government, in passing orders on the subject in the Proceedings above quoted, directed that "instructions be issued in the Revenue and Public Works Departments absolutely restricting the functions of the subordinate officers of the latter department to the regulation of the water-supply in channels which supply the lands of more than one village, and vesting in the village officers the charge of the water supplied to single villages from the moment it quits the regulating sluice, over which however they will have no control." The Board of Revenue were directed to report after consulting with Collectors from what date the arrangement could take effect, and the reference elicited the fact that, with a few unimportant exceptions, the system was already in force throughout the Presidency and was found to work satisfactorily. Under these circumstances no special legislation seems to be called for in connection with canal administration so far as irrigation is concerned. The objections to making the Public Works Officers in charge of irrigation canals responsible for the collections of the additional revenue derived therefrom, the extension of the irrigated area, and the equitable distribution of water are twofold. In the first place, owing to the paucity of Engineers, it is with difficulty that they can cope with their own legitimate work, and, if fiscal duties of the nature indicated are

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Mr. Sullivan-continued.

imposed upon them in addition, the burden will be greater than they can bear. These great systems of irrigation, where the flow of mighty rivers is suddenly arrested in view to their being made to pay a fertilising tribute to the thirsty land before they are allowed to resume their natural course towards the ocean, form a very anxious charge, and tax the best energies of the specially-trained body of men to whose care they are entrusted. Then why assign to them a task alien to their profession, for the performance of which another agency exists? Secondly,—even supposing the Engineers had time to devote to such matters, the practice would be objectionable on the ground that considerable friction between them and the officers charged with the collection of land-revenue would be inevitable. At present this and the revenue derived from irrigation are both collected by one agency-an agency with which the ryots have been accustomed to deal from time immemorial, and which has at its sole disposal the organised service of the villages. But, if the Engineer is to collect the water-rate and the Tahsildar the land-revenue, the village officials would be at the beck and call of two masters whose joint requirements it would be impossible for them to satisfy, and general confusion would be the result. It would be utterly imprac-ticable to work such an arrangement.

The causes are not far to seek. In the first place the Hindoo ryot is eminently conservative and slow to adopt any innovation, especially when he does not clearly see that it will benefit him to do so. There is no idea more general, or more fallacious, than the hypothesis that water has only to be brought to a hitherto unirrigated tract for all the people to scramble for it and at once to convert their dry grain lands into rice-fields. This may be, and often is, the case in a part of the country where the advantages of irrigation are generally known and the mode of rice cultivation is understood; but where this knowledge is wanting there are several reasons why the ryot should hesitate before quitting the path trodden by his ancestors for centuries. In the first place capital is required to level and ridge the ground intended to be irrigated; then there is the question of enhanced assessment in the shape of water-rate which he will have to pay; again, the possibility, nay the probability, of the land becoming barren for a time by saline efflorescence has to be considered, as also, in some cases, the precariousness of the water-supply. All these considerations, apart from a perfectly natural prejudice against hastily adopting a new mode of agriculture which may or may not turn out profitably, serve to explain why the exten-sion of irrigation should be slow in localities where previously cultivation has been carried on without the artificial application of water. Reference is made in the question to the Madras Irrigation Company's works at Kurnool. In 1866 when the writer was acting for a short time as Collector of the district all these causes operated against the canal water being utilised. There was first of all the fact that the ryots had always grown cholum (Sorghum vulgare) and other dry grains which formed the staple food of the country, the straw of which was considered far more nutritious for cattle than rice straw; there was precariousness of supply, inasmuch as the Company could not guarantee water after the 31st December when they were under agreement to Government to close their head sluices so as not to injuriously affect the supply of the previously existing works in the Kistna Delta, and in several localities, where the experiment of flooding had been tried, saline efflorescence had appeared, rendering for the time sterile land which before had been fertile, so that altogether the Kurnool ryot came to the conclusion that it was hardly

Mr. Sullivan-continued.

Q. 24.

worth while to pay an enhanced assessment of Rupees 4 per acre for benefits which were, to say the least, questionable. The year 1866, however, was one of drought and scarcity in those parts, and the ryots began to waver in their determination not to buy the precious fluid which was flowing idly by them. A little judicious management at this crisis might have weaned them from their prejudices, and have secured to the Company a number of customers, but in spite of the deprecatory warnings of the Revenue Officers of the district who for the sake of the ryots, and in the interests of the Company (which owing to the State guarantee were identical with those of Government), were most anxious that some satisfactory arrangement should be arrived at, a shortsighted and rapacious policy was allowed to prevail, and this time of all others was chosen to raise the water-

See Appendix B.

rate from Rupees 4 to Rupees 6 per acre. Under such a mode of administration it would have

been a matter for surprise if the extension of canal irrigation in Kurnool had been otherwise than slow. It is asked how these obstacles to progress can best be removed and the people induced to accept promptly the benefits afforded by artificial irrigation. When commercial enterprise desires to introduce a new article to the notice of the public every effort is made to conciliate them in its favor; it is widely advertised, samples are distributed, and possible customers are invited to satisfy themselves as to its merits. It is thought that much the same course might advantageously be adopted to enlist the sympathy of the agricultural community in new irrigation projects in localities where the benefits derived from the artificial application of water to the cultivation of the soil are not well understood. Let them have the water free or at a nominal rate for two or three years, and, having once realised its advantages, they would not care to forego its use when the time came for imposing an equitable charge. This would, to a great extent, obviate the necessity for advances to bring the land into condition for irrigation, and where needed the capital required could be obtained under the provisions of the Land Improvement Act which are yet but imperfectly known and understood by the cultivating classes.

That it would be more equitable to recoup public outlay on unremunerative works by imposing a special local rate instead of distributing the cost over the general revenues of the country may, to a certain extent, be admitted; but it is difficult to understand under what circumstances it would be justifiable on the part of the State deliberately to undertake such projects. Allusion is made in the question to their being constructed for the "protection" of the locality, presumably, in the time of scarcity. But if burdensome taxation for ever is to be the price of such protection, the remedy is likely to prove worse than the disease, progress would be obstructed, and the continued strain on the resources of the people would leave them less capable than ever of standing up against the pressure when the time of trial came round. And if the principle be admitted that it is expedient to provide irrigation at any cost for the protection of a province in time of drought, where is the line to be drawn? "Impossible" is a word not to be found in the Engineer's vocabulary, and, so long as funds are forthcoming, a head of water may be secured in almost any focality. It seems to be a dubious policy to depart from the old rule that no projects should be undertaken save those which might reasonably be expected to pay their cost of maintenance and the interest on capital outlay without undue pressure on the resources of the people. When, to cover expenses, it becomes necessary to impose a cess exceeding the

Mr. Sullivan-continued.

average rates of the district, such pressure is applied, and the project should be abandoned on general administrative grounds and for the reasons given below.

There is one especial point in which the land-revenue administration of the present day under British rule in the Madras Presidency contrasts most favorably with that of Native Governments, and that is the entire freedom secured to the cultivator of the soil. Under the latter the ryot had very little liberty of action. He was not allowed to throw up any portion of his holding, however unprofitable it might be to him to retain it; he was bound to cultivate only such crops as the Sircar might dictate, and his rights as a landed proprietor were scarcely recognised. He was regarded rather as having been placed where he was, not that he might till the land and enjoy the fruits of his industry, but that he might produce revenue for the State. But happily this state of things no longer exists, and although it was recently decided by the High Court of Madras that the legal status of a ryot holding land under an ordinary puttah was only that of a yearly tenant, in practice his title as an absolute proprietor, subject to the payment of the Government demand, has been recognised to the fullest extent, as is evidenced by the freetransfer of landed property recorded in the archives of the Registration Department. He is at liberty to cultivate what crops he likes, and is free to contract or extend his holding as may seem best to him, and where the water-rate is levied distinct from the land assessment he may take water or not as he pleases, and is only liable to pay for what he uses. If, as apparently is contemplated in the question, it is intended to make an otherwise unremunerative work, pay by the imposition of a special rate, it is clear that to attain the object in view, all such liberty of action must cease and determine, and the ryots must be compelled to take the water, or at any rate to pay for it, whether they want it or not.

Q. 25.

(a), (b), (c) & (d).-Such claims and prescriptive rights, if they exist at all in this Presidency, do so to such an inappreciable extent as not to merit consideration. It has happened in the case of a large irrigation project traversing a Zemindari or other private estate that the works have intercepted the supply of water from other sources formerly enjoyed by the proprietor. Such matters are equitably adjusted either by the grant of money compensation or by giving free of charge from the new project water sufficient to irrigate the area affected. There is, however, another subject closely allied to that alluded to in the question which deserves notice. It happens that the sources of some of the large rivers and their affluents from which the Government works of irrigation on the plains derive their supply are situate in hills covered with forests which lie within the limits of private estates, and of late years, owing to the development of the coffee-planting industry, these forests, which were previously abandoned to the tiger and the bear, are now eagerly sought after as suitable sites for planting purposes. In some places, where competition is at all keen, large prices are obtained by the owners for such lands, and the consequence is that the denudation of these hill sides is already beginning to affect the water-supply, and unless measures are taken to check it, serious results are likely to follow. That the agriculturists below, who have had the use of the water for a lengthened period, have a cause of action against those by whom a diminution of the supply is caused cannot be doubted; but the difficulty would be to fix the responsibility on any one, and to determine in a Court of law how far the damage was due to the felling, and how far to natural causes. The sole means, therefore, of averting a

Mr. Sullivan-continued.

danger, which is daily becoming more imminent, seems to be a strict conservancy of all such forests, and the only way in which such a measure could be carried out would be by the State acquiring the right over them which now vests in private individuals.

(e).—Only it is believed in cases where the claim in the former was superior to that in the latter.

(f).—The position of the Madras Irrigation Company's Canal in Kurnool and Cuddapah is a case in point. As previously stated, when the project was initiated a stipulation was made that the Company should close their head sluices on the Tungabhadra (an affluent of the Kistna) on the 31st December, so that the supply, to the existing Kistna Delta works should not be injuriously affected. This was simply deference to a prior claim to the water and the condition could not be equitably set aside, although it seriously impairs the efficiency of the Company's works. The remedy in this case is the construction of large reservoirs for the storage of water when the rivers are in flood to supplement the supply when they run low, and this, it is believed, formed part of the Company's original scheme, but was abandoned for want of funds.

(g) and (h).—By a Commission in which the interest of all parties should be adequately represented. Except where a private Company or Zemindar intervene, the interests of the State as involved in the remunerative nature or otherwise of the project would be best upheld by Engineers specially conversant with the subject of irrigation, whilst the interests of the agricultural community, which, to a wide extent, are identical with those of Government, might be safely entrusted to Revenue Officers (European and Native) of mature experience. Any decision which the Commission might arrive at would, of course, be subject to the revision and approval of Government. The concluding portion of the question offers a wide field for remark, but it will suffice here to observe that in disposing of such matters the object to be kept prominently in view is the general good. Vested interests and priority of claims should have all the weight given to them to which they are justly entitled, but when these are found to conflict with the general welfare, they must be made to give way, care, of course, being taken that due compensation is awarded.

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Irrigated land is liable to an enhanced charge for the use of the water supplied by Government. This takes the form either of a water-rate imposed in addition to the land-cess, or of a consolidated wet assessment in which the two items are combined. In either case the ryot pays more than he otherwise would in consideration of the benefit he derives from the water being brought to his land, and a corresponding liability on the part of the State to maintain the supply efficiently has always been admitted. In any case, therefore, where it may be deemed expedient to transfer the cost of up-keep to the ryot, it is clear that the measure must be accompanied by a reduction of the rate previously charged, equal in amount to the estimated annual charges for that purpose. Except in minor works it is more than doubtful whether the arrangement would be found to answer practically, as the rvots interested would always find a difficulty in apportioning the cost of repairs amongst themselves, and rather than pay more than their share they would allow the work to deteriorate. This could only be prevented by constant supervision on the part of the Public Works Department, the necessity for which it is the object of the proposal to obviate. This has been shown to be the case wherever the experiment has been tried, and it would, therefore, be unwise to attempt to 155

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Mr. Sullivan-continued.

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apply the principle to works of importance, or to those requiring engineering skill. What seems to be a better plan is suggested below.

The importance of irrigation in a tropical climate and the fact that nearly all irrigation works are in the hands of Government impose on the State the duty of maintaining them in the highest state of efficiency, in view to the general prosperity of the country and the security of the public revenues. That the means adopted to this end, under existing arrangements, fail to attain their object will be testified to by every Engineer and Collector in the service. A lump sum is assigned to "Repairs—Irrigation," the amount having been calculated, not according to the requirements of the works, but according to what could be conveniently spared from other projects. As Provincial grants fluctuate with the state of the Imperial Exchequer, it comes to pass that the efficiency or deterioration of these life-giving works is dependent more or less on Imperial contingencies, and the agriculturists of Southern India realise the effects of a frontier war by the breaching of their tanks and channels. This is surely an unthrifty policy which, if persevered in, must result in a serious diminution of the public resources. It has been accepted as a general principle that no irrigation project should be undertaken or maintained, the income of which is insufficient to meet the charges of interest on capital outlay and of up-keep. But where a work is remunerative to this extent, it follows that only that portion of the income which is in excess of the charges of maintenance is claimable as an asset of the general revenues. This and nothing more repre-sents the interest on the capital expended. But as a matter of fact the whole return is swept into the Imperial Treasury, and once there it becomes a matter of considerable difficulty to get it out again. As long as the construction and up-keep of lines of communication were dependent on grants from Imperial funds, it was hardly possible to drive 50 miles on end in any direction, and irrigation works, under existing arrangements, suffer much in the same way. The plan that suggests itself as a remedy is not the imposition of an additional local cess for the up-keep of irrigation works, which is an Imperial liability, but an appropriation of a portion of the income of such works within certain local limits to be expended on their maintenance and on nothing else. An estimate should be made by the Department of Public Works of the cost of maintaining each project in an efficient state of repair, and that amount deducted from the enhanced revenue derived from the land permanently improved by the application of irrigation, should be set aside for the purpose. The aggregate of these sums within defined territorial limits—say a taluk—should form the local repair fund for all irrigation works within them, and should be at the disposal of the Collector and Engineer of the district. The Imperial grant for Provincial expenditure would, of course, be pro tanto diminished. It is possible, though not probable, that the whole amount might not be expended in the course of the year, but the balance should be carried forward so as to be available for accidents of a serious nature to which the best constructed works are liable at times. This commends itself as a more practical arrangement than the proposal to reduce the rates now payable by the ryots on condition of their keeping the works in repair, whilst at the same time no enhanced expenditure will be involved.

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The obligations of Zemindars in this respect are, of course, limited to the works on their own estates, and as there is no law to enforce their performance, they are often neglected. For the sake of their tenants, and for the protection of interests beyond the boundaries of

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of their estates which might be injuriously affected by the breaching of tanks and channels, it seems desirable that the performance of this most important duty of a landlord should be made compulsory by law. The arrangement suggested in the preceding question would not be applicable in this case, as the State is under no obligation to maintain the irrigation works in a Zemindari.

(a) & (b).—These will be found printed in Appendix C. They are applicable to all the districts in the Presidency with the exception of those noted in the heading of the rules and to all lands not permanently classed as wet. In the excepted districts, however, the same system obtains with modified rates, and the amount of water-rate realised in them is, therefore, included in the following statement. It must be borne in mind that this merely exhibits the additional revenue due to irrigation, derived from lands on which the land assessment is a charge distinct from the water-rate, and is exclusive of the revenue derived from irrigated lands charged with a consolidated wet assessment :—

STATEMENT of Irrigation Revenue derived from Lands not bearing a consolidated West Assessment.

Districts.		Water-rate.		Second Crop Assessment.	Total.	
	1.100			RS.	RS.	RS.
Ganjam				26		26
Vizagapatam				2,377		2,377
Godavari	1.4.105	· · · · · · · · · · · · · · · · · · ·		10,20,878	4,222	10,25,100
Kistna	(Charles -			6,98,672	373	6,99,045
Nellore				17,529	10,646	28,175
Cuddapah				23,715	42,682	66,397
Bellary	1			39,217	76,053	1,15,270
Kurnool				27,497	29,663	57,160
Madras						
Chingleput	1000	法的情况		43,818	51,755	95,573
North Arcot		distantion of the		64,541	35,410	99,951
South Areot				2,48,922	69,077	3,17,999
Fanjore				1,44,963	86,407	2,31,370
Frichinopoly		Canal States		38,344	92,667	1.31.011
Madura	Rederic			3,782	31,931	35,713
Finnevelly				3,622	27,921	31,543
Coimbatore	Sec. A.	and starting	Straight a	16.646	302	16,948
Vilgiri	Sector Sector	Back Street	1200	and the second second	Checkaning & Collections	
Salem	100	A State States	1.1.1.1	5,279	Contract And Contract	5,279
South Canara						
Malabar					and the second	
		Total		23,99,828	5,59,109	29,58,937

(c).—The exemptions are confined to permanently settled estates where lands previous to the construction of the works were classed as wet and charged accordingly when the peishcush was fixed, and to Inam lands where irrigated land formed the original grant. Such lands coming under the influence of a work subsequently constructed are allowed the use of water free of charge.

(d).—The contribution of this cess is almost entirely confined to one district. The total amount collected in 1875-76 was only Rupees 3,700, of which nearly Rupees 3,000 was contributed by the District of Chingleput. This is evidently a relic of former days when Public

Mr. Sullivan-continued.

Works Department's Budgets and Estimates were unknown and the revenue of the State was paid in kind under the "warum" or sharing system. At the time of the harvest the outturn of each holding in the village was stored in certain convenient localities, and no one dared to remove it until the officers of Government came round. Then, according to a system varying in different parts of the country, but well understood by the village communities, commenced the distribution of the shares. Part of the gross produce was set aside to recoup the ryot for the expenses of cultivation, part for the remuneration of the village servants, part for the pagoda and religious services, and amongst other items a portion was allotted for the repairs of tanks and channels. In some places this was added to the Sirkar share when the final division of the net produce took place, the State nominally undertaking the repairs ; in others, it was handed over to the heads of villages for the purpose, but as a matter of fact the irrigation works of the country benefited but little whichever system prevailed. The Collector of Coimbatore reporting on the latter stated as follows :--- "This system appears to have been most fallacious and unprofitable as on the assumption of the province by Government the tanks and channels were found in the utmost state of disrepair and the cultivation proportionately deteriorated." The cost of maintaining irrigation works in an efficient state of repair having, ever since the commencement of British rule, been accepted as a charge on Imperial revenues, there can be no question but that this cess should be done away with in the few districts where it now survives.

APPENDIX A.

COMPARATIVE STATEMENT of Wet Lands cultivated between Faslis 1275 and 1286 (A.D. 1865-66-1875-76).

Districts.	Fasli 1275.	Fasli 1276.	Fasli 1277.	Fasli 1278.	Fasli 1279.	Fasli 1280.	Fasli 1281.	Fasli 1282.	Fasli 1283.	Fasli 1284.	Fasli 1285.	Fasli 1286.
	ACRES.	ACRES.	ACRES.	ACRES.	ACRES.	ACRES.	ACRES.	ACRES.	ACRES.	ACRES.	ACRES.	ACRES.
Ganjam	173,343	170,617	177,216	177,484	179,409	181.324	177,014	178,141	171,140	169,319	168,465	168,984
Vizagapatam.	20,874	22,889	23,967	23,788	23,803	22,175	19,736	24,256	22,051	24,035	23,497	22,522
Godavari	-174,071	203,216	197,247	210,213	225,032	238,011	243,075	264,909	273,535	281,209	288,918	273,326
Kistna	147,418	147,812	136,687	124,288	144,591	152,765	137,515	169,867	157,008	184,975	184,587	169,029
Nellore	141,920	167,757	161,231	162,797	176,927	181,230	159,598	169,548	170,572	176,322	147,122	96,598
Cuddapah	133,236	127,396	112,678	124,508	94,789	100,732	91,377	102,279	101,077	109,166	85,773	57,753
Bellary	152,375	154,537	131,055	140,600	144.989	145,749	96,932	103,816	101,816	112,976	87,496	68,432
Kurnool	27,481	25,603	24,421	25,948	26,092	26,168	23,906	24,700	25,530	26,708	25,858	17,096
Chingleput	240,160	234,338	216,916	213,093	203,568	238.044	249,292	256,140	236,681	256,578	226,133	199,831
North Arcot	186,002	193,323	165,087	171,209	173,673	192,572	192,759	189,845	184,704	192,794	171,905	124,513
South Arcot	253,029	261,823	256,348	244,532	258,001	269,755	268,661	269,619	263,329	270,004	266,637	221,691
Tanjore	671,817	674,155	674,853	683,989	698,142	705,504	703,528	716,649	708,480	711,626	708,981	678,092
Trichinopoly	116,160	119,334	117,446	121,573	129,162	128,499	126,790	129,768	128,255	129,745	128,995	115,738
Madura	125,264	125,669	125,019	131,941	133,377	130,700	133,758	139,613	134,278	138,708	141,572	109,863
Tinnevelly	144,334	159,726	158,881	160,042	159,655	155,700	152,031	158,098	148,676	165,758	161,271	150,070
Coimbatore	77,294	80,186	78,496	79,031	80,871	79.431	80,669	81,805	84,407	83,705	81,534	76,910
Nilgiri			1.1.1.1.1	40	40	40	40	40	40	40		1,227
Salem	76,140	77,626	61,543	63,310	63,657	68,174	77,752	85,753	87,733	90,747	80,837	71,740
South Canara			State Contraction			Area not	known.				State Constant	
Malabar	379,318	380,425	380,972	382,187	384,239	385,455	385,234	386,610	386,430	385,750	386,674	387,169
Total	3,240,236	3,26,432	3,200,063	3,240,573	3,300,017	3,402,028	3,319,667	3,451,456	3,385,742	3,510,165	3,366,255	3.010.584

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Mr Sullivan-continued.

APPENDIX B.

Read the following Proceedings of the Madras Government, Revenue Department, dated 5th November 1866, No. 2989.

Read the following Proceedings of the Board of Revenue, dated 20th August 1866, No. 5886.

Read the following letter from the Acting Collector of Kurnool, to the Acting Secretary to the Board of Revenue, dated 30th July 1866, No. 163 :--

I have the honor, in continuation of my letter, dated 14th instant, No. 146, to submit the information called for in paragraphs 20 and 21 of the Order of Government, dated 1st June 1866, No. 1348.

2. The statement appended shows the number, position, and area of the gardens at present irrigated from the canal. The majority of them are partially planted with fruit-trees, a portion of the ground being cultivated with the usual garden produce, chillies, onions, &c. The position of the gardens, with reference to the canal, is not, as supposed by the Consulting Engineer and Government, "distant and isolated." In some cases water flows to the gardens through lands cultivated with wet crops, and the greatest distance of any of these gardens from the canal is estimated at about thirty-five chains, whilst some are only five chains off. This ground for claiming a special rate for gardens being disposed of, I have only to add that I entirely concur with Mr. Minchin's opinion, that this species of cultivation does not require any thing like the quantity of water necessary for the cultivation of two crops of paddy. I doubt myself whether it requires as, much water as one crop of paddy, when it is considered that the latter has to be continuously flooded from sowing till close upon harvest time,—a mode of treatment which would be destructive of crops like onions, ragi, &c., which are only watered morning and evening four days in the week.

3. It must be remembered also that the canal water is only available for irrigation for six or seven months in the year, and for the remainder of the time these gardens have to be watered from wells with which each is provided. The owners, therefore, cannot dispense with their cattle which, if the supply from the canal was perennial, they would do, and being saved this expense, might be able to pay a high rate for irrigation. As the gardens are supplied with good wells, and as the owners are obliged to maintain their bullocks all through the year, I think it more than probable that the imposition of a special rate might lead them to dispense with the canal water altogether.

4. I trust it will not be considered out of place if I venture to say a few words here regarding the enhanced rate of Rupees 6 which it is proposed to impose on ordinary irrigation. I cannot but regard it as a most impolitic step on the part of the Company at present. The fact is, as I had occasion to point out to the Chief Engineer the order day when he proposed that the subsidiary channels should be constructed by the ryots themselves instead of the Company delivering the water on the land to be irrigated ; that in a district like Kurnool where wet cultivation is the exception to the general rule, the people do not set the same value on water as the inhabitants of a rice-growing district would. Having had no experience of it, the system of cultivation under artificial irrigation is not understood by the majority, and even if they did understand it with prices ranging as they do at present, it is a question whether it would be, as a general rule, remunerative to the ryot to convert his cholum fields into rice-fields. Cholum is now selling in the district at 6³ measures the rupee, and rice at 6¹/₄, setting aside the cost of irrigation, the expenses of cultivating land with paddy are double, if not treble, the amount of cultivating dry grains, and the ryot argues, "why should I incur this heavy outlay when there is scarcely any difference between the market prices of rice and cholum." An acre planted with rice may yield more than an acre planted with cholum ; but it is a question whether this difference will make up the enhanced cost of cultivating the former, whilst, at the same time, it must be remembered that cholum is the food of aine-tenths of the people, that there is always a steady local demand for it, and that the stalks are far more nutritious as fodder for cattle than rice straw.

5. It is obviously the interest of the Company to get as much land as possible under irrigation. Up to the present time not one-third of the land irrigable from the canal has been brought under yet cultivation. This being

Mr. Sullivan-continued.

the case when the price of water was comparatively low, are they likely to attain their object by enhancing their rates in the third year of their operations. I think not, and if the increased rate of 6 Rupees is imposed this fash on people who applied for the water under the impression they were to get it for 4 Rupees, it will be paid grumblingly, and applications for the future will be few and far between. I may be mistaken in my views, but from the circumstantial evidence before me, and from the information furnished to me by those who are well qualified to judge, this is the opinion at which I have arrived.

Submitted for the consideration of Government, with reference to paragraph 21 of Government Order, dated 1st June 1866, No. 1,348, Revenue Department.

2. Mr. Sullivan brings forward one fact which escaped the Board when passing their Proceedings, dated 16th May 1866, No. 3,415, disposed of in the above Government Order, viz., that under the restriction placed on the Company by the Order in the Public Works Department requiring the Company to close the head sluices to their canals after December, for the maintenance of the requisite supply for the Kistna Delta works, the Company can, in fact, only supply water for some six or seven months in each year, and that consequently the argument on which the rate for sugar-cane is fixed, at double that for a single rice crop, viz., that the cane requires water throughout the year, is seriously weakened, inasmuch as the supply cannot be afforded for that period. The Board are of opinion that on this point the Government Order needs to be reconsidered.

3. The Board deem Mr. Sullivan's further remarks as to the doubtful policy of the proposed enhancement of the rates, at least for the present, as deserving of consideration; but leave it for Government to decide whether they shall be referred to the Agent of the Company and the Consulting Engineer for their remarks before the enhancement be notified.

4. In this case it may be deemed advisable to direct the Acting Collector by telegraph to suspend action on Government Order, dated 9th August 1866, No. 2,014, authorising the Acting Collector to notify the enhanced rates in the District Gazette.

ORDER THEREON, 5th November 1866, No. 2,989.

Miscellaneous. Miscellaneous. In their Order of the 1st June last, Government called for information regarding certain garden lands in Kurnool, for watering which the Irrigation Company's Officers and the Consulting Engineer wished to charge a special and heavy rate. This proposal appeared to be founded on the supposition that these "gardens" were isolated and at such a distance from the Company's Canal that the supply of water would be more expensive than that of

2. Mr. Sullivan shows that this is a mistaken idea. The gardens are not at a distance from the canal, and he doubts whether they will require more water than the same extent of paddy cultivation. It seems also that there are only twenty-eight "gardens" altogether, comprising an aggregate area of 140 acres.

ordinary wet cultivation.

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3. Under these circumstances, Government cannot assent to any exceptional water-rate being levied on these "gardens."

4. The Board notice a circumstance mentioned by Mr. Sullivan, viz., that the Irrigation Company are not in a position to supply water for the whole year, and recommend reconsideration of the Order of Government fixing the rate for sugar-cane at 12 Rupees, or twice that for rice.

5. The order, however, necessarily pre-supposed full irrigation for the crop If the Company do not fulfil this condition, they cannot claim the double rate for sugar-cane any more than they can claim the single rate for rice, if they do not supply sufficient water to bring the crop to maturity.

6. Lastly, Mr. Sullivan deprecates the recent enhancement of the water-rate from 4 to 6 Rupees per acre, and the Board consider his remarks deserving of consideration. Mr. Sullivan doubts whether on such terms the cultivation of

Mr. Sullivan-continued.

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rice will be as profitable as that of cholum, both grain selling now at nearly the same prices. It does not, however, by any means follow, that because at this moment a measure of rice fetches no more than a measure of cholum, *therefore* an acre of land under rice cannot afford to pay 6 Rupees for its irrigation, or, charged with that tax, does not yield a larger return than an acre of cholum. The ryots are not obliged to take the water at all, nor, if they take it, are they obliged to grow rice only by its means.

7. The Government see no reason to modify their order at present.

(True Extract.)

(Signed) J. D. SIM, Secretary to Government.

APPENDIX C.

RULES for the levy of Water-rate in addition to Land-assessment on all lands not permanently classed as wet in all districts (except Ganjam, Tanjore, Madura, Tinnevelly, Malabar, South Canara, and the Nilgiri Hills) when water is supplied from a Government source of irrigation.

I. All dry lands temporarily cultivated with wet crops shall in lieu of any system now in force pay a fixed water-rate on the following scale of Standard Rates. Where water is raised by mechanical contrivances, the rates shall be reduced one-fourth, and in deltaic tracts when water is drawn from drainage channels one-half.

First-class Tanks,	Second-class Tanks,
River and Spring	River and Spring
Channels.	Channels.

Standard Rates.

	RS.	А.	Р.	RS	А.	Р.	
a. Water-rate for a single wet crop raised on dry lands, per acre	4	0	Ö	3	0	0	
b. Second crop on the same land, per	2	0	0	1	8	0	
c. For sugar-cane, betel, cocoanuts, plan- tains, &c., requiring water longer							
than an ordinary wet crop, per acre.	6	0	0	4	8	0	
d. For dry crop watered, whether first or second crop, per acre	2	0	0	1	8	0	

1. This rule does not apply to North Arcot or South Arcot, which have special rates uniform throughout the district, nor to the delta tracts of the Godavari and Kistna District.

2. Rate b does not apply to Cuddapah.

3. In Kurnool, rate d to be reduced one-half.

...

II. When a portion (or portions) of a field is irrigated, and the field is not more than half an acre in extent, the charge shall be calculated on the actual extent of the field.

When the field is larger than half an acre, the extent irrigated must be carefully measured and the charge shall be made by the half acre subject to the limitation that more than the recorded extent of the field shall not be charged for.

For instance, if 1.5 acres are irrigated, the charge shall be the rate for three half-acres; if the extent irrigated is 1.55 acres, the charge shall be the rate for four half-acres, provided that, if the whole field be less than four halfacres, as for instance 1.75 acres, the charge shall be the rate for the recorded extent of the field.

III. The Collector has power to impose prohibitory rates whenever water is taken without permission.

IV. The above rules are applicable to all Government sources of irrigation, the supply in which is at all regular and to be depended on. Simple jungle streams which only receive a casual supply may be utilised as hitherto without charge.

Mr. Sullivan-continued.

V. No Government water is to be taken under these rules without the express sanction of the head of the village or of the Department of Public Works Officer, when the works are in charge of that department.

N.B.—These rules do not apply to second crop raised on wet land, for which the usual charge (generally half the single crop assessment) will be made.

Mr. Thomas.

Wastage of Water.—In connection with irrigation the wastage of water under our present system of charging for its supply is a subject, the importance of which can hardly be exaggerated. Economy of water is, in effect, the increase of the area cultivable by irrigation. I believe that economy alone might be made to increase the irrigated area from 50 to 100 per cent. There is no economy so effective as self-interested economy. To obtain this I would sell the water by the cubic yard, and not by the acres irrigated. On this point, I will again quote from one of my previous letters when Collector of South Canara, 24th November 1869, No. 1507.

"There is also another point on which I would venture to make a suggestion. The water-rates proposed are in no way proportioned to the amount of water used, but to the acreage to which it is supplied ; consequently, a ryot that has once paid his Rupees 4 or Rupees 3 an acre for water has no inducement whatever to be economical in his use of water, but simply to get as much as ever he can for his money, and consequently to waste it, for his crop is the better for standing in running rather than stagnant water; and as he has no advantage whatever from using less water, he perforce always grows the most profitable crop, viz., paddy; whereas, if he could have a less quantity of water at a less total, though equally proportioned cost for the same acreage, he would often grow raggy, cholum, Indian corn, vegetables or other things by which the land also would have the advantage, it now necessarily never has of a rotation of crops, and this he would be particularly disposed to do whenever from a shortness of supply in the tank, there might be some uncertainty as to its being sufficient to carry the later sown paddy quite to maturity, and his economy of water in this respect would tend to the security of the other crops as well as his own advantage, for the dry grain crops raised with the aid of just a little irrigation are particularly fine ones.

"It seems to me unfair when the supply is precarious to divide the risks as it were, by charging the ryot Rupees 3 instead of Rupees 4. Our irrigation arrangements are strictly a contract, under which the Government undertakes to supply the water necessary for a crop, and the ryot in return pays the value of it, and has no option of refusing to pay, for if the water in the tank is sufficient, he gets no remission, for neglect to cultivate is presumed, and only in the case of the Government supply failing is he entitled to remission, the principle being that if the Government has failed to fulfil its part of the contract, it cannot exact the other part from the ryot.

"Furthermore, if less water than is necessary for a crop of rice is supplied for Rupees 3 it is a mockery, if more than is sufficient is supplied for Rupees 4 it is wasted; and if every man that pays Rupees 4 wastes one-fourth of his water, how great must be the total waste. That, in practice, it really is so, every revenue officer will, I think, agree with me, how much more advantageous it would be to economise that waste for other fields."

Q. 13.

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Lieut.-Colonel Mullins. Q. 12.

Statistical Information for principal Canals-Average local Value of Chief Crops, &c .- The principal systems of irrigation in the Madras Presidency are-

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(1) the Godavari Delta;

(2) the Kistna Delta;

(3) the Cauvery Delta;

- there is also a guaranteed Irrigation Company ;
- (4) the Madras Irrigation and Canal Company.

The required statistical information is subjoined for these :----

	Capital Interest		Mainte-	Area of	PER ACRE.			
Systems.	Outlay to end of 1877-78.	for 1877-78.	in 1877-78.	Irrigation, 1877-79.	Capital Outlay.	Interest.	Mainte- nance.	
Godavari Kistna Cauvery Madras Irrigation	R8. 78,77,781 48,40,546 13,66,501	RS. 3,54,500 2,17,825 61,492	RS. 3,41,767 2,42,428 1,64,702	AC8. 520,051 264,256* 835,208†	15·15 18·31 1·63	0.68 0.82 0.07	0.65 0.91 0.19	
and Canal Com- pany's Canal	1,60,18,521	7,20,833	1,59,428	50,918	314.60	14.15	3.13	

There is no recent information in this department as to the local value per acre of the chief crops raised by irrigation in these deltas, but this value has been abnormally high for the last three years.

The same crops are not raised with and without irrigation except to some extent under the Irrigation Company's Canal.

Water-rates, Rent, &c .- The particulars of water-rates are subjoined :--

Godavari and Kistna Delta Systems.

	1	Per 1	Acre In	rrigated	1	
	1	Flow	w.	1	ift.	
	R	3. A	. Р.	RS.	A.	Р.
Single wet crop	4	0	0	3	0	0
Second wet crop on irrigated land	4	0	0	3	0	0
If compounded for two crops for a term						
not less than five years	6	8	0	4 1	14	0
Single dry crop	2	0	0	1	8	0
Second dry crop on irrigated land (if not						
compounded).	2	0	0	1	8	0
Sugar-cane, betel plantations, and other						
garden produce remaining on the ground						
for the time of two crops	8	0	0	6	0	0
Do, if compounded for not less than						
five years	6	8	0	4 1	14	0
Dry grop on land for which irrigation	NG PROD			DW EDS		
has never been supplied, or, having been						
once supplied, has been since continued	2	0	0	1	8	0
ence supplied, and seen anot continued.				e Parti	N	
Madras Irrigation and Canal (Comp	any	•			
Sugar-cane, betel leaves, cocoanuts, plan-						
tains, saffron, fruit-trees (various)	12	0	0	8	0	(
Rice, field sown	6	0	Õ	4	0	(
Rice on bedded and bunded fields-	100			-		all.
First year	3	0	0	2	0	(
Second year	4	Ő	Õ	2	10	8
Third c 0	5	0	õ	3	5	4
Subsequent years	6	õ	Ő	4	0	(
Nuberfactic Joard			0	(Hearthy)	1	5

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For 1875-76, subsequent information is not available.
 + For 1873-74, including lower anicut subsequent information is not available.

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Lient.-Colonel Mullins-continued.

Garden raggy, onions, chillies, sweet potatoes, tobacco, maize, garden korra, indigo, brinjals, yava (wheat), cummin, bariga, mentilu . .

Cholum, field raggy, field korra, field tobacco, field chillies, cotton, gram

(various), oil-seeds (various), areca ... For a series of crops

For first-class crop, matured partly from canal and partly from other sources ...

For second-class crop, matured partly from canal and partly from other sources. For irrigation from canal after 1st

January, rice excepted For water supplied to store in a tank If conveyed to a crop, the same rates as

if supplied direct from canal. If not conveyed free.

Crop on land cultivated under the tank supplied during any of the five years

previous to opening the canal Crop on other land in the tank ayacut ...

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RS. Α. P.

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RS. A. P.

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Free. The difference between the wet and dry assessment. Same rate as if supplied direct from the canal.

Crop on land outside the ayacut

No water-rates in force in the other irrigation systems of the Presidency, the water-tax and assessment being consolidated.

There is in the Irrigation Department no information as to the ordinary increased rent on irrigated over unirrigated land. In this Presidency so far as has come under notice the practice has been-

(1) for a Zemindar to pay peishcush or quit-rent for his estate;

. .

- (2) for the total wet ayacut, or land classed as wet, to be supplied from Government canals free of charge, irrespective of the previous average or even maximum extent of irrigation during any immediately preceding period, where the old sources of irrigation are superseded by canals. The instances referred to are the Nidadavol and Baharzalli Zemindaris in the Godavari; and,
- (3) for the Zemindar to pay the ordinary water-rates on lands irrigated in excess of the former total ayacut.

No instance of enhancement of the peishcush or quit-rent has come under notice. There would probably be great difficulty in obtaining any payment beyond the water-rate from Zemindars even could it be proved that their estates had been generally benefited by the construction of irrigation works because the peishcush is not liable to enhancement.

Q. 14.

Law for recovery of Canal dues-Lavish use of water, &c.-The land assessment and the water-rates also are levied by the Revenue Officers, and the Canal Officers have nothing to do with the matter.

Canal Officers are able to secure reasonable economy of water under the canals of the modern systems of irrigation. There is much and sometimes enormous waste in the case of old river-channels, and the Calingaroyen Channel in Coimbatore may be cited as an instance. There the ryots do pretty much what they please, and the supply of water actually admitted to the channel would suffice for the irrigation of three times the area now irrigated were reasonable economy enforced. As a consequence of the waste which is gross and palpable the lands under the lower part of the channel are very badly supplied.

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Lieut.-Colonel Mullins-continued.

Public Works Officers have so far been able to effect little or no improvement, because—

- (1) the channel is under the control of the Revenue Officers, and no control is enforced; and,
- (2) the ryots have as many openings, often without sluices or proper means of regulation, in the channel bank as suits their convenience.

Water has never been charged for by quantity or volume for the irrigation of land. It could not be so charged for without a radical change of system, because—

- (1st) ryots do not know what quantities are required for different kinds of crops;
- (2nd) the same crops require materially different quantities when the soils vary.

It would be a difficult matter to teach the former, and the means of deciding the latter are not at present available. No ryot and, indeed, none but Canal Officers have any idea what a cubic foot a second or any other volume means. It may be assumed that 200,000 eubic feet of water are on the average ample for an acre of rice, and if 4 Rupees be the water-rate per acre, it would follow that 50,000 cubic feet a rupee would be the ordinary charge by volume. Were it practicable to introduce the system at old works, it would undoubtedly pay to do so as there the wastage is great. It would not answer to introduce it at the Godavari for there a considerably less quantity suffices, and year by year as the distribution arrangements have been improved waste has been reduced, and the duty of a cubic foot a second increased.

It would not do to make a system of supply by volume compulsory as regards existing irrigation, for the introduction of any system which the ryots could not possibly understand would occasion wellfounded dissatisfaction. It might be introduced at new canals, or new reservoirs, but only by selling to capitalists or men of education and practical agricultural experience combined who would be willing to take large quantities on highly favorable terms, and to see to the detailed distribution. Where Canal Officers have reasonable powers of control waste can be prevented without injury to individuals. Consequently, the easiest remedy for waste is to give such control to them where, as in the case of old works, it is not now present. There would then be no advantage in resorting to another system which would inevitably be very unpopular unless middlemen were introduced, and then unprofitable.

Increase of Water-rates.—The advisability of increasing water-rates must be decided with reference to the actual circumstances of particular localities. In the Delta of the Cauvery there are indications that the assessment, which is there consolidated, *i.e.*, there is no distinction between land-revenue and water-rate, is remarkably low taking the character of the water-supply into account. The great increase in the value of land since the upper anicut (weir) was built upwards of forty years ago is evidence of the great value of the private property created by that improvement, and this property has not contributed to the needs of the State. This Delta, the most extensively irrigated and perhaps richest tract of country in the Presidency, remains unsurveyed, and data are wanting, therefore, • for ascertaining the actual extent of irrigation or for dealing comprehensively with any questions relating to the revenue.

In districts which have been settled for a fixed period no alteration of rates can be made unfill the time for a fresh settlement arrives.

Q. 15.

Q. 16.

Lieut.-Colonel Mullins-continued.

Statistics of Irrigation—Revenue Reports.—The statistics of the irrigation for which special returns are not made out are exhibited in the District Irrigation Registers. For the larger works or systems statements of cultivation and revenue have, in some cases, been prepared in the Revenue Department, and in others are under preparation. No revenue report is prepared by the Canal administration, but the statements furnished by the Revenue Department are reviewed and the results of successive years compared. Canal Officers require to know during the season what areas are being irrigated, and the Administrative Officers need to be informed what are the results of each season's irrigation, in order that all necessary improvement of management may be ascertained and introduced. Lastly, the net results have to be incorporated in the financial accounts of the works. Accurate statistics, including the quantities of water consumed in the irrigation of given areas, are of great importance, not only to the efficient management of existing works, but as a guide to the probable results of proposed works.

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The degree of detail should differ for the several offices.

The officer in charge of a canal should know what area is irrigated in each village, for he has to supply the water accordingly, and he has to watch variations of area, and to understand their causes.

A Superintending Engineer and a Chief Engineer require to compare by canals actual with anticipated areas of irrigation, and to watch the progress of extension of irrigation when not fully developed. They must judge, for the most part, by results whether the detailed administration is thoroughly efficient.

The annual reports on the season's irrigation are the most convenient place for the record of statistical information for each year, and this should afterwards be so posted up in abstract as to enable comparisons to be made for a series of years for any one system of irrigation and in due course between systems. Under the arrangements in force in this Presidency, the final areas and revenue for the year must be furnished by the Revenue Officers. All statistics of watersupply, consumption, cost of maintenance, &c., can be recorded by the Canal administration.

Effect of Irrigation on public Health—Effect on Soils—Drainage.— There is no accepted evidence that irrigation is injurious to health in any of the great fields of irrigation in this Presidency. There was an impression that fever was the result some few years ago in

Low latitude and proximity to the sea appear to be favorable to health in irrigated tracts.

the Godavari Delta; but it was shown that though fever was in one or two seasons very prevalent there in the cold weather, it was demonstrated that it was more prevalent and of a more severe type in the upland and unirrigated parts of the

district. The population of the Godavari, Kistna, and Cauvery Deltas compares favorably as regards health with that of localities where irrigation is absent. The extent of land injured by efflorescence and surface salts is small. On the other hand, the area of barren land in the coast swamps made arable and often ultimately very valuable by washing out the salt is very considerable. All deltas need more or less drainage: some localities more and some less or none at all. It is a necessity of the manner and of the progress of formation of these alluvial tracts that the level of a good deal of the country should be low while the coast formation and the tendency which there exists to throw up bars at the outfalls of the rivers and sand dunes make artificial arrangements requisite for the relief of the lands. Delta lands do not ordinarily drain direct into the rivers, but the slope of

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Lieut.-Colonel Mullins-continued.

the country is from the rivers first and generally parallel to them afterwards.

Every part of every large tract of irrigated country needs to have its requirements as regards drainage investigated, and provided for. Generally, the surplus irrigation water to be disposed of is insignificant compared with rain-fall drainage. It is the latter rather than the former which occasions such difficulties as are met with in the principal fields of irrigation in Madras.

Improvement of Soils unfit for Cultivation.—The salt swamps in the lower parts of the Godavari and Kistna Deltas have been reclaimed and converted into fertile lands by means of the water supplied from the canals. This process is going on year by year, and the change in the last few years in the appearances of the country in the localities referred to is very marked.

Effect of continued Canal Irrigation on Character of Cultivation.—In Madras rice or paddy is the chief irrigated crop. There are many different kinds of paddy. An abundant water-supply leads to the introduction of the better kinds of rice and to the improvement of the inferior kinds. The question probably refers to irrigated crops of a kind differing materially from the staple in Madras. Ragi, hemp, and many crops are grown before or after the paddy on the same lands, but they are altogether subsidiary to the main crop.

Effect of prolonged Irrigation.—Some soils are much better suited than others for continuous irrigation. There are soils which have been certainly irrigated for twenty-five to forty years which have increased in value greatly, and the prices which irrigated lands in Tanjore and more especially in Tinnevelly, where as much as Rupees 3,000 an acre have been paid, indicate the belief of the natives that no deterioration of value is to be expected.

Utility of inundation Canals.—Nearly all theriver irrigation in Madras is effected by what are understood to be inundation canals, and channels *i.e.*, canals designed to be full only when the rivers are in fresh. Successful irrigation without the aid of storage tanks is possible only when the freshes last through the season of the chief crop. With tanks, and channels arranged according to the circumstances of the river and the character of its freshes, any river can be made to serve irrigation purposes. No canal here has been designed with reference to the minimum supply of a river. Wells might be useful to irrigate seed-beds; they are seldom necessary or used for paddy cultivation except in the country near the Coast supplied by rain-fed tanks; for raggy and similar garden crops they are used extensively in many parts of the country.

Qs. 21 and 22.

System of canal administration—Legislation.—In Madras as regards the larger modern works the Canal Officers are responsible for the distribution of the water. In the Tanjore Delta the distribution by Canal or Public Works Officers is limited to the equitable division of the supply between the several rivers which there take the place of canals. Public Works Officers have generally nothing to do with the distribution of water from tanks, which is managed by the people cultivating under the tanks. The dues or revenue is assessed and collected by the Revenue Officers, and only in a few instances and not as the rule are Canal Officers consulted as to the remissions to be granted for alleged failure or excess of water. Were the revenue work in connection with canal irrigation thoroughly done by the Revenue Officers, there would be no advantage in making any change in the present system, and it would be in every way better that it should be so thoroughly done by those officers than that the duty

Q. 19.

Q. 18.

Q. 20.

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Lieut.-Colonel Mullins-continued.

should be transferred to the Canal Officers, who have more than sufficient work to do of a kind which can be done by them alone. That there was revenue work to be done which has been left undone is evident from the fact that any definite information as to the extent and revenue of the irrigation under even the most important systems such as the deltas was not forthcoming until a few years back, the earliest statement for the Godavari and Kistna being for the year 1871-72 (Fasli 1281) while for the Cauvery Delta, the Penner Anicut, and the rest of the systems for which capital and revenue accounts are to be maintained, no statement of the particulars of irrigation has yet been prepared. The statements for the first-named deltas were also very imperfectly prepared, and comparison of the details for successive years led to the discovery of many discrepancies, and to corrections and explanations, which latter being in many cases essential to the understanding of the statements, should have from the first been recorded thereon.

The Proceedings of Government marginally noted indicate how

Proceedings of Madras Government, No. 2085, dated 22nd July 1875. much remained to be done before the work of the Revenue Officers could be deemed to have attained to a reasonable standard of efficiency.

It is impossible, of course, for any Public Works Officer at any rate to say what revenue has been lost, because no data for an examination are on record, but it must be assumed that for effective check the superior Revenue Officers must know what areas are under irrigation, where they are situated and from what canals supplied, and they have not in any case until recently had such information, and have not got it generally even now.

The canals supplied water and the people were very willing to take it, and so as regards the Godavari and Kistna Deltas the works were as irrigation works and financially successful. Had the conditions been otherwise, as in the case of the Madras Irrigation and Canal Company's canal from Kurnool to Cuddapah, the results which have, in a great measure, there followed from inefficient revenue administration would have most prejudicially affected the financial prospects of the delta systems.

In the Cauvery Delta, in the absence of a revenue survey or any thing more accurate than the rude measurements of the village accountants, which measurements, moreover, were in many cases taken originally from starting points which have long since ceased to be capable of identification, really efficient revenue administration is out of the question. It may be that the Government get a proper revenue from the irrigated lands or their revenue may be little or much less than it should be, but under existing circumstances definite and accurate information on these important matters is unattainable and adequate supervision and control are impossible. Encroachments here and elsewhere are common, and so little is their injurious effect appreciated even where river embankments and channel banks have been scarped to extend the area of the fields, that these encroachments when most apparent and confirmed by the fields being in excess of the registered areas, are deemed the property of the ryots, and if it be found, as is sometimes the case, essential to recover such land in order to provide for the safety of the banks, such land has to be purchased, and often at a very high price.

Legislation.—There is great want of discipline generally in the management of irrigation works. Canal and Public Works Officers have never been furnished with any powers for the enforcement of

Lieut.-Colonel Mullins-continued.

good order and the prevention of improper interference with the distribution of water. The definition of mischief in the Penal Code does not admit of the most mischievous and prejudicial acts being dealt with criminally, and there is no special law to remedy this defect. The enforcement of discipline by civil suit is, of course, impracticable, and Government would be often unable to prove for damages in such suits, as it might be held that the ryots rather than the Government were the sufferers by the wrongful acts.

A law providing for the prompt repression of all wrong-doing in connection with works of irrigation is much required, and Canal Officers in those cases in which the detailed management of the irrigation is in their hands should be adequately empowered to enforce the law and the rules and regulations made under it.

It is a notable instance of the mistake which has been made in leaving Public Works Officers, in charge of irrigation works, without power to enforce rules, that in 1856-57, when the responsibility for the maintenance of irrigation works generally throughout the Presidency was transferred from the Revenue to the Public Works Depart-ment, no provision was made for the enforcement of Kudimaramut, i.e., of the obligation of the holders of irrigated lands to execute petty repairs to the irrigation works on which such lands are dependent for their supply of water. The Revenue Officers ceased to attend to the matter, and the Public Works Officers could do nothing beyond for a time refusing to do what the villagers ought to have done. The works suffered and ultimately when taken up for repair the deterioration due to the neglect of the Kudimaramut obligation had to be included in the estimates. The absence of efficient arrangements, which must, it is considered, be attributed principally to an idea which prevails in this Presidency that no Public Works Officer is fit to be entrusted with any legal powers, has cost the State a great deal of money, and the neglect of Kudimaramut has been at least as injurious to the people as to the State.

Slow progress of Extension of Irrigation-Its Causes.-The extension of the use of canal water in this Presidency has not commonly been slow. The principal Government irrigation works are near the Coast, and in the Coast Districts at any rate the people have shown a strong desire to take water, the demand being often much in advance of the supply.

The disinclination of the ryots to avail themselves of the water of the Madras Irrigation and Canal Company's canal has, however, been marked and disappointing. The absence of success is due to several causes, among which the chief are probably-

- (1) prejudice of ryots against irrigation to which they were not accustomed;
- (2) difficulties resulting from inappropriate and complicated administrative arrangements, which made it almost impossible for the ryot to understand how he could get water, and what he would have to pay for it;
- (3) inefficient revenue arrangements;
 (4) the description of soil of much of the land commanded. The regur, ragada or black cotton soil of the Kundar Valley is in seasons of ordinary rain-fall highly productive when cultivated with dry crops, and cholum is the staple. food of this part of the country and much appreciated by people and cattle. The people did not believe that irrithe second barred franks and gation would suit the soil, or that it would be possible to the state of the state of the state of make canal water an even partial substitute for rain, and

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Lieut.-Colonel Mullins—continued. they were, and are still, averse to the conversion of their lands into paddy-fields. During the famine they were, to some extent, persuaded to try the effect of watering the dry crops, and some good crops were raised entirely in this way without any rain. This experience will doubtless lead to a more extended use of water when the rain-fall is scanty, but this year (1878) the rain-fall has been more than ample for the dry crops, and consequently but little, if any, canal water has been taken for such. It may be noticed that in the Kistna Delta much very similar land is successfully and regularly irrigated.

(5) The water-rate* for rice or paddy is higher than is usual

3	Rupees	first ye	ar.
4	.,,	second	year.
5	,,	third	
6		fourth	and
	oftorn	abres	

under Government tanks in the neighbourhood of the canal. It is difficult to judge whether these charges have had any material effect in deterring the ryots from

effect in deterring the ryots from irrigating, seeing that they appear to have had very imperfect information as to what they had to pay, but it would have been a good plan probably had the full rate been reached by four instead of three increments.

There are no similarly circumstanced Government works of irrigation but there are parts of the country in which there are tanks of native construction and of some magnitude, the cultivation of the fields under which with paddy the ryots look upon as of secondary importance to their dry crops, and these latter obtain the first attention. In the Coast Districts this preference is never shown probably generally, because the soil is better suited for irrigated than for dry crops.

Compulsory special Rate on all Lands "protected by an Irrigation Work .- There can be no injustice in making particular districts or localities pay for protection which may be afforded them by means of irrigation works. The arrangement should be precisely similar to taxation for Police or other protection. What should be the unit of territory would depend upon circumstances. The rate should be very light, and should be spread over as large an area as possible. All land commanded by the canals or reservoirs should be required to pay and land not so commanded, but within reach of the indirect benefits such as certainty of food-grains being in the country, better fodder, cheaper fire-wood, might contribute something in the shape of a still smaller rate. Lands actually irrigated would, of course, pay a fair and full rate. Nothing could be easier than to provide for such a system on the resettlement of a district, but it would not be desirable to levy a cess for any such purpose. Numerous cesses are very distasteful to natives, and natives are not singular in their dislike to imposts which are added from time to time, and which are all imposed on the same thing, viz., the land. If the land could bear the existing assessment *plus* the several cesses which have been added thereto, it should have been assessed at the higher figure once for all, and then the objects to be provided for by the cesses should have been met from the revenue. To settle the land-revenue and then to upset the settlement at short intervals by fresh impositions is, however good the objects arrived at, regarded by the natives as a breach of faith..

A district like Bellary would be greatly and prominently benefited could water be provided for it on any large scale for it has unhappily frequently suffered from drought. All that would be desirable

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Q. 24.

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Lieut.-Colonel Mullins-continued.

cannot be done, for the district has no really good river within its boundaries, but it has a good river, the Tungabhadra, for its northern boundary, and so far only an insignificant strip of country along the river margin has derived any benefit from this fact.

Mr. He See

A practicable scheme* has been worked out for a canal by the [•]Upper Bellary project. Madras Irrigation and Canal Company, and has been abandoned by them to Government, because they were unable to raise the necessary capital. It is not financially a very promising project, but the loss on interest would probably not be very considerable, and a small rate on the protected area of about 800 square miles would make it financially feasible. Were any considerable part of the northern portion of the district well watered, such a scheme might not be entitled to favorable consideration, but there is no part so circumstanced, and there is no other means of ameliorating the condition of even this fraction of the district. What can be done elsewhere is not exhaustively known, but the circumstances are not favorable, and it is improbable that any very material alteration of the conditions of agriculture ean be secured, for rain-fall is liable to be very deficient over the entire basins of all the interior rivers.

The losses of the last twelve years, could they have been prevented even in the area of 800 square miles above alluded to, would have more than sufficed to cover a protective rate, and undoubtedly the people would have been in a much happier position than is the case at present.

Customary Claims and prescriptive Rights to Water.—The circumstance that the bulk of the water used for irrigation in Southern India is devoted to the cultivation of paddy probably makes the circumstances different to those contemplated by this question. Lands assessed as wet have a well-founded and first claim to water as long as it is available, and Government could not equitably divert water from such lands to irrigate other lands not so classed or not heretofore connected with that source of supply. It would be different with lands assessed as dry for such have no claim to be supplied with water. Practically, none of the Government large works are so situated as to command alternative fields of irrigation. The assertion of a right to utilise water in tracts of country differing year by year would be inconsistent with any such arrangement as that which is the subject of Question 24.

Maintenance of Tanks.—Tanks are of two classes. Those the maintenance of which is of great importance to the well-being of the population, because the villagers are dependent upon them for a continued supply of water in their wells or for similar reasons, and is also of importance to the State on account of the revenue dependent on them.

Those of which the continued up-keep is important neither to the people nor the Government.

So far as the available evidence goes, it is tolerably clear that all the tanks of the former class must be under some sort of Government supervision. If such control be withdrawn, they will not be maintained: this is the universal teaching derived from tanks left to the villagers themselves to manage and maintain.

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(1) Tanks supplied by rivers and streams;

(2) Rain-fed tanks in groups;

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(3) Do. isolated.

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Lieut -Colonel Mullins-continued.

Under each description or class there are tanks of many sizes. Whatever arrangements be made it will be necessary in dealing with tanks other than those which are so small and so circumstanced that their condition would not affect materially the security of other and more important irrigation works, to determine what are the essential requirements of those which it may be considered desirable to transfer from the charge of the Irrigation Department. Tanks irrigating less than fifty acres, and which are supplied from a catchment basin of not more than one to one and a-half square miles, might generally without much risk be left to be managed by the villagers without any professional assistance, and without, therefore, the leading features of their arrangements, such as height of bund, length of surplus works, description of sluices, &c., being fixed definitely.

> For larger tanks it would generally be needful to prescribe such particulars and to provide for their being promptly attended to under such specific arrangements as might be thought equitable and suitable. Thereafter all tanks so transferred to the charge of the villagers interested would be put in order and maintained by them.

> Formerly, it was the custom for villagers to execute from time to time, under the name of Kudimaramut, all petty repairs required to village tanks as well as to other village irrigation works. As regards tanks the custom has fallen into disuse, and proposals for its revival and re-establishment on a complete and satisfactory basis have been several times made, but so far progress has not advanced beyond the stage of discussion. The custom requires to be enforced in connection with all irrigation works except the great systems of irrigation which are specially maintained in complete order under departmental arrangements, and interference of any kind with which, on the part of the villagers, within the limits up to which water regulation is in the hands of the Canal Officers, would not be advisable.

> The first and most important step towards reforming the arrangements under which tanks and petty irrigation works are maintained is, therefore, the re-establishment of Kudimaramut. It may safely be assumed that if this cannot be effectually done, it would be useless to discuss what measures could be taken for transferring to villagers the further duty of maintaining generally the irrigation works in which they, as village communities, are primarily interested. This first step taken, however, and got into working order, there would be no difficulty in taking the further step of placing in their hands the responsibility of looking after all works which it may be considered desirable to transfer to their charge, for Kudimaramut will not be systematically carried out without inspection, and the staff employed to enforce it would be equally capable of seeing that in all respects the works were kept up in conformity with the general or particular rules laid down for their proper maintenance.

> Unless a very radical change were made in the administrative arrangements customary in this Presidency, the supervision of the management of all irrigation works transferred to the charge of the villagers must, it is considered, rest with the Revenue Department. Legislation would be necessary to give power to enforce the obligation; the work would have to be done under the orders of the village officers who are subordinate to the Revenue Officers; and whatever arrangements were made for reimbursing the villagers for the cost of the duty imposed upon them, the settlement would naturally and conveniently be made with them at the time of the annual jummabundy.

Lieut.-Colonel Mullins-continued.

Reimbursement or relief should in some form be made or given to the villagers for all work beyond Kudimaramut which they may be required to perform. The State is responsible for the water-supply of lands on which a wet assessment is levied, and consequently for the up-keep of the works by means of which such water-supply is* made available. For works in good order a remission of 8 per cent., which is the average assignment for the repair of irrigation works under the present system, might be allowed on its being ascertained that the tanks, &c., were maintained in complete order. For works needing repairs beyond those which might fairly be classed as Kudimaramut grants of from one to five years' revenue might be assigned according to the present state of the works to give the villagers a fair . start in taking up their new obligations.

The success or failure of the arrangements thus sketched out would depend upon the degree of judgment and extent of supervision exercised by the superior Revenue Officers. The inspecting agency must necessarily be of a very subordinate description, for otherwise there would be no gain in any direction to compensate for a loss of knowledge. The inspecting agency would possess considerable power, and unless fully supervised and controlled the remissions of revenue given would not reach those for whom they were intended without material curtailment, while the penalties which the Act empowering the arrangements would necessarily contain would enable Inspectors to enforce their demands by threatening summonses. Under the Public Works system a given and definite quantity of work done has to be shown to allow of money being disbursed, and the work is capable of complete check. Under the suggested system there would be nothing but the state of the irrigation work to refer to, and it would be essential to provide for the examination by responsible officers yearly of a fair proportion of all the works in each Inspector's range.

It would not be desirable to transfer to the charge of villagersen interestant allementer enterestingunge erreterter

- (1) any large tanks the safety and good order of which may be essential to the security of the irrigation works supplying villages lower down;
- (2) tanks or other works on which the irrigation of many villages depends.

There is at present no local or other fund from which work not included in Kudimaramut could be carried out. An irrigation cess has been suggested by some Revenue Officers, but such a cess would not be equitable in the case of villages which have been resettled for a definite term, and cesses are necessarily unpopular. The only case in which a cess is reasonable and equitable is when Government undertake to do work which it has heretofore been admittedly the duty of the villagers to do, but which for any sufficient cause, such as the general interests, it is desirable that they should cease to do. In districts which are about to be resettled it is easy and altogether better to include in the assessment the full demand, and this can, of course, be divided into any number of component parts, with one or more of which Government could deal as might be considered expedient. The people want to know what they have to pay for the occupation • of certain land, and they prefer holding at a charge of 5 Rupees on acre to being told that they are to pay $4\frac{1}{2}$ Rupees, and then having an additional half rupee demanded.

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Obligations of Zemindars and others to maintain Irrigation Works .-As far as can be ascertained, Zemindars are under no direct obligation to Government to maintain works of irrigation. As a rule, the

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Lieut.-Colonel Mullins-continued.

villagers are expected to maintain them, and it is only occasionally that special assistance is afforded them, *e.g.*, when a flood has occasioned damage evidently beyond the means of the villagers to repair. It does not seem to be usual for Zemindars to assign any fixed proportion of the revenue to the up-keep of irrigation works. There are no data for comparing the present state of the works with their condition at any former period. That condition is not what it should be, but the same may be said of a large proportion of the irrigation works of Government villages.

Q. 28.

Q. 29.

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Madras Act No. VII of 1865.-No information.

Distribution of Water when demand exceeds Supply.—Ordinarily the area to be irrigated is at least roughly limited to the supply of water supposed to be available, and this area is, in the case of old tank and channel irrigation, termed the ayacut. When the supply is less than the ayacut requires, the distribution is either regulated by local custom or, where none such exists, the more influential landholders appropriate the water, and the less influential leave their lands waste.

No distinction is made between lands under Ryotwari and Zemindari settlement in supplying water from canals. Canal Officers are guided solely by areas in apportioning the supply.

Q. 30.

Difficulty due to intervention of a Company.-Only one Company, the Madras Irrigation and Canal Company, has been in existence in Southern India. Its intervention has been attended with numerous difficulties which are due to many causes, among which conflicting interests, an assumed necessity for protecting the ryot or user of the water at the expense of liberty of action on the part of the Company, complex rules which are almost unavoidable when two independent authorities have a voice in all the arrangements are among the most prominent. It is questionable whether these difficulties could be overcome otherwise than by selling water by volume, and to introduce such an arrangement is not easy, first, because the ryots have no knowledge of quantities; secondly, the volume needed for different soils and for different crops is very variable, and its value under such circumstances would differ widely. There is no advantage in employing the agency of a Company, and there are many and important disadvantages. If a Company desired nothing but to make its canals beneficial to the population, it would not be a good instrument for the carrying out of irrigation projects, because its obligation cannot be made sufficiently definite to remove all occasion for difference of opinion as to whether they had been fully performed.

Q. 31.

Calculation of Returns from Irrigation Works.—The data for a proper answer to this question are not available. The results of irrigation have been completely worked out only for one system, the Kistna Delta, and final orders in the Revenue Department have not been passed on these. It is improbable that full credit will or can be given in the accounts of the more successful works, for many items of acknowledged beneficial results are not capable of definite estimation, added to which the detailed examination of the Kistna Delta irrigation has shown how many causes there are for differences of opinion as to what items are or are not such as should be credited to irrigation. The general conclusions will probably be approximately correct, and the decision come to will be the basis for the accounts of all the other large irrigation works.

Q. 14.

Major Montgomerie.

Qs. 12 and 13. The statistical information available in this office has already been furnished by Colonel Mullins, R.E., in his answers to these questions.

> The assessment and collection of revenue from all irrigation works throughout the Madras Presidency is carried out by the Revenue Department without any reference to the Public Works Department except in the Kistna and Godavari Districts where it is understood that the necessity for remissions is sometimes referred to the canal officers for their report.

> Water is certainly used in a most lavish manner especially in the older irrigation works. To sell water according to the quantity taken would no doubt prevent this waste, but to do so would be very expensive and distasteful to the people as interfering with what they have long considered their rights and quite impracticable without an entire change in the canal administration at present existing.

> Supply by volume is no doubt suitable when a limited quantity of water is required for the irrigation of what are commonly known in Madras as dry crops; but it must be remembered that rice or paddy is the principal crop irrigated in Madras, and that as long as water is available no other crop is likely to be grown on the paddy fields. The quantity of water required to mature a crop of rice is very considerable, and is estimated at from two cubic yards per hour per acre, where large areas are irrigated to as much as eight or ten cubic yards per hour per acre; where only small areas are supplied large orifices are consequently required to pass sufficient water for rice cultivation and the prevention of waste becomes all the more difficult.

> Judging from the selling value of irrigated lands in districts, such as Tanjore and Tinnevelly, the margin of profit left to the cultivator must be very considerable; the best way of discovering how much the water-rates could be increased without trenching unduly on that profit would be to encourage public competition in taking up the lands on the expiration of leases; existing settlements cannot be interfered with.

> There is very great want of system in the canal administration of the Madras Presidency, especially on the older irrigation works of Tanjore, Trichinopoly, &c. By present arrangements the maintenance and repair as well as the extensions and improvements of all irrigation works are entrusted to the professional department who cannot be held responsible for the revenue under these works as they have no practical control over the distribution of the water, and are unable to find out without a tedious reference to the Revenue Authorities the particulars of the lands to be irrigated by the works. While, on the other hand, the assessment and collection of the revenue including the granting of remissions are carried out entirely by the Revenue Department, although they cannot possibly be in a position to know what the actual quantity of water supplied is, whether it is sufficient or otherwise, whether the excess or deficiency is avoidable or not.

Nominally the regulation of the water in the rivers and main canals is attended to by the professional department, and its distribution by the Revenue Authorities. But the efficient regulation of the water without full and timely information as to the requirements and capabilities of the land to be irrigated is not practicable; and the distribution of the water is necessarily left in the hands of the curnams or headmen of villages who being interested parties and under no professional control have virtually become masters of the situation.

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Q. 22.

Major Montgomerie-continued.

In the Madras Presidency, where one-half of the total land-revenue or about 200 lakhs of rupees is dependent on irrigation, canal or rather irrigation administration, has necessarily been the subject of much deliberation, but the organisation of a Department of Public Works that would not encroach on the prerogative of the Revenue system has been the rock on which successive administrations have invariably split; the fact that each department should perform its own proper functions has never yet been recognised. It is not convenient even were it practicable in the Madras Presidency at least to combine the functions of both in one department.

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The Collector, who is also the Chief Magistrate of the district, must be held responsible for the collection of the revenue, and the Irrigation Engineer for the production and development of that revenue ; but the Engineer cannot be held responsible for any thing, unless he is entrusted with powers to carry out the conditions of the law and with full control over the details of the system.

To entrust the local executive with more power and control in irrigation matters will not be sufficient, unless the administration is also strengthened by the introduction of a professional element either in the Revenue Board or the Council Chamber or both.

There is great want of legislation with reference to the conservancy of rivers and canals, the enforcement of customary Rev. Bd.'s Pro., 7469, 16th Oct. 1866. labor and the management of irrigation works

B.D., G.O., 1451, 22nd
May 1869.
P.W.D., G.O., 90, 8th
Jan. 1870. generally. The unsatisfactory state of the existing law is somewhat explained in the Proceedings Jan. 1870. R.D., G.O., 1750, 11th Nov. 1870. R.D., G.O., 376, 2nd March 1871. as per margin.

But legislation without at the same time empowering the responsible executive to enforce the law promptly and effectually would be useless.

The extension of the use of water for irrigation is not considered to have been slow on Government lands in the Madras Presidency proper, where the natives are fully alive to the benefits to be derived from irrigation.

Schemes of irrigation, the financial prospects of which would not ordinarily justify their execution, would be constructed not only for the profit of the individual cultivator, and to some extent the district protected, but for the benefit of the State generally; and each should bear their proportionate share of the extra cost.

There is no local or other fund from which to pay for work required to be done to tanks, &c., which is more than that ordinarily furnished by kudimaramut, nor does it seem advisable to form such a fund. Once the irrigation works are placed in proper order they can be maintained in that order in the easiest manner by enforcing kudimaramut or customary labor.

All petty tanks, the maintenance and repair of which is not profitable, should be given up, but they must not be maintained as reservoirs except under some sort of Government supervision.

All tanks or systems of tanks which are worth maintaining must be under Government supervision, and the enforcement of their repair by kudimaramut or by whatever system is decided upon can only be done by the Revenue Department or by giving the Executive Engineer magisterial powers which would virtually make him and his subordinates assistants to the Collector. The Engineer would thus secure the full assistance and influence of the Revenue Department in the execution of the work, and he would have much more leisure for the performance of his own-professional functions.

Q. 23.

P.W.D., G.O., 941, 30th March 1871.

R.D., G.O., 1375, 28th August 1878.

Q. 24.

Q. 26.

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Major Montgomerie-continued.

By this arrangement one Executive Engineer would probably be sufficient for each collectorate except in the Godavari, Kistna, Tanjore, and other districts, where the important irrigation works are situated, and which must always necessarily be as much as possible under the direct centrol of the professional department. The establishment thus set free would form the nucleus of the staff of the Chief Engineer for Irrigation referred to in answer to Question 2.

To further strengthen the hands of the Engineer and to place him in closer relations with the Collector no remissions on account of excess or deficiency of water, &c., should be granted without having been referred first to the Public Works Department for report.

The Zemindars can hardly be said to be bound by any obligations to maintain tanks and other irrigation works in a really efficient state.

P.W.D., G.Os., No. 2724, dated 21st September 1875, and No. 1723, dated 6th July 1876.

In the first place, their negligence cannot be checked until after the event, and in the next place after a disaster has occurred it is not difficult to make out that the cause was beyond human control, or at all events what could reasonably be required of the proprietor.

Q. 30.

Q. 27.

Unless a Company is in the position of a Zemindari proprietor with reference to the lands commanded by its irrigation works, it is not likely that it can succeed in overcoming the difficulties in the spread of irrigation which are unavoidable except when an interested proprietor carries out the improvements.

The method of reckoning the return obtained from the outlay on irrigation works in the Madras Presidency has not yet been decided upon.

Mr. Longley.

There are no canals in this district; but there are three channels leading off from the Cauvery, under which a large

1. Raja Channel. Moganur Channel. 2

3. Komarapoliem Chan. nel.

extent of wet cultivation is carried on. As these channels were constructed prior to our acquisition of the country, their cost is not known. The

revenue [Fasli 1287 (1876)] under the channels was Rupees 63,219.

The cost of maintenance (on an average of the last five years) is as follows :-

	Raja Channel.	Moganur Channel.	Komarapoliem Channel.	Total.
Establishment	RS. 2,900	кя. 1,063	RS. 557	RS. 4,520
Repairing Channels &c	1,736	536	837	2,609
Dige North	4,636	1,599	894	7,129

These charges are met from fees paid by land-holders, as 'the aggregate value of the customary labor and grain-tax, which, from time immemorial, were contributed by them for the purpose. These grain fees were commuted in 1872 to a money-payment, which constitutes a fund called "Channel Fees Fund." The present acreage irrigated is under-

Raja Channel	13	CARE AND		ACRES. 3,825
Moganur Channel	••			1,535
Komarapoliem Channel	• •	•••	 	993

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Mr. Longley-continued.

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The following are the rates per acre-

Cost per Acre.	Estim	ate.	• R	epair	s.	Rate per A	cre.
	RS. A.	. P. *	RS	. А.	Р.	RS. A. 1	P.
Raja Channel .	. 0 12	1	0	7	2	11 1	6
Moganur	. 0 11	1	0	5	7	7 12	6
Komarapoliem Channel	0 9	0	0	5	5	8 15	4

There is only one principal crop raised under the channels, which is paddy, the average yield of which is 1,152 measures of 136 Rupees weight. The value of this at normal prices is Rupees 48 per acre. These irrigated lands yield on an average five wet crops in two years.

> Paddy is not cultivated without irrigation, so that no comparison in the manner indicated in the question can be made.

> The lands under the Cauvery Channels pay a consolidated wet assessment, and no special water-rate is levied, except in the case of dry lands temporarily cultivated, in which case water-rate is levied according to the following scale :---

> > First-Class

	per l'entre la construcción de	and Cha	Sprin	ng is,	
		RS.	А.	P.	
(a)	Water-rate for a single wet crop, raised				
1.11	on dry lands per acre	4	0	0	
(b)	Second crop on the same land per acre	2	0	0	
(c)	For sugar-cane, betel, cocoanuts, plan- tains, &c., requiring water longer than				
	ordinary dry crops per acre	6	0	0	
(d)	For dry crops watered, whether first or				
	second crop per acre	2	0	0	

Fees for the maintenance of the channels are paid at the following rates :---

	Direct ir Baling	rigation pe do.	r acre	•••	•••	::	::	2 1
have and the same sin T	The ordinary	rent paid	under	the	channels	is—		

and the second second second second		Per Acr	е.
Channels.		Rent in kind, Madras Measures.	Rent in Money.
			RS.
Raja Channel	 	1,152	48
Moganur Channel	 	768	32
Komarapoliem Channel	 	960	40

The average rates paid by the proprietor per acre in the shape of land-revenue or owners' rate are-

				RS. A.	P.	
Raja Channel pe	er acre	· · · ·		 11 1	6	
Moganur	do.		S	 7 12	6	
Komarapoliem	do.			 8 15	4	

There is no reason why persons deriving increased benefit by irrigation from canals, &c., maintained at public cost, should not pay for the additional advantages; but Inamdars holding lands under Cauvery channels do not pay any tax for irrigation, as they are entitled by their Inam to the same (irrigation) free. Zemindari ryots pay consolidated wet assessment on their lands to Zemindars (and Government ryots to Government), as the assets on which the peishcush (payable by Zemindars) was fixed included the same.

640

Mr. Longley-continued.

Inamdars and Ryotwari holders owning dry lands are allowed to apply for, or relinquish water from Government sources of irrigation. In such cases water-rate is collected from them direct. In cases of default arrears are collected under Act II of 1864, and this appears to be the proper course. In the case of permanently settled estates water-rate is now collected under Act II of 1864 (not from Zemindars), but from the ryots using water (*vide* paragraph 5 of Board's Proceedings, dated 16th April 1877, No. 17,047); but, in future, I would levy it from the Zemindars themselves for the reasons given in Question 14.

Q. 14.

I take the canal dues here referred to as the water-cess imposed in Salem on dry lands on account of Government water used in raising a wet crop. This cess is by Madras Act VII of 1865 recoverable under Act II of 1864. There is a separate money cess levied from the owners of lands under the Cauvery channels in lieu of contributions of labor and grain-wages, which were formerly exacted from them for the maintenance of these channels. I wanted to legalise the levy of the cess by a special enactment, of which I submitted a draft to the Board of Revenue for approval with my letter, No. 92, dated 16th April 1872; but though the Board then promised (Proceedings, No. 1088, dated 24th June 1872) to consider the matter in connection with the general subject of revising and enforcing customary labor' nothing has yet been done in the matter. The cess (called channel fees), however, is now included in the putta, and levied as an item of revenue.

(b) No difficulty has actually arisen, but it is possible that such a difficulty might present itself in the case of Zemindari ryots. If these ryots are held directly responsible for the water-cess (Act VII of 1865) as is now done, their lands cannot be sold for arrears (vide Extract from Board's Proceedings, No. 1704, dated 16th April 1877, copy annexed), and if the defaulter clandestinely removes his movable property to evade attachment, the result will be loss to Government. I would, therefore, propose that the law be so altered as to allow water only at the request of the Zemindar, and to hold him responsible for the cess; he (Zemindar) being vested with power to recoup himself from the ryots, as he will then be able to sell their lands under Act VIII of 1865.

The charge on the irrigated area of dry lands is regulated with reference to the crop raised (vide Question 13); but in the case of wet lands there is no separate charge for irrigation. I do not believe that the water is lavishly distributed, because the distribution is regulated by special Nirkattis or water distributors; when water in the Cauvery is low, and consequently the supply in the channels begins to diminish, the distribution is very economically made.

Extract from Proceedings of the Board of Revenue, dated 16th April 1877, No. 1704.

5. In reference to paragraph 5 of the Government Pleader's letter, regarding the question as to who is primarily liable, to Government for the water-rate, the Muttahdar or the ryot, the Board are of opinion that the matter is not important, for so long as the right of

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Mr. Longley-continued.

Government to levy water-rate is established, it is immaterial who pays it. In the Godavari and Kistna Districts the rule and practice is well settled. If the land-lord applies for water, the arrangement is made, and the water-rate recovered from him. Zemindari ryots, however, are allowed to apply for and relinquish water, and in such cases the water-rate is recovered from them direct, but, of course, not by sale of the land which belongs to the Zemindar. In the absence of any application by or understanding with the Muttahdar, the Revenue Authorities must look for payment to the ryots, who actually use the water, and are *prima facie* liable; but if the Government Pleader is right in assuming that plaintiff admitting his liability to Government for water-rate only claims the right to make his own terms with his tenants, the Board see no objection to such arrangement as far as Government are concerned.

The water of the Cauvery has not been found to increase sickness or to produce surface salt. The villages surrounded by irrigated lands are particularly healthy.

The surplus of the channel water, after irrigating the lands, runs back again into the Cauvery. There is no drainage to speak of, except such as is afforded by the fall of the land. Nor do I consider any additional drainage to be required.

In Salem, the poorer grains are grown on dry uplands, and not on irrigated areas, so that it is not probable that the irrigated areas would affect the cultivation of these dry grains, which are the staple food of the population. There is nothing to show if the extent, now irrigated by the Cauvery, was ever cultivated with the staple dry crop.

The cultivation under the channels during the last ten years was as follows :---

Fasli.						Extent.	Revenue.
1277			064			.5,463	55,750
1278	in de las	161.0023				5,448	55,609
1279	Contraction of	00.111			100	5,454	55,720
1280				1.		5,474	55,761
1281						6,210	57,520
1282						6,343	58,259
1283		194.				6,204	58,073
1284						6,221	58,338
1285	de la com	Sec.				6,232	58,367
1286			Sec.	Service States	0.10	6,232	58,367

Owing to the sufficiency of supply, there were no appreciable fluctuations in the areas cultivated in the different years.

I have no reason to suppose that prolonged irrigation (provided the land is well manured for each crop) damages the land. It is probable that if the cultivator would give his land rest, and not raise five crops in two successive years, the land would produce heavier crops, but it will take a long time before the native cultivator will allow his land to rest. "As much as possible, and as quickly as possible" is the ryot's motto. His forefathers never fallowed the land, and why should he? Natives believe that the alluvial deposit brought down by the Cauvery when in flood regenerates the lands and prevents deterioration.

The Cauvery channels were formerly under the superintendence of the Department of Public Works, but were taken in hand by the Revenue Department in 1872. As already explained, the holders of wet lands under the channels pay, besides the wet assessment, a cess called "Channel fees" for the maintenance of the channels.

Q. 19.

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Q. 17.

Q. 21.

Mr. Longley-continued.

Out of these fees, all expenditure for clearing and repairing the channels, and for the erection of the temporary dams (corumboos) necessary for diverting the stream from the Cauvery River into the channels is met, and an establishment maintained for distributing the water according to the several shares to which, from time immemorial, the inhabitants of the several riparian villages have been entitled. This establishment inspects the channels, and a daily register is kept of the height of the water at certain points in the channels.

The Revenue Department is responsible for the distribution of water and for collection of the dues. The distribution is made by Nirkattis (water distributors) paid out of the channel funds. These men are under Inspectors, who are again suberdinate to the Tahsildars and Deputy Tahsildars, who collect the revenue (both the wet assessment and channel fees).

The Cauvery channels have no works requiring engineering skill, the Civil officers being equal to the ordinary requirements of the channels, such as the construction of artificial dams for the diversion of river-stream into channels and for distributing water to cultivators, cleaning the channels, and keeping them clear. When any work requiring skill is required, the assistance of the Professional Department is asked for.

The system prevailing in the district has already been delineated, and as explained in my answer to Question 13, a special law to legalise the levy of channel fees under the Revenue Recovery Act is required. At present no such law exists.

The water of the Cauvery channels has been utilised to the *fullest* extent possible, and no obstacles have occurred for their full development. The channels are in very good order, and the distribution of water is quite satisfactory. The supply in the channels is, even in dry seasons, sufficient, as the Cauvery is a perennial stream.

Yes. The following are the customary claims or prescriptive rights which have grown up in the Salem District :---

(1st)—The ryots owning lands in a particular village or a particular portion of a village are entitled to water through a particular sluice in a channel or tank. Thus, if a tank has two sluices, one of which is on a high, and the other on a low level, each having a fixed extent to irrigate, the lands irrigated from the former (high level) are not entitled to water from the latter (low level).

(2nd)—Lands which are entitled to surplus water only are not entitled to direct irrigation through sluices and from tanks or channels. Lands are cultivated by surplus water only, *i.e.*, water discharged over the waste weir of a tank, and if water ceases to run over the waste weir, the crops on the lands, if raised, must suffer, though there is water enough in the tank, *e.g.*, the drainage water of fields irrigated from Raja channels of the Cauvery falls into a channel called Komarapoliem channel, which does not take its rise direct from the Cauvery, but which has a fixed area of its own to irrigate. The lands under the latter have no claim on water from the other two channels, even should the supply in the same (latter) become scanty.

(3rd)—Some of the river-channels feeding large tanks or reservoirs have certain areas allotted to them for *direct* irrigation. Such lands, continue to be irrigated without interruption to the supply to the tank, so that the owners of these lands cannot obstruct the flow in the channel, even should the water run so short as to be insufficient for themselves. On the other hand, the owners of lands under the

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643

Mr. Longley-continued.

tank cannot object to the use of water by owners of lands under the channel under such circumstances.

(4th)—Where a tank or channel has lands in more than one village to irrigate, the supply to each is regulated according to the quantity required for each village, and water for the irrigating sluice of this is allowed to flow for so many hours. Again, the water allotted for each village is in turn distributed among individual holdings according to their requirements, which are also decided by the number of hours water is allowed to run through a regulating sluice to their holdings.

(5th)—Certain natural drainages are destined to feed certain particular tanks; *e.g.*, in the village of Velamputty, in the Mahendramangalam Mitta, there is a drainage water-course which empties its water into the Government tank of Dandukaranahalli. The Zemindar cultivated one of his lands with the water of this drainage channel by diverting the same within his own limits, but a water-rate was levied on the land on the ground that he had no right to the water.

(6th)—In the case of Mahendramangalam Zemindari, referred to in the answer to Question 28, the Zemindar was entitled to water for eight fields only, the assessment for which was included in the assets of his peishcush. Government claimed water-rate on all cultivation in excess of the said eight fields. These claims are chiefly founded on prescription as recognised by custom. They originate with necessity, convenience, capability of works, user, wainer, and the like, which time constitutes into custom and prescription.

No inconvenience has arisen from such claims or rights.

In case of disputes the Law Courts will inquire as to whether such claims were previously recognised and respected; Village Punchayats under Regulation XII of 1816 may also act.

I cannot conceive cases arising in which the action of the ordinary Courts would be impossible or inapplicable.

The proprietors or cultivators cannot be held responsible for the repair of tanks, however small and numerous they may be; and this principle applies to all tanks whether great or small. The present rules regarding ruined tanks (Board's Standing Order) are all that can be desired, and I would apply these rules to the case of small tanks alone. In any case in which a ruined tank is made over under the above rules, the obligation to repair can be enforced by reserving to Government the right to enhance the rates of assessment on lands to be irrigated. There is no local or other fund which can be charged with the execution of such works.

No obligations at present exist on Zemindars or other superior landholders to maintain tanks or other irrigation works; but a special enactment is necessary, making it obligatory on Zemindars to keep all irrigation works in thorough order—first, to secure sufficient supply of water for irrigation; and, second, to prevent danger in case of floods to railway and other public properties.

The rules are contained in Board's Standing Order, No. 137-A, (No. XX of 1874).

I. All dry lands temporarily cultivated with wet crops shall, in lieu of any system now in force, pay a fixed water-rate on the following scale of standard rates. Where water is raised by mechanical

Q. 26.

Q. 27.

Q. 28.

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Mr. Longley-continued

644

contrivances, the rates shall be reduced one-fourth, and in deltaic tracts, when water is drawn from drainage channels, one-half.

	Standard Rates.	First-cla River au Cha	ss Ta nd Sp innel	anks, oring s.	Second River	and Char	s Tanks, Spring mels.	•
	the contract of the strength of the	RS.	A.	Р.	RS.	А.	Р.	
(a)	Water-rate for a single wet crop raised on dry lands,	an Brita						
	per acre	4	0	0	3	0	0	
(b)	Second crop on the same land, per acre	2	0	0	1	8	0	
(c)	For sugar-cane, betel, coco- anuts, plantains, &c., requiring water longer than an ordinary wet							•
	crop, per acre	6	0	0	4	8	Ô	
'(d)	For dry crop watered, whether first or second							
	crop, per acre	2	0	0	1	8	0	

1. This rule does not apply to North Arcot or South Arcot, which have special rates uniform throughout the district, nor to the delta tracts of the Godavari and Kistna Districts.

2. Rate (b) does not apply to Cuddapah.

3. In Kurnool, rate (d) to be reduced one-half.

II. When a portion (or portions) of a field is irrigated, and the field is not more than half an acre in extent, the charge shall be calculated on the actual extent of the field.

When the field is larger than half an acre, the extent irrigated must be carefully measured, and the charge shall be made by the half acre, subject to the limitation that more than the recorded extent of the field shall not be charged for.

For instance, if 1.5 acres are irrigated, the charge shall be the rate for three half-acres; if the extent irrigated is 1.55 acres, the charge shall be the rate for four half-acres, provided that, if the whole field be less than four half-acres, as for instance, 1.75 acres, the charge shall be the rate for the recorded extent of the field.

III. The Collector has power to impose prohibitory rates whenever water is taken without permission.

IV. The above rules are applicable to all Government sources of irrigation, the supply in which is at all regular and to be depended on. Simple jungle-streams, which only receive a casual supply, may be utilised as hitherto without charge.

V. No Government water is to be taken under these rules without the express sanction of the head of the village, or of the Department of Public Works Officer when the works are in charge of that department.

Water-rate is levied under the above rules on all dry lands irrigated from rivers, streams, channels, tanks, and other irrigation works belonging to Government, except in cases mentioned in Board's Standing Order, No. 126.

I. The Government revenue from land, consisting properly in payment for the use of the land, and payment for water supplied by Government, no extra demand under the denomination of "Tirvajasty," "Fasaljasty," or any such term, shall hereafter be made, in any case, in excess of the regular assessment on the land, on account of advantages derived from irrigation supplied by natural pools, or jungle-streams, in the improvement of which the

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Mr. Longley-continued.

Government have had no concern, and incurred no expense; always provided that the use of such water shall not interfere with the supply to any Government work, and that the right of Government to execute, at any future time, any works whatever, for the improvement of such sources of supply, and the extension of their benefits, shall remain unaffected by such intermediate usufructuary enjoyment. Provided, also, that before any private individual shall proceed to construct any new works of permanent character for utilising the water of such jungle-streams or natural pools, such as an anicut, or new spring channel in the bed of a stream, he shall fully conform to the following rules :—

II. Any ryot wishing to construct any such new permanent work shall, in the first instance, apply to the Collector for permission, stating distinctly the nature and dimensions of the proposed work, and the precise locality selected for it.

III. On receipt of such application, the Collector will immediately direct the Tahsildar of the taluk or other competent officer to inspect the locality, and ascertain by careful inquiry whether the proposed work will cut off, or sensibly diminish, the supply of any other public or private irrigation work, or interfere with the cultivation, irrigation, or drainage of any lands in its vicinity, so as to give just cause for complaint.

IV. If this inquiry shows that no injury will be caused to existing interests, the Collector will grant permission to the applicant to proceed with the work, subject to the approval of its plan by the Department of Public Works, whether before, during, or after its execution, according to circumstances.

V. Should the officer of the Department of Public Works be of opinion that, for the security of others, the work needs to be strengthened, or in any way altered or extended, as for instance, by the execution of additional facilities for drainage, or extra sluices, the work so pronounced necessary shall be executed by the owner, within a suitable time to be fixed by the Collector, under the penalty for neglect of the exemption from additional assessment being withdrawn, and the whole work taken under the control of Government without compensation.

VI. Should the lands of other ryots be, in any way, affected by the proposed work, the projector must, in the first instance, produce their written consent to it, before it will be allowed to proceed, and no claim to recover payment from them for benefit derived from the work shall be entertained, without the production of their written agreement for the execution of the work and for the payment claimed.

Statement will follow. The Revenue in Fasli 1286 was as follows :---

On lands held by Government ryots On Inam and Zemindari lands	::	::	3,170 793	
	Total	••	3,963	

Zemindaris and Inam Villages.—There is an anicut across the Sanathkomara Nadi near the village of Marandahalli in the Dharmapuri Taluk, which supplies a Government tank (Sanganbasavan Talab). The channel which is taken from the anicut to the tank is nearly two miles in length, and runs through the lands of Marandahalli Zemindari. The anicut and channel were in existence at the

646

Mr. Longley-continued,

time of Pymaish (1801), when eight fields were under irrigation from the channel in the village of Marandahalli. In 1814 all the Government villages in that taluk were parcelled out into small Zemindaris, under Regulation XXV of 1802, on which a permanent assessment or peishcush was to be paid, the Zemindars collecting the assessment themselves from the ryots. This permanent assessment was arrived at by taking the average revenue of the past three years for assets, and deducting a certain *per-centage* (the rate was not uniform) from the same for the benefit of the Zemindars. In the case of the Marandahalli Zemindari, the wet assessment of the eight fields above mentioned was included in the assets on which the peishcush was fixed, and for this reason these lands are exempt from water-cess.

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There are similar cases in other parts of the district.

Inams.—All small Inams, which, being situate under Government works of irrigation, were classed as wet in the pymaish, are exempt from water-rate, the presumption being that the granters of the Inams intended that the lands should be supplied with water from the sources of supply under which they are situate.

There are no receipts under the head "Cess for repair of tanks" in this district.

Mr. Price. Qs. 12, 13, 14, 15, and 17.

Q. 19.

There are no canals in this district, and I never had any thing to do with this form of irrigation excepting in the case of the Madras Irrigation Company's Canal in Cuddapah, and with that my acquaintance was very limited, as I had the famine to attend to. I am, therefore, unable to express any opinion, or give any information, in regard to the points raised in these questions.

I may, with respect to the first part of this question, state that before the Irrigation Company's Canal was opened, Chennoor and Vallur, now two large and exceedingly prosperous villages in the Cuddapah Taluk, were almost entirely cultivated with dry crops. They are now nearly all under wet cultivation from the canal, and ragi, cholum, &c., have been supplanted by rice, that of Vallur being exceedingly fine and well-known for its quality all through the district. Rice, where there is an *assured* source of irrigation not involving the cost of lifting, being a more paying source of income than dry grain, threw the latter out. The Tahsildar of the Cuddapah Taluk, a very intelligent officer, whose acquaintance with his charge was one of many years, told me that he knew Chennoor when hardly any rice was grown there.

Qs. 21, 22, & 23. These relate to matters of which I have (vide reply to Question 12 et seq.) no experience.

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Q. 24.

I think that where a work is likely to be of benefit to a limited section of the population, but one of actual loss to the State, such section might fairly be called upon to pay increased rates until the cost of the work was recouped; but, as regards this, it is to be remarked that Government have in very many districts made a settlement with the ryots which is to last unchanged for thirty years, and that unless the latter agreed,—which I am certain that they would not,—to an increased and special rate for improvements not remunerative to the State, imposing it would be a decided breach of faith. I do not think that, it would be just to charge the whole of a district with the cost of an improvement of a local character. No one at home would dream of raising the rent of a whole estate because the landlord improved the farm of a single tenant upon it; and I do not

Mr. Price-continued.

Q. 25.

Part II.

National States

see why this should be done in India. In the case of river embankments, &c., I think it fair enough that such lands or parts of districts as are protected by them should be taxed at a special rate, not permanently, but until the State has recouped itself to such an extent that it is not absolutely out of pocket.

I know of no cases such as those referred to. I have been told that such exist, e.g., that there are spring channels which supply, say, the village of A. The spring head may be in the village of B, and the channels run through the villages of C and D, but none of these have any right to the water, which all goes to A. I do not see what would be the use of interfering with cases of this kind. B, C, and D, of course, would like to have the water, but if they were allowed to take it, there would not be enough for A, and the people and Government would, on the whole, be no gainers. All that would be effected would be the transfer, on the payment of a heavy compensation, which, I presume, would be levied upon the parties profiting, of a portion of the gains of the villagers of A to those of the others. Another practical outcome would be an abundant crop of disputes which would enhance the work of the revenue and judicial officers. I am certainly opposed to interference. I cannot form any opinion as to what principles should govern cases of water-disputes in which the action of the ordinary law courts would be impossible or inapplicable.

I have become, as a revenue officer, acquainted with four districts, and I have been over every part of two of them. They are Salem, Cuddapah, North Arcot, and Chingieput, and in them petty tanks in the most ruinous condition abound. Government practically leave these irrigation works unrepaired. They have not enough, and, as far as I can see, will never have enough, to allow of their putting them into order. The most obvious way of dealing with this, which is a real difficulty, is to hand them over to the ryots at a slight reduction upon the usual assessment and to collect this from them, water or no water, leaving them to repair their tank or not as they please. Another way of dealing with the matter would be to cut the bunds of the tanks in several places so as to prevent their holding water and then to give up the land, which had been under the tank and that in its bed, on dry rates, charging these, as is customary, without regard to the season. But to these plans there are the following objections.

(a).-That practically there is not the slightest chance, except under a law which would render it compulsory, of ensuring that the ryots would, if the tanks referred to were handed over to them, keep them in order. A very large number of these small works form links in chains along which are scattered tanks worth keeping.

(b).-If all consideration of the up-keep of these small tanks is lost sight of, there will always be the danger of their breaching and carrying away the tanks lower down which have been retained by Government. It is a well-known fact that the breaching of even one small tank in a series has led to the destruction of a large number of others in the chain.

From a revenue and irrigational point of view, I would rather not make over the small works to the ryots. It is all very well to make laws and rules on the subject and to direct them to be carefully observed : they will, in practice, not be, and there is not a sufficient staff of officers to enforce obedience.

To the second of the proposals made, the objection to be put forward is an economic one. It is that the small tanks are very often

163

Q. 26.

Mr. Price-continued.

648

the means of supplying water for cattle and the villagers and for keeping up, during the dry season, the supply of that element in the surrounding wells. It is, therefore, on this ground objectionable to . cut the bunds. Otherwise, this would be a satisfactory way of getting rid of the difficulty. The plan would not, in my opinion, involve any loss; indeed, I think that profit would be the result, for the assessment of the land within the tank would quite make up, if not exceed, the difference between wet and dry rates (which former would have to be given up on those fields under it) and remissions would never be allowed. The tanks selected for retention would have a better supply, and the money which is now yearly frittered away, generally as a precautionary measure, in tinkering up the small tanks would go to the improvement of the larger works. At present no one is contented. Every one grumbles: the ryot because he gets an insufficient supply of water, and has to pay wet assessment; the Engineers because these tanks are always a source of anxiety and trouble to them; and the Revenue officers because the ryots are always crying out for repairs, and because the Public Works Department officers are always patching and producing no apparent increase of revenue.

It will be seen from what I have written above what my views are. The idea of making the ryots, by means of pains and penalties, keep petty tanks in order is utopian. Theoretically it is possible; practically it is, in my opinion, utterly impossible, unless Government employ a much larger staff of officers than they now do. I would get rid of these small works, once and for all, by cutting the bunds so as to render them harmless and letting the people take the beds up for cultivation. Very many petty works could now be disposed of in this way without risk of harm of any kind occurring in consequence. I would, in the case of all works, no matter whether great or small, insist upon the execution by the ryots of all petty repairs. It is perfectly well known amongst the people themselves in what customary labor consists. It has been an institution of very long standing, and that it has fallen into desuetude has been the fault of the authorities themselves. It could now be easily revived and worked by the Public Works Department through the Revenue Officers.

There is no local fund from which to pay for petty repairs, and I do not see how one could be established. I think that by far the the simplest way of dealing with the question of repairs to tanks would be to yearly set aside for this purpose a certain proportion of the revenue of each work. I consider that this should come out of the present returns, as the settlement recently introduced decidedly implies if it does not convey the agreement that Government will, in consideration of the rates paid, keep the sources of irrigation in order. Adding a tank-repair tax would, of course, not be illegal, but it would hardly be just, and it certainly would be the source of much dissatisfaction.

There do not appear to be any legal obligations resting upon Zemindars and other proprietors as regards the up-keep of tanks, &c. If any such ever existed in this district, they have long since ceased to be regarded. Even in the case of "Hissa" tanks, *i.e.*, those the irrigated area under which is partly the property of Government and partly of a Zemindar, and the obligation regarding the repairs of which lies in defined shares between the owners, Zemindars nearly always utterly neglect and even absolutely refuse to do their part of the necessary works. There is at the present moment pending in this district a case in which this has occurred, and orders to sue the

Q. 27.

Mr. Price-continued.

Zemindar have been issued, and will, at an early date, be carried out. I would certainly have some more simple and effective means of dealing with recalcitrant part-proprietors in tanks than at present exist. I consider that it would be desirable to pass an Act by which it should be lawful for Government whenever a tank in which they are a part-sharer is in a state which needs repair to cause the necessary estimates for such to be made, to then call upon the Zemindar to contribute his share, and, if he declines or neglects to do so, to carry out the work and recover the money due in the same manner as if it was arrears of revenue. There ought also to be some law enabling prompt dealing with Zemindar and other proprietors of tanks which form part of a chain including works belonging to Government. At present the only remedy where danger is caused by these is to sue for an order to direct the proprietor to put his tank into a safe condition, or, if any thing occurs in the mean time, to file another suit for recovery of damages.

I enclose a copy of the rules under Act VII of 1865. These are the only ones which, as far as I know, exist. The rules apply to all cases where Government water is taken for lands not classed as "wet." To give a statement of the works concerned would be to furnish one showing pretty nearly every irrigation work in the district. The sum of Rupees 43,818* was realised

* Figures taken from the Jamabandi Report of Fasli 1285 as that was a normal year. in the revenue year 1875-76 on account of rates paid for water, the property of Government, taken to dry lands. There are no exemptions under

Section 4, Madras Act VII of 1865, in this district. I am unable to state precisely what is the nature of the receipts entered under the sub-head "cess for repair of tanks" (head Land Revenue, Miscellaneous). The subject of this particular item is now under investigation. My predecessor, in his letter embodied in the Proceedings of the Board of Revenue, No. 4669, dated 8th October 1877, gave an imperfect account of the matter, and further report was called for; but, in consequence of the famine and jamabandi work, it has not yet been sent in. Mr. Barlow's figures give only Rupees 149, but the treasury accounts show that Rupees 1,861-3-6 are collected. As far as I can ascertain, the "cess for repair of tanks" is the result of the proprietors of tanks jointly with Government having compounded by a yearly payment for their responsibilities in regard to repairs which might from time to time become necessary.

Mr. Wilson. Q. 12.

I know nothing personally of the capital expenditure on or the cost of maintenance of the various great irrigation works in the Presidency, but I annex a statement communicated to me by the Assistant Examiner, Department of Public Works (Irrigation) Accounts. Columns are added showing the present acreage irrigated and the rates per acre.

Q. 28.

Systems.	Capital Expendi- ture up to 31st March 1876.	Gross increased Revenue due to Irrigation to 31st March 1876.	Working Ex- penses to 31st March 1876.	Net Revenue.	Year from which increased Rov- enue is obtain- ed.	Period to which increased Rev- enue refers.	Yearly Average Net Revenue.	Per-centage of Yearly Average Revenue on Capital Outlay.	Present Acreage irrigated.	Rate per Acre.	Remarks.
	RS.	B8.	RS.	RS.			ES.		ACRES.		
1. Chembrambakam Tanl	5,26,819	62,172	71,069	8,897	1871-72	5 years.	1,779	•34	7,571	Unknown. The assessment is consolidated.	Improvements completed in 1870-71.
2. Godavari Delta System	. 73,64,443	2,45,71,999	58,00,075	1,87,71,924	1847-48	29 "	6,47,308	8.79	525,398	2 15 1	Anicut completed in 1846-47.
"3. Cauvery do.	13,48,900	2,14,63,455	47,86,180	1,66,77,275	1837-38	39 "	4,27,622	31.7	851,749	Unknown. The assessment is consolidated.	No reliance can be placed on this figure Improvements completed in 1836-37.
4. Kistna do.	46,35,898	88,89,154	25,74,952	63,14,202	1855-56	21 "	3,00,676	6-49	264,256	2 15 10	Anicut completed in 1854-55.
5. Palar do.	12,57,922	13,88,104	1,87,627	12,00,477	1856-57	20 ,.	60,024	4.77	21,291	1	Do. do. in 1855-56.
6. Pelandorai do.	2,73,087									Unknown The	Anicut was only completed in 1876-77.
7. Pennar do.	13,40,201	1,06,314	* 37,933	68,381		1 year.	65,381	5.1	54,102	assessment is consolidated.	Anicut completed in 1861-62.
8. Srivaikuntam do.	11,07,713	1,05,114	98,770	6,344	1871-72	5 years.	1,269	.12	30,019		Do. do. in 1869-70.

Information respecting revenue is as yet unknown to this office for the period subsequent to 1875-76. The outlay has, therefore, been entered to correspond. In the case of the Cauvery Delta System, revenue information being available only up to 1874-75, the outlay on that system has been shown accordingly.

• The exact working expenses of the Pennar anicut system are not available prior to 1875; the charge for the year 1875-76 and the corresponding revenue for that year only have been entered in consequence.

16th September 1878. .

F. BEAUCLERK. (Signed)

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Mr.

Mr. Wilson-continued.

651

Mr. Beauclerk notes that at least 20 per cent. must be deducted from the revenue or added to the working expenses—

(1) for collections of revenue ; •

(2) for distribution of water;

(3) for capital expenditure under-stated ;

(4) for general over-statement of the returns.

I do not think that in the case of the Kistna the revenue has been over-stated to the extent supposed by Mr. Beauclerk. Revenue was not credited in many cases where revenue had undoubtedly been received, because there was no account to show what the amount was. White paddy is the chief crop raised under these systems : when there is not water enough for a second paddy crop, indigo, palapoo jonna, sazza, raggi, and the like are put down. The variety of paddy raised under irrigation cannot be grown without irrigation. "Palapoo jonna" I never knew to be grown without irrigation. Ordinary jonna would probably die if irrigated. Of crops like indigo, raggi, and sazza, which can be grown both under irrigation and without, I have no *data* of outturn to enable me to compare the respective values of the crops when grown under irrigation and when grown without. White paddy is far and away the most ordinary product of irrigated land. Its average price per Madras garce for the last five years in the various districts of the Presidency is shown below :—

D	istri	ets.			1282.	1283.	1284.	1285.	1286
					RS.	RS.	RS.	RS.	RS.
Ganjam					98	98	106	114	133
Vizagapatam		Caller Mark	10.20		146	118	133	140	* 161
Godavari					122	116	112	100	168
Kistna			S. Salar Tra		169	177	146	133	228
Nellore		1. S.			140	156	146	131	226
Cuddapah				ad the state	169	164	148	164	331
Bellary					157	161	134	153	292
Kurnool					192	166	152	`156	322
Madras					125	156	157	169	240
Chingleput		AND APPE			131	153	144	155	263
North Areot		and the			116	136	134	154	272
South Arcot				[125	158	149	158	265
Tanjore	1.110			10.00	133	141	149	148	210
Trichinopoly			Constant Party	1.1	141	157	167	165	279
Madura			State of the second	S. Sec.	157	172	190	168	269
Tinnevelly					198 1	204	215	192	256
Coimbatore					174	185	201	201	305
Nilgiri.									
Salem					144	164	161	176	328
South Canara					Sec. 1	and the second		Section 1	
Malabar			2310 1323		185	183	201	200	257

Q. 13.

The water-rates in the Kistna and Godavari Districts are as follow :---

- (1) For a single wet crop, Rupees 4 an acre.
- (2) For a second wet crop on irrigated land, Rupees 4 an acre, provided that the cultivator may compound for irrigation for two crops for term of years not less than five, for Rupees 6-8-0 an acre.
- (3) For a second dry crop on irrigated land, Rupees 2 an acre, except where the landholder has compounded under Clause 2.

Mr. Wilson-continued.

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- (4) For sugar-cane, betel, plantains, and other garden produce remaining on the ground for a time of two crops, Rupees 8 an acre, provided that the cultivator may compound under Rule 2 for Rupees 6-8-0 an acre.
- (5) For a dry crop grown on land for which irrigation has never been supplied, or having once supplied has since been discontinued under Rule 3, Rupees 2 an acre, whether the crop be a first or second crop.
- (6) When the water used for irrigation cannot be obtained without raising it by baling or mechanical contrivances, a deduction of one-fourth of the water-rate will be made.

The same principles are adopted in charging for water-supply to lands not classed as wet which receive water from tanks and watercourses in the uplands of these districts and under all other tanks in the Presidency with certain exceptions. The assessment of irrigated lands is not always greater than that of unirrigated lands. The consolidated assessment of the inferior classes of irrigated land is generally lower than that of the better classes of dry land.

The following table shows for the districts settled by the Revenue Settlement Department the average incidence of wet and dry rates. Taking only the Kistna and Godavari Deltas, where land assessment and water-rate are separated, the average of the 'former is for the Kistna Rupees 1-14-11, and for the Godavari Rupees 2-6-8 an acre:—

	T					Aver	GE	RATI	e per	Ac	RE.
		istricts.				W	et.		D	ry.	
						DS		p	De		
Ganiam						3	5	0	1	4	5
Godavari						6	Õ	7	ī	12	9
Kistna					Section .	5	14	iľ	1	8	5
Nellore					10.00	5	5	0	ĩ	3	7
Cuddapah			Sector Phil			6	7	2	1	2	4
Chingleput		CO. wes	el le salo	17. AN		3	8	4	1	2	8
Trichinopoly		1964 S 100				4	4	2	0	15	5
Tinnevelly						6	10	2	0	11	2
Kurnool						5	14	. 3	0	15	4
Salem						4	8	11	1	2	3
South Arcot					14. ···	5	8	7	1	13	5

If lands are increased in value by irrigation, it is to be supposed that they are irrigated, and that the proprietor pays for their irrigation, unless he is entitled to it for nothing.

As arrears of revenue under Madras Act II of 1864, I never knew of any difficulty in the application of its provisions.

The only way to stop the lavish use of water in delta systems, like the Kistna and the Godavari, is to regulate and control the supply. To raise the water-rate might induce the ryot to refuse irrigation, but would not make him economical in the use of the water supplied to his land. There is, as a rule, no "poorer" and no "non-paying" crops under canal irrigation.

The general product is white paddy. Water is not charged by for quantity, but I do not know any reason why it should not be if it be thought proper to do so.

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Mr. Wilson-continued.

Q. 15.

Part II.

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The only contracts that I know of are the compositions entered into for a series of years,—generally five,—by Zemindars for the waterrate chargeable on dry lands in their Zemindaris, converted into wet under the channels. There are no such contracts as those adverted to in the question. Having had no experience of such a system, I know nothing of the difficulties attending it, and can offer no opinion on its merits.

The assessment of land in this Presidency is supposed to be the value of half its net produce.

In the deltas of the Kistna and the Godavari, where separate waterrates are imposed, it is impossible to say whether the sum of the land assessment and water-rate represents half the net produce or not, for the land assessment was calculated, not on what the land produces white paddy, but on a dry grain standard, and the total charge on the land is this fictitious assessment, *plus* a water-rate. If the total demand on the land equals the value of half its net produce of paddy, the water-rates could not be raised without upsetting the principles of assessment prescribed by the Secretary of State for this Presidency.

The assessment of these delta lands rests on a basis so artificial and fictitious that it is impossible without minute inquiry to say whether the water-rate is fair or too low. For all present occupation it certainly is not too high; if it were, the land would be relinquished. An increase in the water-rate during the currency of a lease would affect the tenant according to the terms of his lease. A revenuepaying proprietor would have to pay the new rates in full, because the rates are, under Madras Act VII of 1865, fixed at such amounts as the Government may from time to time think proper to impose, and are never fixed for any given term; water-rates are altogether apart from Revenue Settlements.

The only mischief that I know to have been caused by irrigation under the canals is the efflorescence of salts of soda— "choudoo." Drainage is a necessary accompaniment of sohemes like those of the Kistna and Godavari anicut systems. It has been provided for to some extent, but in the Kistna especially much still requires to be done; it has been all provided for in the completion scheme.

There is no "irrigated area of poorer grains" in the deltas of the Kistna and Godavari. The only product of the Kistna Delta and the chief—in both crops—crop of the Godavari Delta is white paddy.

In the Kistna there were irrigated in 1865-66 acres 214,637; in 1875-76, the latest year for which information has been tabulated, the area was acres 264,256.

Except in the matter of "choudoo" I never knew land to be in any way damaged by continuous irrigation, nor so far as I know is there the slightest ground for supposing that there has been any diminution of produce.

The canals and their banks are entirely under the control of the Department of Public Works who distribute the water as far as the village channels, from which point it is managed by the villagers themselves. The Revenue Authorities collect the water-rates.

I see no reason for changing the present mode of administration; it works well, and is the simplest that could be adopted. The ryot pays his water-rate, which is only part of the assessment on his land with the other portion of it to the Munsif of his village according to the immemorial custom of the country. I do not see what possible

Q. 17.

Q. 19.

Q. 21.

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Mr. Wilson-continued.

advantage could be derived from setting a department, which at present has no establishment for the purpose, but would have to entertain one, to do work which another department is already doing, and can without any additional cost to Government or trouble to the ryot continue to do with an establishment that exist and could not be dispensed with even were it relieved of this duty.

The division of the demand on land in these deltas into land assessment and water-rate is a mere artifice of account. The water-rate is as much revenue as the land assessment, and the department responsible for part should be responsible for the whole.

I cannot see what reason there can be for joining in one officer the functions of an Engineer with the duties of a Collector, or why, for the collection of two artificially divided parts of the assessment on the same land, two Collectors should be appointed.

I have answered the first part of this question above. There is no such law in this Presidency, and I know nothing that could make me think one necessary.

I do not think that it can be said of the Kistna and Godavari systems that the extension of the use of the canal water has been slow. There is only one part of these tracts where I know water to have been steadily refused—part of the Tenaly Division of the Repally Taluk of the Kistna. Elsewhere water is sought with avidity, and the difficulty is to keep pace with the demands of the people. In the Kistna the scheme is not more than half complete, and the only obstacle to its extension and completion is the refusal of funds by the Government of India until the Capital and Revenue Accounts have been furnished.

In the Godavari the greater part of the scheme has been completed.

Irrigation from the Godavari anicut began in 1847-48. Before that the recorded area of wet land in occupation was acres 81,503. In 1875-76 it was acres 525,398. Kistna anicut irrigation dates from 1855-56. The area of wet land in occupation is acres 59,675; in 1875-76 it was acres 264,256.

There are no difficulties in the conversion of dry land into wet that the most ordinary ryot does not feel himself quite superior to.

The existing system makes no provision for advances to cultivators for the adaptation of their land to irrigation; any system of advances for the purpose of cultivation can, in ordinary circumstances, be productive only of mischief; it destroys independence and thrift and fosters a breed of pauper ryots.

A very large supply of water for irrigation in the hot season is not expected any where. In the Kistna there is none at all; the canals are then all closed for clearance.

The hot season in India is like the winter in England,—the time that the land hath rest. Shortness of supply at that time of year can have no effect whatever on the progress of canal irrigation.

If the deficiency can be made good by a special rate on the land that would be protected, that is, I presume the land that is irrigated by the work, it strikes me that the work is remunerative and that the question so far is meaningless.

I can see no equity in charging lands or districts for irrigation that does not affect them.

If lands, districts, or provinces are taxed for works which do not affect them, and which are not remunerative, they are taxed for the support or enrichment of people whom it would be a farce to call

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Q. 22.

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Q. 23.

Mr. Wilson-continued.

Q. 25.

Q. 26.

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paupers. I consider that no work of irrigation should be undertaken that will not at the least cover its expenses.

No such claims or rights ever came to my knowledge.

Where Government cannot practically carry out the supervision and maintenance of tanks, it would be better to hand them over to the ryots whose lands are affected by them, leaving their up-keep to their self-interest.

At present in many parts of the country the ryots will not stir hand or foot to stop even a rat-hole. They pay assessment for wet land, and expect Government which charges for its irrigation to maintain the work which supplies it.

In the case put in the question tanks are practically *not* maintained; they could not be worse if handed over to the ryots, but would really stand a better chance of being properly kept up than they have at present. This would necessarily involve a reduction of assessment. Government is at present responsible for the maintenance of the tanks; if it declines this responsibility, it must cease to look for the return that it expects for supplying lands with the means of irrigation; the land under a resigned tank is to Government nothing more than unirrigated land; the assessment of it should, therefore, be its proper assessment if classed as dry.

Where much engineering skill is required in a work, the probability is that it will be sufficiently supervised by the officers of Government; it is the great mass of small rain-fed tanks throughout the country that I would hand over to the ryots, and in handing them over I would impose upon them no obligation whatever for the upkeep of the works, the maintenance of which I would leave to their self-interest. It may be said that the tanks would soon be utterly ruined if handed over in this way, because the ryots would never take common action in the matter, and would be always fighting and quarrelling about it. What in this respect has been the result of handing over to the ryots the many *ruined* tanks throughout the country? The results of this policy cannot have been bad, or the policy would have been changed. If successful in cases where a considerable initial cost to make the tank hold water at all must be incurred would it be unsuccessful where the initial cost would be little or nothing. Besides the question supposed that the tanks if not ruined already are in a fair way to being so, since Government can neither maintain nor supervise them.

No obligation other than what is imposed by their self-interest is imposed on Zemindaris for the maintenance of tanks, &c., and it would be impossible to impose any other obligation, for so long as the Zemindar pays his peishcush, Government cannot interfere with the management of his estate, and the maintenance of tanks is, of course, a part of the management of an estate.

The water-rate rules made under Madras Act VII of 1865 were published with G.O., No. 2665, dated 31st October 1865, Revenue Department. They have been applied only to the Kistna and Godavari anicut systems.

In 1875-76 the rate produced in the-

				RS. A. P.
Kistna			. 2.	 2 15 10
Godavari	 5	S		 2 15 1

An Inam holding registered as wet is entitled to irrigation free of charge if the anicut superseded its former source of irrigation, or if

* 165

Q. 27.

Q. 28.