

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following Proceedings of the Board of Revenue, dated 1st June 1886, No. 1222:—

Read—the following letter from F. A. NICHOLSON, Esq., Acting Collector of Anantapur, to the Secretary to the Board of Revenue, dated Pallaram, 12th May 1886, No. 212:—

I have the honor to submit a further report on the question of search-boring for wells in this district, as called for in Board's Proceedings, No. 287, dated 11th January 1886. I have delayed my report as I wish to see something of the country, its ryots, soils and existing wells before making a final reply.

2. A party of Sappers and Miners were sent to this district to put down bore-holes in search of water, so that ryots might not waste money in vain searches, or might be induced, on knowing that water was to be found, to dig wells from their own or Government money. The instructions received (Executive Engineer's letter to Collector, No. 2090, dated 21st January 1885) were that borings were not to be made where the soil was very rocky or where the water-bearing stratum was very deep, *i.e.*, anything below 20 feet (report for January); hence, as remarked by the Executive Engineer (*loc. cit.*), only properties lying in valleys and low grounds could be worked at. The party began work on 16th December 1884 at Gooty, and continued it at Anantapur, putting down altogether forty-six bore-holes averaging 13 feet deep almost entirely through clay, sand and gravel in sixteen weeks at a total expense of Rs. 2,398, or Rs. 52 per bore. This sum includes only the Sappers' pay, cost of tools, repairs and contingencies (G.O., No. 821, Revenue, dated 15th July 1885), and not the cost of superintendence; *per contra*, the value of the plant at the end of the experiment is to be credited.

3. On a consideration of the whole case, I have to remark that the boring experiment was a failure. In this I mean no reflection upon the intention of the experiment or on the efforts of the party; the beneficence of the intention is undeniable and, so far as I hear, the efforts of the party admirable, but the profitable result is simply *nil*. I proceed to support this allegation.

4. I would remark (1) that it is extremely questionable whether, artesian wells being excluded, we can teach the ryots anything regarding sub-soil water at ordinary depths; (2) that in this particular instance the places selected were such that any man of common intelligence would have known, without the bore, that water would be easily found; (3) that ordinary boring is unsuited to the country or at least to this district as a method of search for ordinary sub-soil water; (4) that the remedies for the absence of wells, where needed, are not those for ignorance of the existence of water, but for poverty, or for want of a better system of overcoming the difficulties of rocky soils, &c.

5. Regarding point 1, I have observed the knowledge of the ryots regarding sub-soil water in Madura (especially the Palni taluk), Coimbatore and Salem, and have found it to be remarkable; it is *not* guided by superstition as supposed, but by observation and long experience. The astrologer is indeed called in, and perhaps the plan of pouring water on a sheep's head and noting when it shakes itself may be tried, but this is merely to indicate the place of turning the first sod, or the precise *locale* of the well; its general position is determined by the ryot and will always be found to be in the part of the field most promising for water and most suited for irrigating the largest possible area with the least possible toil. When the very hope of existence largely depends upon sub-soil water it is *a priori* improbable that in so simple a matter the experience of thousands of years should not have taught the ryots where to look for water; the wells of Salem and Coimbatore prove that they do know where to look for and how to get water. As the Ceded Districts' ryots are certainly not less dependent on

water, it is presumable that they also know where to look, and tours in this district show me that the ryots are as perfectly acquainted as their Tamil brethren with all possible sources of water and all the most likely places. I am astonished indeed at the marvelous knowledge and industry which they have displayed all over this district, and, while wells are pretty numerous, the little channels dug from land springs are marvels of patient industry. This district has such wide waste areas that land springs are frequently far distant from village cultivation, in which case it is well known that no one will venture to dig a well and make a garden from the old fear of robbers—a fear comparatively small now, but not long ago a real obstacle to cultivation far from the (still) fortified villages; hence, and because the ryot is gregarious, and will not adopt the homestead system, springs distant from the village-site are useless for well purposes. The ryots have therefore adopted the plan of co-operation; men of all castes and classes join in “gonchi (joint) puttās,” uncover the land springs, and bring the tiny streams of water even as much as two miles from the springs to 10 or 20 acres of land. These springs will be found on the driest hill sides many feet under the surface, and the water is led by cuttings often many feet deep to the fields where it is wanted. How came the ryots to know of these springs, except that they have acute powers of observation added to the experience of ages? If they can discover such hidden springs far away in dry waste lands, much more will they know where sub-soil water is to be had in their own village fields. Moreover, there is not a sandy nullah or jungle stream that does not supply a spring channel, led sometimes three miles to a few acres of land by means of a deep cutting into which, if necessary, the water is baled. In a recent instance seen by myself, the nullah channel failed this year and the ryots promptly borrowed Rs. 200 from a sowcar and dug a huge cutting to a spot inland from the nullah where they had observed the vegetation to be green, and thus got a small supply from a land spring. (I may remark that these poor fellows are assessed at Rs. 6 per acre for a single crop on land irrigated by such a source and at such immense expense to the ryot.) Finally, the country has many wells in all sorts of places; many, though abandoned, still have water; wherever there is a basin or bottom there wells, both old and new, in use and abandoned, are to be found, but even in less likely places, such as hill sides, wells and spring channels are numerous, and it is clear that it is not ignorance which often prevents a ryot from digging a well and which leaves likely places without wells. In setting to work to teach the ryot where to find water, we are apt to forget a well-known English proverbial saying.

6. On the second point, I must observe that in the present case the money has simply been wasted because a child would, from mere inspection, have known that water was to be found at the bore localities. The instructions given precluded boring except in places where it was obvious that water would be found, and hence as an aid to the ryot the bores were useless. The general aspect of this district is that of a bare, open, undulating plain, very stony in most places, and with but very few exceptions (outside the black-soil tracts) covered with a thin stratum of cultivable soil lying on more or less disintegrated rock, which in its turn lies upon and is inextricably mingled with more or less massive but fissured rock. Moreover, a permanent water-supply, except in favored places, is hardly to be met with until below 18 or 20 feet and often much more. Hence to refuse borings in rocky places and to anything beyond shallow depths was not to touch the district at all, but to confine borings to “valleys and low grounds,” where water was certain to be met with. Accordingly forty-six bore-holes were driven, and almost without exception they were either actually in wet or to irrigation channels or to wet lands. The selection lay with the Revenue officers, and while admitting that they were restricted by the instructions, it seems incredible that such places should have been selected to teach the owner of the land that there was water in its sub-soil. The maximum depth at which water was reached was 17½ feet, the minimum 4 feet, and the average between 11 and 13 feet, and this in a year when the water-supply was deficient; *a fortiori*, therefore, in ordinary years water would, in such localities, be much nearer the surface and the ryots must have known it. Every one knows, and there are many wells and pits to show it, that sub-soil water is abundant in wet lands and near drainage channels, and it was unnecessary to spend Rs. 50 per hole to ascertain this undoubted fact. Even the dry lands were not

far from wet lands, and the slight depth at which water was found shows that the ryot needed no teaching on the point; to suppose the contrary, would be to suppose that the ryot had no eyes, or need of water, and that he never dug pits or wells. One of the wells subsequently dug actually cost only Rs. 40 complete—a sufficient commentary when wells on really dry lands ordinarily cost Rs. 300; in a second case, the land in which the well was dug was actually irrigated by tank water for the principal crop. It is needless, however, to bring arguments to prove that a ryot knows there is sub-soil water in wet lands.

7. But, assuming it to be necessary to teach the ryots, I hold that boring is a mistake for all ordinary irrigation depths. In England, where labor is, say, six times as costly as in India, the apparatus at hand and machine-power cheap, boring is successful as against trial shaft digging; but here, where the converse is the case, it is a mistake. A 6-foot trial-shaft, to the same depth as the bore-holes in any of the successful bore localities, might be dug at one-fourth of the money expended in driving the 6-inch bore holes, so that a useful well would remain for the money instead of a useless gimlet-hole. This proposition I support by the prices of well-diggers' labor in the district; in all cases well-work is done by Wudders on contract at so much per unit, which in this district is the cubic fathom (4 cubits cube). The following table is averaged in rupees from returns for every taluk in the district; maximum and minimum rates are also quoted; if the sub-soil proves very hard, the Wudders will strike for an increase, which is usually given at 8 annas per cubic fathom:—

Soil.	FIRST UNIT.			SECOND UNIT.			THIRD UNIT.		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
1	2	3	4	5	6	7	8	9	10
Soft ..	Rs. A. P. 0 8 0	Rs. A. P. 0 4 0	Rs. A. P. 0 6 0	Rs. A. P. 1 0 0	Rs. A. P. 0 8 0	Rs. A. P. 0 12 0	Rs. A. P. 2 0 0	Rs. A. P. 1 0 0	Rs. A. P. 1 8 0
Medium ..	Rs. A. P. 1 0 0	Rs. A. P. 0 6 0	Rs. A. P. 0 12 0	Rs. A. P. 2 0 0	Rs. A. P. 0 12 0	Rs. A. P. 1 8 0	Rs. A. P. 4 0 0	Rs. A. P. 1 8 0	Rs. A. P. 3 0 0
Hard ..	Rs. A. P. 1 8 0	Rs. A. P. 0 10 0	Rs. A. P. 1 0 0	Rs. A. P. 3 0 0	Rs. A. P. 1 4 0	Rs. A. P. 2 0 0	Rs. A. P. 6 0 0	Rs. A. P. 2 8 0	Rs. A. P. 4 0 0

Soil.	FOURTH UNIT.			FIFTH UNIT.		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
	11	12	13	14	15	16
Soft ..	Rs. A. P. 4 0 0	Rs. A. P. 2 0 0	Rs. A. P. 3 0 0	Rs. A. P. 8 0 0	Rs. A. P. 4 0 0	Rs. A. P. 6 0 0
Medium ..	Rs. A. P. 8 0 0	Rs. A. P. 3 0 0	Rs. A. P. 6 0 0	Rs. A. P. 16 0 0	Rs. A. P. 6 0 0	Rs. A. P. 12 0 0
Hard ..	Rs. A. P. 12 0 0	Rs. A. P. 5 0 0	Rs. A. P. 8 0 0	Rs. A. P. 24 0 0	Rs. A. P. 10 0 0	Rs. A. P. 16 0 0

By “very hard” soil is meant the semi-disintegrated rock which can just be tackled by the pick, crowbar and hammer; it includes rock which can be broken up by wedges and hammers: if the rock is solid it is either avoided by side excavation, or the well is abandoned. From the progress reports of the boring it will be seen that the soils attempted were usually soft or medium; wherever limestone or so-called rock was struck the bore was abandoned; practically it is almost impossible to bore by hand through rock even if not massive. Taking the maximum rates for medium hardness, an average 6 feet trial-shaft by Wudders to the second unit (12 feet), which is just below the average depth reached in boring, would have cost Rs. 3, and to the third unit (18 feet), which is the maximum bored depth, Rs. 7, as against a boring average of Rs. 52. Assuming that bores might be done cheaper in future, which, however, I doubt at the scale of pay proposed, and seeing that operations would be scattered over the country instead of all close together as in these experiments, and assuming a higher rate for Wudders for cost of superintendence, the advantage in cost

is still with the Wudders *plus* the advantage of an actual well instead of a petty bore-hole. As an instance, I point out that an actual irrigation well *complete* at one of the bore-holes actually cost only Rs. 40, while the average bore-hole cost Rs. 52; I have also seen shallow wells (12 feet), which were dug at Re. 1 per cubic fathom all round, in pretty hard gravel and kunkur.

8. But boring is also inadvisable on other grounds. The sub-soils of this district are in general so hard that the auger would have no chance and the chisel is very expensive, especially when it jams or breaks; disintegrating rock and massive though fissured rock are the usual sub-strata; hence the boring-rod would have no chance, especially at ordinary water depths of, say, 24 feet. Again repairs to rods and tools would in such case be frequent and in this district very expensive. Moreover, most of the dry land wells of this district are sunk into rock: since the boring tool has to stop where it reaches rock, unless expense is no objection, boring would in most cases give no indication whether a well could be successfully dug. In this district a ryot expects to meet rock; the only question is whether it will be so disintegrated or fissured as to allow of being broken up or of water percolating through. Hence the boring tool cannot be a guide; the trial-shaft is a much safer test. Further, it often happens that the soil contains boulders or massive rock surrounded by soft rock; the bore-hole being only 6 inches in diameter it cannot be known whether a rock is only a petty boulder, or of large size, or continuous, whereas in a shaft this can be readily ascertained; any big stone will stop a bore, but it can be got out or turned in a shaft. The District Forest officer's well at Anantapur, driven through disintegrated rock, has in this way met the edge of an out-crop of rock; leaving this on one side it has gone round and below it and found ample and excellent water: had the first shaft been a bore-hole, the site would have been abandoned. Hence the boring-rod might often mislead a ryot into abandoning a good site.

9. On the score therefore of economy and success I advocate trial-shafts by Wudders as against bore-holes by skilled artisans. If boring were still advocated, I would suggest the auger only for soft soils and replace the chisel and rod by the Chinese method of the rope and ram (Monton) armed with blunt chisels.

10. Finally, I believe that the obstacles to wells are poverty, frequent failures in supply, presence of speculation (the perquisite system), an absence of knowledge of well rules, a dislike to spend money when water is ordinarily otherwise available, the assessment rules, the absence of the homestead system, and the difficulty of piercing very hard soils.

11. A good well, 30 feet deep and perhaps 30 feet square in this district, costs from Rs. 200 to 500, according to soil and locality; to this must be added the cost of two pairs of decent bullocks, for the lift in this district is invariably worked by two pairs, one ascending the incline while the other descends. Few ryots have so much cash in hand, while the interest at only 12 per cent. on even Rs. 300 is a very heavy item in the expenses, especially as water is often so scanty that only a small area can be irrigated. If to the interest be added the expenses of several pair of good cattle, buckets and ropes, coolies, and so forth, it is obvious that, on ordinary cereal crops, there is little margin for profit even in ordinary years; hence the unwillingness of the ryot to sink wells. Even supposing him, however, to be willing, he cannot always find a lender, for in this poor district, with a railway only in the extreme north, and the soil and rainfall usually poor, land has but a very small value as evidenced by registration and other statistics. The same poverty of the district, with its wide areas and poor ryots and comparative isolation from large markets, prevents the growth of valuable crops to any great extent, as is so markedly the case in Coimbatore; chillies, tobacco, turmeric and such like are luxuries, and not much in demand; hence cereals, giving only a poor money return but certain food, are generally grown, except near tanks in the south where cocoanuts and areca are prevalent.

12. The frequent failure in the water-supply has been mentioned in paragraph 11; nothing can be more discouraging than such failure, either entire or by the sinking of the water level, as in the past and current year, owing to the exhaustion of the sub-soil stores. Such failure is, I learn, only too frequent; hence the joint system or the precarious but cheap dry cultivation.

13. If it is asked why the offers of Government to lend money at cheap rates are not taken advantage of, I reply in the first place that there is still great ignorance of the offers and of the terms of the loans. From my inquiries I am convinced that ryots are largely ignorant of the Government offers. I was even assured that, as the investigation of titles and securities for the loans gives Tahsildars and Inspectors a good deal of trouble, the applications are often discouraged, and this discouragement or negligence is one of the charges brought against Tahsildar Triembaka Rao by the late Deputy Collector. Still more do I regret to say in the second place that frequently in this district the allegation has been made to me (by officials, by private persons, and by professional men) that ryots are shy of these loans, not merely because of the rigidity of the demand but because from half to two-third is apt to be swallowed up in gifts to Government servants, especially in the villages. The great ignorance of the ryots here, the power of the village officials, especially the karnam, in an unsurveyed and unsettled district, gives ground for belief in this allegation, even if the proportion taken be exaggerated; it is then conceivable that ryots prefer the Sowkar with whom they deal personally to the Sirkar with whom they deal through several petty subordinates.

14. I am even disposed to think that all ryots are not, to this day, aware that gardens irrigated by private wells are free from all extra assessment and that only dry rate is chargeable. It is obviously to the interest of village officers to keep the ryots in darkness, and only three days ago two ryots, one of whom was a police constable, deliberately asked in a petition if it was a fact that they would only be charged dry rate for *any* crop if cultivated by a well which they proposed to dig in their dry land. It is not the habit, I am sorry to say, for ryots to attend the jamabandi in this district, so that a great opportunity is lost for openly instructing and encouraging them; I think it will be well to print certain standing rules regarding private irrigation and other simple but important matters at the foot of their puttas, and I will do this for next year.

15. As regards the notable absence of wells in wet lands, I have ascertained from numerous inquiries in tank villages, which this year are largely dry, that ryots do not care to dig wells where there is a fair chance of the tank getting supplied. Up to 1884 if they cultivated wet crops with such wells, they were liable to wet assessment, and this they object to: *e.g.*, in Dharmavaram town there is a splendid tank usually fed from the Chitravati river; this year it was practically dry; there were few wells and practically no cultivation, although in February and March I saw holes not 5 feet deep with water in them, and that not in the lowest part of the ayaat but amongst the highest; a well by the road-side near the tank bund was full of water. Ryots from want of energy in this district will not dig wells when there is an average chance of water, in spite of frequent and ruinous failures in supply and certain success in wells; in this they contrast with Coimbatore, Salem and Madura ryots, who are always ready with permanent or temporary wells. The habitual levy of wet assessment on such lands has been a great obstacle, and the new well rules, though much more favorable than formerly, still appear to admit of improvement, on which I propose to address the Board separately.

16. I have above adverted to the absence of the homestead system as accounting for the absence of wells in favorable localities and abandonment of existing wells; ryots will not grow valuable crops and keep valuable cattle a couple of miles from the village dwellings.

17. The last point is the difficulty of piercing hard rock. The Wudders here do not know the use of powder, and there is not an irrigation well in the district that bears a single blast mark in it. A superstitious or religious reason is given, viz., that the goddess in charge objects to being blasted out of her subterranean home, but prefers the pick, crowbar and wedge; I doubt the belief and think that it is want of knowledge. A few Wudders sent to Coimbatore to learn the use of powder might prove useful; not a well in that district is dug without heavy blasting with slow-acting country powder which rends rocks into large fragments. I am convinced that the use of powder would tend to increase wells: the 60,000 great wells of Coimbatore would not have been sunk without such aid.

18. I beg to apologise for the length of this letter, but I am desirous both of avoiding a waste of money and of putting plainly the difficulties in the matter of wells in a poverty-stricken, arid, rocky district. I would report in brief that it is not ignorance of where to find water that is the obstacle, but poverty and general backwardness.

Resolution—dated 1st June 1886, No. 1222.

Submitted for the orders of Government.

2. The Collector seems to show conclusively that the cost of sinking a well-shaft is less than that of making a trial-boring; but in the opinion of the Board he is mistaken in deducing a belief that such borings are of no use, and that the sinking of a trial-shaft (which may be successful) is always better than the making of a trial-boring. The Board believe the instances are numerous, where a ryot wishing to sink a well somewhere about a certain locality has not known exactly where to sink it, and a trial-boring would have given him the wanting information. The Board have known cases where ryots wanting to make a well could not afford to lose the area which would be made uncultivable by a trial-shaft, if it proved unsuccessful. In such cases they would prefer a trial-boring made at little or no cost to them. The Government no doubt have to pay considerably for it, but that is another question, and as the total expenditure is not great and the encouragement of well-sinking is a most important matter, the Board consider the money is well spent. The Collector seems to doubt whether the expense of making wells is not prohibitive, but it is certainly not so in other parts of India, and there does not appear to be any reason why Anantapur should be the single exception to the general rule.

3. As to the ignorance of the loan rules and well irrigation rules, among the ryots improvement must be slow and will depend on the intelligence and energy of the officers who come in contact with the ryots. The Collector's intention to print some of the rules at the foot of the puttis is a good one, but only a small amount of information can be circulated in this way, and he should consider whether it is not desirable to print other information as posters, which may be posted up in each village.

4. The Board await with interest the Collector's suggestions for the improvement of the new well rules.

5. It is unnecessary to send Wudders to Coimbatore to learn the use of blasting powder which is not uncommon in Bellary.

(A true Copy and Extract.)

(Signed) M. HAMMICK,
Acting Secretary.

To the Secretary to Government, Revenue Department.
Copy to the Collector of Anantapur.

ORDER—dated 13th July 1886, No. 578, Revenue.

Land Revenue, No. 46.

It appears to Government that the main points which call for attention are to make the recent rules regarding loans as public as possible, to let the ryots know that improvements made at their own cost do not involve extra taxation, and to see that when they ask for loans they get them without deductions. The Board will take the matter in hand at once and issue such instructions as will effectually secure the objects in view.

2. When the people are informed and assured on the points above indicated, it will not be long ere loans for digging wells are freely sought. If, when this is the case, the ryots find difficulty in selecting spots in which to successfully sink wells, the question of forming boring parties can be revived. At present it is unnecessary to consider it further.

(True Extract.)

(Signed) H. E. STOKES,
Secretary to Government.

To the Board of Revenue.
„ the Public Works Department.

Exd. W. H. French.

Gobt. of (1886) Madras.

REVENUE.

Issued

Recd.

Encl.

G.O., 13th July 1886, No. 578.

B28.1978 W 9-8-86

JULY.

Wells.

With reference to the question of boring for the selection of sites for sinking — directing the Board of Revenue to make the recent rules regarding agricultural loans as public as possible, to let the ryots know that improvements made by them do not involve extra taxation, and to see that when they ask for loans they get them without deductions.

13TH JULY 1886, No. 578, REVENUE.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following Proceedings of the Board of Revenue, dated 1st June 1886, No. 1222:—

Read—the following letter from F. A. NICHOLSON, Esq., Acting Collector of Anantapur, to the Secretary to the Board of Revenue, dated Pallaram, 12th May 1886, No. 212:—

I have the honor to submit a further report on the question of search-boring for wells in this district, as called for in Board's Proceedings, No. 287, dated 11th January 1886. I have delayed my report as I wish to see something of the country, its ryots, soils and existing wells before making a final reply.

2. A party of Sappers and Miners were sent to this district to put down bore-holes in search of water, so that ryots might not waste money in vain searches, or might be induced, on knowing that water was to be found, to dig wells from their own or Government money. The instructions received (Executive Engineer's letter to Collector, No. 2090, dated 21st January 1885) were that borings were not to be made where the soil was very rocky or where the water-bearing stratum was very deep, *i.e.*, anything below 20 feet (report for January); hence, as remarked by the Executive Engineer (*loc. cit.*), only properties lying in valleys and low grounds could be worked at. The party began work on 16th December 1884 at Gooty, and continued it at Anantapur, putting down altogether forty-six bore-holes averaging 13 feet deep almost entirely through clay, sand and gravel in sixteen weeks at a total expense of Rs. 2,398, or Rs. 52 per bore. This sum includes only the Sappers' pay, cost of tools, repairs and contingencies (G.O., No. 821, Revenue, dated 15th July 1885), and not the cost of superintendence; *per contra*, the value of the plant at the end of the experiment is to be credited.

3. On a consideration of the whole case, I have to remark that the boring experiment was a failure. In this I mean no reflection upon the intention of the experiment or on the efforts of the party; the beneficence of the intention is undeniable and, so far as I hear, the efforts of the party admirable, but the profitable result is simply *nil*. I proceed to support this allegation.

4. I would remark (1) that it is extremely questionable whether, artesian wells being excluded, we can teach the ryots anything regarding sub-soil water at ordinary depths; (2) that in this particular instance the places selected were such that any man of common intelligence would have known, without the bore, that water would be easily found; (3) that ordinary boring is unsuited to the country or at least to this district as a method of search for ordinary sub-soil water; (4) that the remedies for the absence of wells, where needed, are not those for ignorance of the existence of water, but for poverty, or for want of a better system of overcoming the difficulties of rocky soils, &c.

5. Regarding point 1, I have observed the knowledge of the ryots regarding sub-soil water in Madura (especially the Palni taluk), Coimbatore and Salem, and have found it to be remarkable; it is *not* guided by superstition as supposed, but by observation and long experience. The astrologer is indeed called in, and perhaps the plan of pouring water on a sheep's head and noting when it shakes itself may be tried, but this is merely to indicate the place of turning the first sod, or the precise *locale* of the well; its general position is determined by the ryot and will always be found to be in the part of the field most promising for water and most suited for irrigating the largest possible area with the least possible toil. When the very hope of existence largely depends upon sub-soil water it is *a priori* improbable that in so simple a matter the experience of thousands of years should not have taught the ryots where to look for water; the wells of Salem and Coimbatore prove that they do know where to look for and how to get water. As the Ceded Districts' ryots are certainly not less dependent on

water, it is presumable that they also know where to look, and tours in this district show me that the ryots are as perfectly acquainted as their Tamil brethren with all possible sources of water and all the most likely places. I am astonished indeed at the marvelous knowledge and industry which they have displayed all over this district, and, while wells are pretty numerous, the little channels dug from land springs are marvels of patient industry. This district has such wide waste areas that land springs are frequently far distant from village cultivation, in which case it is well known that no one will venture to dig a well and make a garden from the old fear of robbers—a fear comparatively small now, but not long ago a real obstacle to cultivation far from the (still) fortified villages; hence, and because the ryot is gregarious, and will not adopt the homestead system, springs distant from the village-site are useless for well purposes. The ryots have therefore adopted the plan of co-operation; men of all castes and classes join in “gonchi (joint) puttas,” uncover the land springs, and bring the tiny streams of water even as much as two miles from the springs to 10 or 20 acres of land. These springs will be found on the driest hill sides many feet under the surface, and the water is led by cuttings often many feet deep to the fields where it is wanted. How came the ryots to know of these springs, except that they have acute powers of observation added to the experience of ages? If they can discover such hidden springs far away in dry waste lands, much more will they know where sub-soil water is to be had in their own village fields. Moreover, there is not a sandy nullah or jungle stream that does not supply a spring channel, led sometimes three miles to a few acres of land by means of a deep cutting into which, if necessary, the water is baled. In a recent instance seen by myself, the nullah channel failed this year and the ryots promptly borrowed Rs. 200 from a sowcar and dug a huge cutting to a spot inland from the nullah where they had observed the vegetation to be green, and thus got a small supply from a land spring. (I may remark that these poor fellows are assessed at Rs. 6 per acre for a single crop on land irrigated by such a source and at such immense expense to the ryot.) Finally, the country has many wells in all sorts of places; many, though abandoned, still have water; wherever there is a basin or bottom there wells, both old and new, in use and abandoned, are to be found, but even in less likely places, such as hill sides, wells and spring channels are numerous, and it is clear that it is not ignorance which often prevents a ryot from digging a well and which leaves likely places without wells. In setting to work to teach the ryot where to find water, we are apt to forget a well-known English proverbial saying.

6. On the second point, I must observe that in the present case the money has simply been wasted because a child would, from mere inspection, have known that water was to be found at the bore localities. The instructions given precluded boring except in places where it was obvious that water would be found, and hence as an aid to the ryot the bores were useless. The general aspect of this district is that of a bare, open, undulating plain, very stony in most places, and with but very few exceptions (outside the black-soil tracts) covered with a thin stratum of cultivable soil lying on more or less disintegrated rock, which in its turn lies upon and is inextricably mingled with more or less massive but fissured rock. Moreover, a permanent water-supply, except in favored places, is hardly to be met with until below 18 or 20 feet and often much more. Hence to refuse borings in rocky places and to anything beyond shallow depths was not to touch the district at all, but to confine borings to “valleys and low grounds,” where water was certain to be met with. Accordingly forty-six bore-holes were driven, and almost without exception they were either actually in wet lands under the great Gooty and Anantapur tanks, or close to large drainage nullahs, or to irrigation channels or to wet lands. The selection lay with the Revenue officers, and while admitting that they were restricted by the instructions, it seems incredible that such places should have been selected to teach the owner of the land that there was water in its sub-soil. The maximum depth at which water was reached was 17½ feet, the minimum 4 feet, and the average between 11 and 13 feet, and this in a year when the water-supply was deficient; *a fortiori*, therefore, in ordinary years water would, in such localities, be much nearer the surface and the ryots must have known it. Every one knows, and there are many wells and pits to show it, that sub-soil water is abundant in wet lands and near drainage channels, and it was unnecessary to spend Rs. 50 per hole to ascertain this undoubted fact. Even the dry lands were not

far from wet lands, and the slight depth at which water was found shows that the ryot needed no teaching on the point; to suppose the contrary, would be to suppose that the ryot had no eyes, or need of water, and that he never dug pits or wells. One of the wells subsequently dug actually cost only Rs. 40 complete—a sufficient commentary when wells on really dry lands ordinarily cost Rs. 300; in a second case, the land in which the well was dug was actually irrigated by tank water for the principal crop. It is needless, however, to bring arguments to prove that a ryot knows there is sub-soil water in wet lands.

7. But, assuming it to be necessary to teach the ryots, I hold that boring is a mistake for all ordinary irrigation depths. In England, where labor is, say, six times as costly as in India, the apparatus at hand and machine-power cheap, boring is successful as against trial shaft digging; but here, where the converse is the case, it is a mistake. A 6-foot trial-shaft, to the same depth as the bore-holes in any of the successful bore localities, might be dug at one-fourth of the money expended in driving the 6-inch bore holes, so that a useful well would remain for the money instead of a useless gimlet-hole. This proposition I support by the prices of well-diggers' labor in the district; in all cases well-work is done by Wudders on contract at so much per unit, which in this district is the cubic fathom (4 cubits cube). The following table is averaged in rupees from returns for every taluk in the district; maximum and minimum rates are also quoted; if the sub-soil proves very hard, the Wudders will strike for an increase, which is usually given at 8 annas per cubic fathom:—

Soil.	FIRST UNIT.			SECOND UNIT.			THIRD UNIT.		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
1	2	3	4	5	6	7	8	9	10
Soft ..	RS. A. P. 0 8 0	RS. A. P. 0 4 0	RS. A. P. 0 6 0	RS. A. P. 1 0 0	RS. A. P. 0 8 0	RS. A. P. 0 12 0	RS. A. P. 2 0 0	RS. A. P. 1 0 0	RS. A. P. 1 8 0
Medium ..	1 0 0	0 6 0	0 12 0	2 0 0	0 12 0	1 8 0	4 0 0	1 8 0	3 0 0
Hard ..	1 8 0	0 10 0	1 0 0	3 0 0	1 4 0	2 0 0	6 0 0	2 8 0	4 0 0

Soil.	FOURTH UNIT.			FIFTH UNIT.		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
	11	12	13	14	15	16
Soft ..	RS. A. P. 4 0 0	RS. A. P. 2 0 0	RS. A. P. 3 0 0	RS. A. P. 8 0 0	RS. A. P. 4 0 0	RS. A. P. 6 0 0
Medium ..	8 0 0	3 0 0	6 0 0	16 0 0	6 0 0	12 0 0
Hard ..	12 0 0	5 0 0	8 0 0	24 0 0	10 0 0	16 0 0

By “very hard” soil is meant the semi-disintegrated rock which can just be tackled by the pick, crowbar and hammer; it includes rock which can be broken up by wedges and hammers: if the rock is solid it is either avoided by side excavation, or the well is abandoned. From the progress reports of the boring it will be seen that the soils attempted were usually soft or medium; wherever limestone or so-called rock was struck the bore was abandoned; practically it is almost impossible to bore by hand through rock even if not massive. Taking the maximum rates for medium hardness, an average 6 feet trial-shaft by Wudders to the second unit (12 feet), which is just below the average depth reached in boring, would have cost Rs. 3, and to the third unit (18 feet), which is the maximum bored depth, Rs. 7, as against a boring average of Rs. 52. Assuming that bores might be done cheaper in future, which, however, I doubt at the scale of pay proposed, and seeing that operations would be scattered over the country instead of all close together as in these experiments, and assuming a higher rate for Wudders for cost of superintendence, the advantage in cost

is still with the Wudders *plus* the advantage of an actual well instead of a petty bore-hole. As an instance, I point out that an actual irrigation well *complete* at one of the bore-holes actually cost only Rs. 40, while the average bore-hole cost Rs. 52; I have also seen shallow wells (12 feet), which were dug at Re. 1 per cubic fathom all round, in pretty hard gravel and kunkur.

8. But boring is also inadvisable on other grounds. The sub-soils of this district are in general so hard that the auger would have no chance and the chisel is very expensive, especially when it jams or breaks; disintegrating rock and massive though fissured rock are the usual sub-strata; hence the boring-rod would have no chance, especially at ordinary water depths of, say, 24 feet. Again repairs to rods and tools would in such case be frequent and in this district very expensive. Moreover, most of the dry land wells of this district are sunk into rock: since the boring tool has to stop where it reaches rock, unless expense is no objection, boring would in most cases give no indication whether a well could be successfully dug. In this district a ryot expects to meet rock; the only question is whether it will be so disintegrated or fissured as to allow of being broken up or of water percolating through. Hence the boring tool cannot be a guide; the trial-shaft is a much safer test. Further, it often happens that the soil contains boulders or massive rock surrounded by soft rock; the bore-hole being only 6 inches in diameter it cannot be known whether a rock is only a petty boulder, or of large size, or continuous, whereas in a shaft this can be readily ascertained; any big stone will stop a bore, but it can be got out or turned in a shaft. The District Forest officer's well at Anantapur, driven through disintegrated rock, has in this way met the edge of an out-crop of rock; leaving this on one side it has gone round and below it and found ample and excellent water: had the first shaft been a bore-hole, the site would have been abandoned. Hence the boring-rod might often mislead a ryot into abandoning a good site.

9. On the score therefore of economy and success I advocate trial-shafts by Wudders as against bore-holes by skilled artisans. If boring were still advocated, I would suggest the auger only for soft soils and replace the chisel and rod by the Chinese method of the rope and ram (Monton) armed with blunt chisels.

10. Finally, I believe that the obstacles to wells are poverty, frequent failures in supply, presence of peculation (the perquisite system), an absence of knowledge of well rules, a dislike to spend money when water is ordinarily otherwise available, the assessment rules, the absence of the homestead system, and the difficulty of piercing very hard soils.

11. A good well, 30 feet deep and perhaps 30 feet square in this district, costs from Rs. 200 to 500, according to soil and locality; to this must be added the cost of two pairs of decent bullocks, for the lift in this district is invariably worked by two pairs, one ascending the incline while the other descends. Few ryots have so much cash in hand, while the interest at only 12 per cent. on even Rs. 300 is a very heavy item in the expenses, especially as water is often so scanty that only a small area can be irrigated. If to the interest be added the expenses of several pair of good cattle, buckets and ropes, coolies, and so forth, it is obvious that, on ordinary cereal crops, there is little margin for profit even in ordinary years; hence the unwillingness of the ryot to sink wells. Even supposing him, however, to be willing, he cannot always find a lender, for in this poor district, with a railway only in the extreme north, and the soil and rainfall usually poor, land has but a very small value as evidenced by registration and other statistics. The same poverty of the district, with its wide areas and poor ryots and comparative isolation from large markets, prevents the growth of valuable crops to any great extent, as is so markedly the case in Coimbatore; chillies, tobacco, turmeric and such like are luxuries, and not much in demand; hence cereals, giving only a poor money return but certain food, are generally grown, except near tanks in the south where cocoanuts and areca are prevalent.

12. The frequent failure in the water-supply has been mentioned in paragraph 11; nothing can be more discouraging than such failure, either entire or by the sinking of the water level, as in the past and current year, owing to the exhaustion of the sub-soil stores. Such failure is, I learn, only too frequent; hence the joint system or the precarious but cheap dry cultivation.

13. If it is asked why the offers of Government to lend money at cheap rates are not taken advantage of, I reply in the first place that there is still great ignorance of the offers and of the terms of the loans. From my inquiries I am convinced that ryots are largely ignorant of the Government offers. I was even assured that, as the investigation of titles and securities for the loans gives Tahsildars and Inspectors a good deal of trouble, the applications are often discouraged, and this discouragement or negligence is one of the charges brought against Tahsildar Triembaka Rao by the late Deputy Collector. Still more do I regret to say in the second place that frequently in this district the allegation has been made to me (by officials, by private persons, and by professional men) that ryots are shy of these loans, not merely because of the rigidity of the demand but because from half to two-third is apt to be swallowed up in gifts to Government servants, especially in the villages. The great ignorance of the ryots here, the power of the village officials, especially the karnam, in an unsurveyed and unsettled district, gives ground for belief in this allegation, even if the proportion taken be exaggerated; it is then conceivable that ryots prefer the Sowkar with whom they deal personally to the Sirkar with whom they deal through several petty subordinates.

14. I am even disposed to think that all ryots are not, to this day, aware that gardens irrigated by private wells are free from all extra assessment and that only dry rate is chargeable. It is obviously to the interest of village officers to keep the ryots in darkness, and only three days ago two ryots, one of whom was a police constable, deliberately asked in a petition if it was a fact that they would only be charged dry rate for *any* crop if cultivated by a well which they proposed to dig in their dry land. It is not the habit, I am sorry to say, for ryots to attend the jamabandi in this district, so that a great opportunity is lost for openly instructing and encouraging them; I think it will be well to print certain standing rules regarding private irrigation and other simple but important matters at the foot of their puttās, and I will do this for next year.

15. As regards the notable absence of wells in wet lands, I have ascertained from numerous inquiries in tank villages, which this year are largely dry, that ryots do not care to dig wells where there is a fair chance of the tank getting supplied. Up to 1884 if they cultivated wet crops with such wells, they were liable to wet assessment, and this they object to: *e.g.*, in Dharmavaram town there is a splendid tank usually fed from the Chitravati river; this year it was practically dry; there were few wells and practically no cultivation, although in February and March I saw holes not 5 feet deep with water in them, and that not in the lowest part of the ayacut but amongst the highest; a well by the road-side near the tank bund was full of water. Ryots from want of energy in this district will not dig wells when there is an average chance of water, in spite of frequent and ruinous failures in supply and certain success in wells; in this they contrast with Coimbatore, Salem and Madura ryots, who are always ready with permanent or temporary wells. The habitual levy of wet assessment on such lands has been a great obstacle, and the new well rules, though much more favorable than formerly, still appear to admit of improvement, on which I propose to address the Board separately.

16. I have above adverted to the absence of the homestead system as accounting for the absence of wells in favorable localities and abandonment of existing wells; ryots will not grow valuable crops and keep valuable cattle a couple of miles from the village dwellings.

17. The last point is the difficulty of piercing hard rock. The Wudders here do not know the use of powder, and there is not an irrigation well in the district that bears a single blast mark in it. A superstitious or religious reason is given, viz., that the goddess in charge objects to being blasted out of her subterranean home, but prefers the pick, crowbar and wedge; I doubt the belief and think that it is want of knowledge. A few Wudders sent to Coimbatore to learn the use of powder might prove useful; not a well in that district is dug without heavy blasting with slow-acting country powder which rends rocks into large fragments. I am convinced that the use of powder would tend to increase wells: the 60,000 great wells of Coimbatore would not have been sunk without such aid.

18. I beg to apologise for the length of this letter, but I am desirous both of avoiding a waste of money and of putting plainly the difficulties in the matter of wells in a poverty-stricken, arid, rocky district. I would report in brief that it is not ignorance of where to find water that is the obstacle, but poverty and general backwardness.

Resolution—dated 1st June 1886, No. 1222.

Submitted for the orders of Government.

2. The Collector seems to show conclusively that the cost of sinking a well-shaft is less than that of making a trial-boring; but in the opinion of the Board he is mistaken in deducing a belief that such borings are of no use, and that the sinking of a trial-shaft (which may be successful) is always better than the making of a trial-boring. The Board believe the instances are numerous, where a ryot wishing to sink a well somewhere about a certain locality has not known exactly where to sink it, and a trial-boring would have given him the wanting information. The Board have known cases where ryots wanting to make a well could not afford to lose the area which would be made uncultivable by a trial-shaft, if it proved unsuccessful. In such cases they would prefer a trial-boring made at little or no cost to them. The Government no doubt have to pay considerably for it, but that is another question, and as the total expenditure is not great and the encouragement of well-sinking is a most important matter, the Board consider the money is well spent. The Collector seems to doubt whether the expense of making wells is not prohibitive, but it is certainly not so in other parts of India, and there does not appear to be any reason why Anantapur should be the single exception to the general rule.

3. As to the ignorance of the loan rules and well irrigation rules, among the ryots improvement must be slow and will depend on the intelligence and energy of the officers who come in contact with the ryots. The Collector's intention to print some of the rules at the foot of the puttass is a good one, but only a small amount of information can be circulated in this way, and he should consider whether it is not desirable to print other information as posters, which may be posted up in each village.

4. The Board await with interest the Collector's suggestions for the improvement of the new well rules.

5. It is unnecessary to send Wudders to Coimbatore to learn the use of blasting powder which is not uncommon in Bellary.

(A true Copy and Extract.)

(Signed) M. HAMMICK,
Acting Secretary.

To the Secretary to Government, Revenue Department.
Copy to the Collector of Anantapur.

ORDER—dated 13th July 1886, No. 578, Revenue.

Land Revenue, No. 46.

It appears to Government that the main points which call for attention are to make the recent rules regarding loans as public as possible, to let the ryots know that improvements made at their own cost do not involve extra taxation, and to see that when they ask for loans they get them without deductions. The Board will take the matter in hand at once and issue such instructions as will effectually secure the objects in view.

2. When the people are informed and assured on the points above indicated, it will not be long ere loans for digging wells are freely sought. If, when this is the case, the ryots find difficulty in selecting spots in which to successfully sink wells, the question of forming boring parties can be revived. At present it is unnecessary to consider it further.

(True Extract.)

(Signed) H. E. STOKES,
Secretary to Government.

To the Board of Revenue.
„ the Public Works Department.

Exd. W. H. French.

80 Copies.

Under the same No. 1978 Traff. S. 86.

Communicates to
the Superintending
Engineers for information
in continuation of No.

No. 1850 to d/o 10th August 1885
18ij J.L.

Govt. of (1886) Madras.

REVENUE.

Issued

Recd.

Encl.

G.O., 13th July 1886, No. 578.

B. 8. 1978 4899-8-86

JULY.

Wells.

With reference to the question of boring for the selection of sites for sinking — directing the Board of Revenue to make the recent rules regarding agricultural loans as public as possible, to let the ryots know that improvements made by them do not involve extra taxation, and to see that when they ask for loans they get them without deductions.

13TH JULY 1886, No. 578, REVENUE.

5

13. If it is asked why the offers of Government to lend money at cheap rates are not taken advantage of, I reply in the first place that there is still great ignorance of the offers and of the terms of the loans. From my inquiries I am convinced that ryots are largely ignorant of the Government offers. I was even assured that, as the investigation of titles and securities for the loans gives Tahsildars and Inspectors a good deal of trouble, the applications are often discouraged, and this discouragement or negligence is one of the charges brought against Tahsildar Triembaka Rao by the late Deputy Collector. Still more do I regret to say in the second place that frequently in this district the allegation has been made to me (by officials, by private persons, and by professional men) that ryots are shy of these loans, not merely because of the rigidity of the demand but because from half to two-third is apt to be swallowed up in gifts to Government servants, especially in the villages. The great ignorance of the ryots here, the power of the village officials, especially the karnam, in an unsurveyed and unsettled district, gives ground for belief in this allegation, even if the proportion taken be exaggerated; it is then conceivable that ryots prefer the Sowkar with whom they deal personally to the Sirkar with whom they deal through several petty subordinates.

14. I am even disposed to think that all ryots are not, to this day, aware that gardens irrigated by private wells are free from all extra assessment and that only dry rate is chargeable. It is obviously to the interest of village officers to keep the ryots in darkness, and only three days ago two ryots, one of whom was a police constable, deliberately asked in a petition if it was a fact that they would only be charged dry rate for *any* crop if cultivated by a well which they proposed to dig in their dry land. It is not the habit, I am sorry to say, for ryots to attend the jamabandi in this district, so that a great opportunity is lost for openly instructing and encouraging them; I think it will be well to print certain standing rules regarding private irrigation and other simple but important matters at the foot of their puttass, and I will do this for next year.

15. As regards the notable absence of wells in wet lands, I have ascertained from numerous inquiries in tank villages, which this year are largely dry, that ryots do not care to dig wells where there is a fair chance of the tank getting supplied. Up to 1884 if they cultivated wet crops with such wells, they were liable to wet assessment, and this they object to: *e.g.*, in Dharmavaram town there is a splendid tank usually fed from the Chitravati river; this year it was practically dry; there were few wells and practically no cultivation, although in February and March I saw holes not 5 feet deep with water in them, and that not in the lowest part of the ayacut but amongst the highest; a well by the road-side near the tank bund was full of water. Ryots from want of energy in this district will not dig wells when there is an average chance of water, in spite of frequent and ruinous failures in supply and certain success in wells; in this they contrast with Coimbatore, Salem and Madura ryots, who are always ready with permanent or temporary wells. The habitual levy of wet assessment on such lands has been a great obstacle, and the new well rules, though much more favorable than formerly, still appear to admit of improvement, on which I propose to address the Board separately.

16. I have above adverted to the absence of the homestead system as accounting for the absence of wells in favorable localities and abandonment of existing wells; ryots will not grow valuable crops and keep valuable cattle a couple of miles from the village dwellings.

17. The last point is the difficulty of piercing hard rock. The Wudders here do not know the use of powder, and there is not an irrigation well in the district that bears a single blast mark in it. A superstitious or religious reason is given, viz., that the goddess in charge objects to being blasted out of her subterranean home, but prefers the pick, crowbar and wedge; I doubt the belief and think that it is want of knowledge. A few Wudders sent to Coimbatore to learn the use of powder might prove useful; not a well in that district is dug without heavy blasting with slow-acting country powder which rends rocks into large fragments. I am convinced that the use of powder would tend to increase wells: the 60,000 great wells of Coimbatore would not have been sunk without such aid.

L.

The Sup. Engrs
Chf Engrs for Districts

18. I beg to apologise for the length of this letter, but I am desirous both of avoiding a waste of money and of putting plainly the difficulties in the matter of wells in a poverty-stricken, arid, rocky district. I would report in brief that it is not ignorance of where to find water that is the obstacle, but poverty and general backwardness.

Resolution—dated 1st June 1886, No. 1222.

Submitted for the orders of Government.

2. The Collector seems to show conclusively that the cost of sinking a well-shaft is less than that of making a trial-boring; but in the opinion of the Board he is mistaken in deducing a belief that such borings are of no use, and that the sinking of a trial-shaft (which may be successful) is always better than the making of a trial-boring. The Board believe the instances are numerous, where a ryot wishing to sink a well somewhere about a certain locality has not known exactly where to sink it, and a trial-boring would have given him the wanting information. The Board have known cases where ryots wanting to make a well could not afford to lose the area which would be made uncultivable by a trial-shaft, if it proved unsuccessful. In such cases they would prefer a trial-boring made at little or no cost to them. The Government no doubt have to pay considerably for it, but that is another question, and as the total expenditure is not great and the encouragement of well-sinking is a most important matter, the Board consider the money is well spent. The Collector seems to doubt whether the expense of making wells is not prohibitive, but it is certainly not so in other parts of India, and there does not appear to be any reason why Anantapur should be the single exception to the general rule.

3. As to the ignorance of the loan rules and well irrigation rules, among the ryots improvement must be slow and will depend on the intelligence and energy of the officers who come in contact with the ryots. The Collector's intention to print some of the rules at the foot of the puttis is a good one, but only a small amount of information can be circulated in this way, and he should consider whether it is not desirable to print other information as posters, which may be posted up in each village.

4. The Board await with interest the Collector's suggestions for the improvement of the new well rules.

5. It is unnecessary to send Wudders to Coimbatore to learn the use of blasting powder which is not uncommon in Bellary.

(A true Copy and Extract.)

(Signed) M. HAMMICK,
Acting Secretary.

To the Secretary to Government, Revenue Department.
Copy to the Collector of Anantapur.

ORDER—dated 13th July 1886, No. 578, Revenue.

Land Revenue, No. 46.

It appears to Government that the main points which call for attention are to make the recent rules regarding loans as public as possible, to let the ryots know that improvements made at their own cost do not involve extra taxation, and to see that when they ask for loans they get them without deductions. The Board will take the matter in hand at once and issue such instructions as will effectually secure the objects in view.

2. When the people are informed and assured on the points above indicated, it will not be long ere loans for digging wells are freely sought. If, when this is the case, the ryots find difficulty in selecting spots in which to successfully sink wells, the question of forming boring parties can be revived. At present it is unnecessary to consider it further.

(True Extract.)

H. C. C. C.

Secretary to Government.

To the Board of Revenue.
„ the Public Works Department.

Exd. W. H. French.

80 Copies.

2642

(5) P.W.C. 13805
Govt. of (1886) Madras.

REVENUE.

Issued

Recd.

Encl.

G.O., 13th July 1886, No. 578.

JULY.

Wells.

With reference to the question of boring for the selection of sites for sinking — directing the Board of Revenue to make the recent rules regarding agricultural loans as public as possible, to let the ryots know that improvements made by them do not involve extra taxation, and to see that when they ask for loans they get them without deductions.

13TH JULY 1886, No. 578, REVENUE.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following Proceedings of the Board of Revenue, dated 1st June 1886, No. 1222:—

Read—the following letter from F. A. NICHOLSON, Esq., Acting Collector of Anantapur, to the Secretary to the Board of Revenue, dated Pallaram, 12th May 1886, No. 212:—

I have the honor to submit a further report on the question of search-boring for wells in this district, as called for in Board's Proceedings, No. 287, dated 11th January 1886. I have delayed my report as I wish to see something of the country, its ryots, soils and existing wells before making a final reply.

2. A party of Sappers and Miners were sent to this district to put down bore-holes in search of water, so that ryots might not waste money in vain searches, or might be induced, on knowing that water was to be found, to dig wells from their own or Government money. The instructions received (Executive Engineer's letter to Collector, No. 2090, dated 21st January 1885) were that borings were not to be made where the soil was very rocky or where the water-bearing stratum was very deep, *i.e.*, anything below 20 feet (report for January); hence, as remarked by the Executive Engineer (*loc. cit.*), only properties lying in valleys and low grounds could be worked at. The party began work on 16th December 1884 at Gooty, and continued it at Anantapur, putting down altogether forty-six bore-holes averaging 13 feet deep almost entirely through clay, sand and gravel in sixteen weeks at a total expense of Rs. 2,398, or Rs. 52 per bore. This sum includes only the Sappers' pay, cost of tools, repairs and contingencies (G.O., No. 821, Revenue, dated 15th July 1885), and not the cost of superintendence; *per contra*, the value of the plant at the end of the experiment is to be credited.

3. On a consideration of the whole case, I have to remark that the boring experiment was a failure. In this I mean no reflection upon the intention of the experiment or on the efforts of the party; the beneficence of the intention is undeniable and, so far as I hear, the efforts of the party admirable, but the profitable result is simply *nil*. I proceed to support this allegation.

4. I would remark (1) that it is extremely questionable whether, artesian wells being excluded, we can teach the ryots anything regarding sub-soil water at ordinary depths; (2) that in this particular instance the places selected were such that any man of common intelligence would have known, without the bore, that water would be easily found; (3) that ordinary boring is unsuited to the country or at least to this district as a method of search for ordinary sub-soil water; (4) that the remedies for the absence of wells, where needed, are not those for ignorance of the existence of water, but for poverty, or for want of a better system of overcoming the difficulties of rocky soils, &c.

5. Regarding point 1, I have observed the knowledge of the ryots regarding sub-soil water in Madura (especially the Palni taluk), Coimbatore and Salem, and have found it to be remarkable; it is *not* guided by superstition as supposed, but by observation and long experience. The astrologer is indeed called in, and perhaps the plan of pouring water on a sheep's head and noting when it shakes itself may be tried, but this is merely to indicate the place of turning the first sod, or the precise *locale* of the well; its general position is determined by the ryot and will always be found to be in the part of the field most promising for water and most suited for irrigating the largest possible area with the least possible toil. When the very hope of existence largely depends upon sub-soil water it is *a priori* improbable that in so simple a matter the experience of thousands of years should not have taught the ryots where to look for water; the wells of Salem and Coimbatore prove that they do know where to look for and how to get water. As the Ceded Districts' ryots are certainly not less dependent on

water, it is presumable that they also know where to look, and tours in this district show me that the ryots are as perfectly acquainted as their Tamil brethren with all possible sources of water and all the most likely places. I am astonished indeed at the marvelous knowledge and industry which they have displayed all over this district, and, while wells are pretty numerous, the little channels dug from land springs are marvels of patient industry. This district has such wide waste areas that land springs are frequently far distant from village cultivation, in which case it is well known that no one will venture to dig a well and make a garden from the old fear of robbers—a fear comparatively small now, but not long ago a real obstacle to cultivation far from the (still) fortified villages; hence, and because the ryot is gregarious, and will not adopt the homestead system, springs distant from the village-site are useless for well purposes. The ryots have therefore adopted the plan of co-operation; men of all castes and classes join in “gonchi (joint) puttās,” uncover the land springs, and bring the tiny streams of water even as much as two miles from the springs to 10 or 20 acres of land. These springs will be found on the driest hill sides many feet under the surface, and the water is led by cuttings often many feet deep to the fields where it is wanted. How came the ryots to know of these springs, except that they have acute powers of observation added to the experience of ages? If they can discover such hidden springs far away in dry waste lands, much more will they know where sub-soil water is to be had in their own village fields. Moreover, there is not a sandy nullah or jungle stream that does not supply a spring channel, led sometimes three miles to a few acres of land by means of a deep cutting into which, if necessary, the water is baled. In a recent instance seen by myself, the nullah channel failed this year and the ryots promptly borrowed Rs. 200 from a sowcar and dug a huge cutting to a spot inland from the nullah where they had observed the vegetation to be green, and thus got a small supply from a land spring. (I may remark that these poor fellows are assessed at Rs. 6 per acre for a single crop on land irrigated by such a source and at such immense expense to the ryot.) Finally, the country has many wells in all sorts of places; many, though abandoned, still have water; wherever there is a basin or bottom there wells, both old and new, in use and abandoned, are to be found, but even in less likely places, such as hill sides, wells and spring channels are numerous, and it is clear that it is not ignorance which often prevents a ryot from digging a well and which leaves likely places without wells. In setting to work to teach the ryot where to find water, we are apt to forget a well-known English proverbial saying.

6. On the second point, I must observe that in the present case the money has simply been wasted because a child would, from mere inspection, have known that water was to be found at the bore localities. The instructions given precluded boring except in places where it was obvious that water would be found, and hence as an aid to the ryot the bores were useless. The general aspect of this district is that of a bare, open, undulating plain, very stony in most places, and with but very few exceptions (outside the black-soil tracts) covered with a thin stratum of cultivable soil lying on more or less disintegrated rock, which in its turn lies upon and is inextricably mingled with more or less massive but fissured rock. Moreover, a permanent water-supply, except in favored places, is hardly to be met with until below 18 or 20 feet and often much more. Hence to refuse borings in rocky places and to anything beyond shallow depths was not to touch the district at all, but to confine borings to “valleys and low grounds,” where water was certain to be met with. Accordingly forty-six bore-holes were driven, and almost without exception they were either actually in wet lands under the great Gooty and Anantapur tanks, or close to large drainage nullahs, or to irrigation channels or to wet lands. The selection lay with the Revenue officers, and while admitting that they were restricted by the instructions, it seems incredible that such places should have been selected to teach the owner of the land that there was water in its sub-soil. The maximum depth at which water was reached was 17½ feet, the minimum 4 feet, and the average between 11 and 13 feet, and this in a year when the water-supply was deficient; *a fortiori*, therefore, in ordinary years water would, in such localities, be much nearer the surface and the ryots must have known it. Every one knows, and there are many wells and pits to show it, that sub-soil water is abundant in wet lands and near drainage channels, and it was unnecessary to spend Rs. 50 per hole to ascertain this undoubted fact. Even the dry lands were not

far from wet lands, and the slight depth at which water was found shows that the ryot needed no teaching on the point; to suppose the contrary, would be to suppose that the ryot had no eyes, or need of water, and that he never dug pits or wells. One of the wells subsequently dug actually cost only Rs. 40 complete—a sufficient commentary when wells on really dry lands ordinarily cost Rs. 300; in a second case, the land in which the well was dug was actually irrigated by tank water for the principal crop. It is needless, however, to bring arguments to prove that a ryot knows there is sub-soil water in wet lands.

7. But, assuming it to be necessary to teach the ryots, I hold that boring is a mistake for all ordinary irrigation depths. In England, where labor is, say, six times as costly as in India, the apparatus at hand and machine-power cheap, boring is successful as against trial shaft digging; but here, where the converse is the case, it is a mistake. A 6-foot trial-shaft, to the same depth as the bore-holes in any of the successful bore localities, might be dug at one-fourth of the money expended in driving the 6-inch bore holes, so that a useful well would remain for the money instead of a useless gimlet-hole. This proposition I support by the prices of well-diggers' labor in the district; in all cases well-work is done by Wudders on contract at so much per unit, which in this district is the cubic fathom (4 cubits cube). The following table is averaged in rupees from returns for every taluk in the district; maximum and minimum rates are also quoted; if the sub-soil proves very hard, the Wudders will strike for an increase, which is usually given at 8 annas per cubic fathom:—

Soil.	FIRST UNIT.			SECOND UNIT.			THIRD UNIT.		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
1	2	3	4	5	6	7	8	9	10
Soft	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Medium	0 8 0	0 4 0	0 6 0	1 0 0	0 8 0	0 12 0	2 0 0	1 0 0	1 8 0
Hard	1 0 0	0 6 0	0 12 0	2 0 0	0 12 0	1 8 0	4 0 0	1 8 0	3 0 0
	1 8 0	0 10 0	1 0 0	3 0 0	1 4 0	2 0 0	6 0 0	2 8 0	4 0 0

Soil.	FOURTH UNIT.			FIFTH UNIT.		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
	11	12	13	14	15	16
Soft	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Medium	4 0 0	2 0 0	3 0 0	8 0 0	4 0 0	6 0 0
Hard	8 0 0	3 0 0	6 0 0	16 0 0	6 0 0	12 0 0
	12 0 0	5 0 0	8 0 0	24 0 0	10 0 0	16 0 0

By “very hard” soil is meant the semi-disintegrated rock which can just be tackled by the pick, crowbar and hammer; it includes rock which can be broken up by wedges and hammers: if the rock is solid it is either avoided by side excavation, or the well is abandoned. From the progress reports of the boring it will be seen that the soils attempted were usually soft or medium; wherever limestone or so-called rock was struck the bore was abandoned; practically it is almost impossible to bore by hand through rock even if not massive. Taking the maximum rates for medium hardness, an average 6 feet trial-shaft by Wudders to the second unit (12 feet), which is just below the average depth reached in boring, would have cost Rs. 3, and to the third unit (18 feet), which is the maximum bored depth, Rs. 7, as against a boring average of Rs. 52. Assuming that bores might be done cheaper in future, which, however, I doubt at the scale of pay proposed, and seeing that operations would be scattered over the country instead of all close together as in these experiments, and assuming a higher rate for Wudders for cost of superintendence, the advantage in cost

is still with the Wudders *plus* the advantage of an actual well instead of a petty bore-hole. As an instance, I point out that an actual irrigation well *complete* at one of the bore-holes actually cost only Rs. 40, while the average bore-hole cost Rs. 52; I have also seen shallow wells (12 feet), which were dug at Re. 1 per cubic fathom all round, in pretty hard gravel and kunkur.

8. But boring is also inadvisable on other grounds. The sub-soils of this district are in general so hard that the auger would have no chance and the chisel is very expensive, especially when it jams or breaks; disintegrating rock and massive though fissured rock are the usual sub-strata; hence the boring-rod would have no chance, especially at ordinary water depths of, say, 24 feet. Again repairs to rods and tools would in such case be frequent and in this district very expensive. Moreover, most of the dry land wells of this district are sunk into rock: since the boring tool has to stop where it reaches rock, unless expense is no objection, boring would in most cases give no indication whether a well could be successfully dug. In this district a ryot expects to meet rock; the only question is whether it will be so disintegrated or fissured as to allow of being broken up or of water percolating through. Hence the boring tool cannot be a guide; the trial-shaft is a much safer test. Further, it often happens that the soil contains boulders or massive rock surrounded by soft rock; the bore-hole being only 6 inches in diameter it cannot be known whether a rock is only a petty boulder, or of large size, or continuous, whereas in a shaft this can be readily ascertained; any big stone will stop a bore, but it can be got out or turned in a shaft. The District Forest officer's well at Anantapur, driven through disintegrated rock, has in this way met the edge of an out-crop of rock; leaving this on one side it has gone round and below it and found ample and excellent water: had the first shaft been a bore-hole, the site would have been abandoned. Hence the boring-rod might often mislead a ryot into abandoning a good site.

9. On the score therefore of economy and success I advocate trial-shafts by Wudders as against bore-holes by skilled artisans. If boring were still advocated, I would suggest the auger only for soft soils and replace the chisel and rod by the Chinese method of the rope and ram (Monton) armed with blunt chisels.

10. Finally, I believe that the obstacles to wells are poverty, frequent failures in supply, presence of speculation (the perquisite system), an absence of knowledge of well rules, a dislike to spend money when water is ordinarily otherwise available, the assessment rules, the absence of the homestead system, and the difficulty of piercing very hard soils.

11. A good well, 30 feet deep and perhaps 30 feet square in this district, costs from Rs. 200 to 500, according to soil and locality; to this must be added the cost of two pairs of decent bullocks, for the lift in this district is invariably worked by two pairs, one ascending the incline while the other descends. Few ryots have so much cash in hand, while the interest at only 12 per cent. on even Rs. 300 is a very heavy item in the expenses, especially as water is often so scanty that only a small area can be irrigated. If to the interest be added the expenses of several pair of good cattle, buckets and ropes, coolies, and so forth, it is obvious that, on ordinary cereal crops, there is little margin for profit even in ordinary years; hence the unwillingness of the ryot to sink wells. Even supposing him, however, to be willing, he cannot always find a lender, for in this poor district, with a railway only in the extreme north, and the soil and rainfall usually poor, land has but a very small value as evidenced by registration and other statistics. The same poverty of the district, with its wide areas and poor ryots and comparative isolation from large markets, prevents the growth of valuable crops to any great extent, as is so markedly the case in Coimbatore; chillies, tobacco, turmeric and such like are luxuries, and not much in demand; hence cereals, giving only a poor money return but certain food, are generally grown, except near tanks in the south where cocoanuts and areca are prevalent.

12. The frequent failure in the water-supply has been mentioned in paragraph 11; nothing can be more discouraging than such failure, either entire or by the sinking of the water level, as in the past and current year, owing to the exhaustion of the sub-soil stores. Such failure is, I learn, only too frequent; hence the joint system or the precarious but cheap dry cultivation.