M.R.O. 14—5,450—22-10-25.

MADRAS RECORD OFFICE.

Government of Madras.

Revenue **DEPARTMENT.**

G.O. No. 2843 Press ~~Mis.~~

483.484

Dated 19-10-1866.

Not to be folded or roughly handled

No. 483. Read the following letter from the Government Astronomer, to the Acting Chief Secretary to Government, Fort Saint George, dated Madras Observatory, 1st September 1866 :—

I have the honor to forward, herewith, a Statement of the Rain Returns received from the various Districts of the Madras Presidency, up to the month of July 1866, in reply to the Proceedings of the Madras Government, Public Department, 4th July 1865, and the Order thereon, No. 704. I beg leave at the same time to offer the following remarks and suggestions in reference to the Returns under consideration.

First.—My immediate object on first undertaking to receive and discuss the Rain Returns of the Revenue Department was, to form a Rain Map of the Presidency, based upon all past records up to a certain fixed date ; shewing, at sight, the height above sea level, and average fall for each station, for which such average was obtainable from not less than five complete years of trustworthy registration. To enable me to accomplish this task, it was obviously requisite that detailed copies, intelligibly prepared, should be furnished me, of all past measurements ; but as these have not yet been forthcoming, the Rain Map could not be constructed. As soon as I can be placed in possession of the necessary data, complete up to the end of the year 1865, this first step shall receive my earliest attention ; but until such time I see no prospect of the current returns being rendered available for any purpose beyond a mere statement of the absolute fall from month to month, information of but little value compared with that easily derivable from them, if the averages were but at hand to shew whether the quantity received in each District was in excess or defect of that due up to date.

Second.—To render the means of the various Registers comparable with each other and with those of the Observatory, or in other words, from the means of a few years to assign the most probable average values which would have been found if such Registers had extended over the same long term of years as that of the Observatory, something more than simple division of the total rain-fall by the number of years in which it fell is required. Although it is well known that rain is often very partially and irregularly distributed from day to day, yet it will be found, upon the whole, that when seasons or years are compared, a surplus or a deficiency will be pretty generally felt as such, not only within this Presidency, but over the whole of India, and probably throughout the tropical zone. The annual rain-fall at any place situated within the tropics is undoubtedly subject to fluctuations, in regular periods, which, though mixed up with and disguised by disturbing influences of a casual nature, cannot be overlooked in a long series of records, such as those of the Observatory. In adopting a standard or average rain-fall for any place, it is as necessary to state the years of observation as the number of years upon which such average depends. This may be readily shewn by the Madras Register between 1803 and 1865. The Returns for 1808 are missing, having been destroyed by white ants, at a time when the official manuscripts were less cared for than they have been of later years. Those also for the four years, 1809 to 1812, made by the native Assistants during the long absence of the Astronomer (Mr. Goldingham) in England, were also flagrantly wrong, and had to be rejected

accordingly. The remaining fifty-eight years, viz., 1803 to 1807, and 1813 to 1865, give a mean annual fall of forty-eight inches, which I propose to adopt as the best approximation yet obtainable. All other meteorological averages rest upon the observations taken during the twenty years, 1841 to 1861, and adopting the same term of years for the rain mean, the annual fall comes out fifty and three-quarter inches, the number hitherto used, and probably in excess. If the average rested solely upon the five years, 1844 to 1848, it would amount to above sixty-three inches; whereas, the mean of the six years, 1860 to 1865, is only forty-one inches. When such uncertainty exists in regard to the true average, at a place where the Registers have been carefully kept through considerably more than half a century, it might be deemed vain to place any reliance upon means of so few years as those during which the Revenue Board gauges have been in use, never more than thirteen, frequently only five or six, and in many cases not consecutively from first to last. The plan of procedure is as follows. Having rejected any incomplete or doubtful returns for past years, a mean must be taken of those supposed to be trustworthy. The mean rain-fall at Madras, during the same years, must then be taken out of the Observatory Records, and assuming the annual Madras average to be forty-eight inches, we shall have for every separate station, the proportion—

Mean rain-fall at Madras during the years of registration.	:	Mean rain-fall actually noted at station in years of registration.	::	Madras average or 48 inches.	:	Most probable average at station.

As examples of this method of deducing, the averages may be given—

Mean rainfall at Madras from 1858 to 1862 = 41·3 inches.	:	Do. at Cuddalore for same five years = 41·8 inches.	::	48 icnhes.	:	Cuddalore average = 48·5 inches.
Mean rain-fall at Madras from 1853 to 1862 = 46·1 inches.	:	Do. at Secunderabad for same 10 years = 24·1 inches.	::	48 inches.	:	Secunderabad average = 25·1 inches.

In the former instance, the simple mean of the five years registered at Cuddalore would mislead us into the supposition that the rain-fall at that station was less than that of Madras, in the proportion of $41\frac{1}{4}$ to 48; whereas, by the above treatment, we find it to be nearly the same, as might have been expected from a consideration of the relative positions of the two places, on the same coast line, and only a comparatively short distance apart.

Third.—From the considerations just stated, it appears, then, that the rain due at any spot in successive years is not a constant or average quantity, but a varying one, the periodical fluctuations of which are obeying some yet undiscovered law, greatly perturbed and disguised by local influences and casual storms, but nevertheless as systematic and undeviating in its rule as any other now recognized in better understood sciences.

Variations in the number of the solar spots, in a period of about eleven years, have of late become an established fact, and coincidental changes in the extent of the diurnal variations of the elements of terrestrial magnetism, have pointed out a certain though yet unexplained connection between the two phenomena. European Meteorologists have failed to trace any corresponding periodicity in the atmospherical phenomena of their climate; but I cannot help entertaining a very strong opinion, that when similar researches have been based upon tropical records,

where the solar influences predominate, they will lead to a very different result; and that not only the intensity of sunshine, a subject deserving the most earnest consideration of all who have to endure it, but also the rain-fall itself will prove to be following what may be termed a compound period. The years of scarcity and plenty might then be looked for in advance, information which would, I conceive, be of the utmost value should it ever be attained to, the realization of which is by no means chimerical, but almost now yielding to the investigations in hand in regard to the solar constitution. The causes of such periodical changes may remain unknown for some years longer, but the effects once fairly traced out by patient research, the explanation must and will follow as a matter of course.

Fourth.—With such far higher ends in view, in addition to the actual current value of correct Rain Returns throughout the Presidency, it behoves us to use our best endeavours to improve the future records, and to submit those already made to the best and most careful treatment, so as to free them from all errors capable of correction. In a letter to the Secretary to Government, in the Revenue Department, dated 1866, August 8th, I have already recommended the construction of a number of improved yet cheap rain gauges to be made at the Public Works Department, subject to my own supervision and examination before issue. The main superiority of these gauges will consist in their being all fitted with turned brass funnel rims 4·697 inches in diameter, so as to make an avoirdupois ounce of water correspond exactly to one-tenth of an inch of rain; and their being provided with stout glass ten ounce measures, divided to ounces and half-ounces, so that hundredths of an inch may be easily read off by all who understand decimals, or equally serviceable records may be kept by any one, in ounces and quarters, without the use of decimals. The glass measures have to be obtained from England, but may surely be had out at short notice, early in 1867, before the setting in of the south-west monsoon along the Western Coast of the Presidency. The strict uniformity of the turned funnel rims of the new gauges will render them all fairly comparable with each other; whereas, those now in use are so rough and inaccurate in this respect, that from error of diameter alone the returns are uncertain to not less than three or four per cent. of the whole quantity measured. If on receipt of each new gauge, the old one is distinctly labelled with the name of the station at which it has been used, and its funnel and tin measure forwarded to me for examination; by measuring the former, and weighing the contents of the latter, the past returns can be corrected, and thereby rendered of far greater value than without such precaution. Unless the greatest care is however taken to enable me to distinguish the funnel and measure of each respective station, their transmission will be perfectly useless, and its object entirely defeated.

Fifth.—In regard to the two Forms A. and B., ordered to be supplied to me from each District, the enclosed Statement will shew in detail the irregularity and incompleteness of most of the Registers hitherto submitted. Nothing could be more simple than the few directions given in the Standing Circular, No. CXIX., Board No. 5,631, dated 9th September 1863; and if the Collectors of other Districts would have complied therewith as carefully as those of Godavery, South Canara, and Malabar, not a word of complaint would have been needed. As it is, however, the Circular referred to might as well have never been issued, so little have its recom-

mendations been attended to. It would be well for those gentlemen to remember, that in undertaking to realize the results of the too often confused and nearly unintelligible returns, some of them have been furnishing for years past, much personal labor is voluntarily incurred by me in attempting it at all;—that by compliance with my very reasonable requests, as embodied in that Circular, they would be greatly assisting me and facilitating the object in view; while by neglecting the same they are absolutely defeating the scheme, and giving me much needless extra trouble and loss of time. My own ordinary duties in the Observatory are of so fatiguing a nature (and I have not a single assistant whose official time is available for the reduction of the Rain Reports) that it is of the first importance for me to be spared all needless correspondence, and that everything should be done to assist the work and remove difficulties instead of creating them. It cannot surely be expected that, having clearly expressed what is wanted, I should have to write officially to each individual Collector, with further directions, before receiving the desired returns! Yet in many cases this has evidently been waited for. One letter, No. 6,233, of the Proceedings of the Board of Revenue, dated 1st October 1863, from the Collector of Kurnool, is so extraordinary as to be worthy of special remark. Paragraph 3 shews too truly that, as it states, "*no one in the Kurnool Cutcherry is acquainted with decimal notation.*"

As none of the past annual returns in Form B. have yet been supplied *as requested*, it may be better to ask only for the complete list of all past records not yet furnished, strictly in accordance with Form A. When there are too many stations to be contained on one side of a foolscap page, the Form should be printed on both sides, and the report should be continued at the back, but never arranged upon the double size or open sheet. The supply of a sufficient number of blank forms to each District, agreeably to Order, Public Department, 11th February 1863, No. 156, would ensure uniformity; and this, with better attention to the five paragraphs of the Standing Circular, would materially aid me in the construction of the Presidency Rain Map, with the least possible delay. I should be glad of five hundred such blank forms at the Observatory, to put in hand the copying out and re-arranging of the many just intelligible but irregular returns now in my possession, of which, however, I do not wish to ask for fresh copies from the original senders. The Collectors may please themselves whether they furnish the past returns in Form A. or B.; either will do, but both are not desired. It is better also to avoid all needless notes upon the reports, such as title of office, date of despatch, reference to Proceedings of Government, or even signature! Nothing should appear upon the Form beyond the information immediately desired.

Sixth.—So far as could be done, the averages for the Districts of Vizagapatam, Bellary, Madras, Trichinopoly, and South Canara, have been worked out by my third or Meteorological Assistant in his over-time, agreeably to paragraph 4 of the Order, Public Department, No. 156, dated 11th February 1863. He has thus worked eighty-seven hours, but I have not thought it advisable to suggest payment for the little yet done until the reductions are further advanced. For this, however, we have to await the arrival of the long-expected-back returns from the many Districts from which they have not yet been supplied.

Seventh.—When the averages for each station, and hence for each District or such Sub-divisions thereof as may be considered best for general purposes, have been deduced, the future monthly Rain Returns may be published in the "Fort Saint George Gazette," in a condensed form, shewing for each District or Sub-division thereof, the actual fall, and also its per-centage of the average due up to date since the commencement of the year. The latter way of exhibiting rain-fall is far more intelligible and valuable than any other, as it shews at once the excess or deficiency, as the case may be, up to the time of the report. Thus, the mere statement that 6·49 inches of rain have been measured this year in Madras up to this date (August 31st) is of small interest, unless it is also made known that the average quantity due in the first eight months of the year is 15·41 inches, and that there is, therefore, a deficiency of 8·92 inches; whereas, if we say that the rain-fall received is only forty-two per cent. of the average due, the mind instantly and without any effort grasps the supplementary consideration, that the deficiency must be fifty-eight per cent., and that so far it has been a very unfavorable and trying year.

Eighth.—As the reports now arrive pretty regularly, I am ready, if desired, to furnish monthly abstracts to the "Fort Saint George Gazette," of the actual rain-falls as at present supplied me, giving the mean quantity measured in each of the inland Districts; and for the rest, distinguishing between the coast line, which might be considered as including all stations within twenty direct miles of the sea, and the inland portion, thereby meaning the average of the remaining stations. If the Collectors would favor me by posting their reports with despatch at the close of each month, this abstract might be printed in the second Tuesday's Gazette of the month following that to which the numbers referred.

No. 484. ORDER THEREON, 19th October 1866, No. 2,843.

Miscellaneous.

1. Mr. Pogson's letter will be communicated to the Board of Revenue.

2. The arrangement proposed at the end of paragraph 4 will be duly attended to by the Board when the new gauges and measures are supplied.

3. The Board will issue instructions to the Collectors for the early submission of the returns still due. There ought to be no difficulty in this respect, as the work can be performed by any careful Copyist.

4. The Government wish the Board to ascertain from the Collectors explicitly what means they possess for having the rain gauges properly attended to, and what measures they have adopted or would recommend with that view. The Board will also ascertain the views of Collectors as to advisability, with the class of servants now available for such work, of having the measurements in inches and decimals, instead of in "measures" and parts of a "measure" as used to be the case.

(True Extract.)

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

To the Board of Revenue.
,, the Government Astronomer.

Exd. S. T. Augustin.

~~Pro 4th July 65 No 12 215~~
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R Pro. 27 July 63 No. 411-412
7 July 65 - " - 101-102
C No. 3084 of 66 - in Pro
19 Sept - " - 451-452

No. 483.

C 11 Oct 1866

Rev. Pro. 18th Oct. forwd for Sanction
No. 3424

From
The Government Astronomer
To A. D. Pein Esq.
Secretary to Government
Fort St George.

Madras Observatory Aug 31st 1866.

Received 5th Sept.
Ans. 5th Oct.

No 1138

Pesdlo Board

Submitting detailed statement of all Revenue Board Rain Returns supplied to the Government Astronomer up to July 1866 with remarks thereupon and further suggestions; — in reference to Proceedings of Madras Government, Public Department 4th July 1865 and the Order thereon No 704.

? Reference this
Sees 2843. 19 Oct

No. 2843.

19th Octr 70

Wor

Mr Popson seems utterly ignorant of our Customs and apparently ex-pects such observations as would be received from an Observatory! Our establishments have lately been reduced, all over the country, to the strength actually required for regular business and that business even is certainly not done without delay. If he really expects such accurate returns as will admit of Nature's laws being discovered, he is, I fear, about as sanguine as the individual who boiled his door mat a boiled carrot.

JB

Mr Popson's letter will be com.d to the Bd of Rev.

The arrangements proposed at the end of para 4 will be duly attended to by the Bd so soon the necessary forms & measures are supplied.

The Bd will issue instructions to the Collrs for the early transmission of the returns & title deeds. There ought to be no difficulty in this respect - as the work can be performed by any careful Collr

The first wish the Bd to ascertain explicitly from the Colrs what means they possess for having the rain prayer properly attended to and what measures they have adopted or would recommend with that view. The Bd wish also ascertain the views of Colrs as to advisability - with the class of servants available for that work - of having the Instruments in inches & decimals - instead of in "Mentures" & parts of a "Menture" as used the Code -

L D S

14 Feb Board of Rev Dr 22 Oct
1 The Pool Ashmansworth

Revenue 1866 Dept.
Pro of Govt. for Oct.

No. 2813.

Pro of the Madras
Government
dt 19th Oct. 1866.

Regarding the pre-
paration of Rain returns
Communicated to Board
of Revenue with ins-
tructions:-

No. 483+484