

INVESTIGATION OF GROUND WATER TO ALLEVIATE DROUGHT
EXPERIENCED IN THE LOW COUNTRY WET-ZONE

By

WARNAKULASURIYA DON LEONARD STANLEY

Thesis

Submitted in partial fulfillment of the requirements

for the degree of

MASTER OF PHILOSOPHY

in the

POSTGRADUATE INSTITUTE OF AGRICULTURE

of the

UNIVERSITY OF PERADENIYA

PERADENIYA

C 631.7
S71

AUGUST 2003



556836

AGRICULTURE LIBRARY
UNIVERSITY OF PERADENIYA

556836

ABSTRACT

Cultivation in the low country wet zone was mainly under rain fed condition. Factors influencing crop failures were established during the investigation. The establishment of drought during cultivation period was one of the objectives of the study. This was achieved through the probabilities of periods of drought where Gamma distribution of probabilities of non rainy days showed that longer period of drought existed. Investigation of trend in the variation of soil moisture deficit was the second objective. The water balance study showed that there was an increasing trend of soil moisture deficit and it was also observed that practically every month, observed values of soil moisture deficit was greater than the predicted values. The above information achieved the second objective. The establishment of rainfall for Gampaha District was the third objective. The established rainfall regime showed that very often, there were occurrences of monthly rainfall amounting to less than 25mm during the months of the year and thus the achievement of the third objective was supported by the above facts. Exploring the possibility of using shallow wells at the time of drought was the fourth objective of the study. The respective values for transmissivity of the aquifer's depth to water table, also depth of water in shallow wells located at Walpita, Veyandoda, Doranagoda were $49.05\text{m}^2/\text{day}$, $24.34\text{m}^2/\text{day}$, $115.4\text{m}^2/\text{day}$, 4.8m 3.2m 5.2m, and 0.9m 1.2m 1.57m. These values on comparison with those for the same parameters pertaining to aquifers and shallow wells in the other area of study showed possibility of using shallow wells for supplementary irrigation at the time of drought. This was further confirmed by economic analysis which showed that farmers from this areas could earn a net income of RS 30,000 per month from the cultivation of betel using a 5 mm kerosene pump and RS 40,000 as net income per month using a similar electric pump. The larger amount of recharge assessed on the basis of area bounded by drawdown curves for locations at Walpita, Doranagoda, Kehelbadara in the study area also confirmed, the possibilities of using shallow wells at the time of drought. The above findings enabled to achieve the fourth objective of the study.

Evaluation of methods employed in the study was the final objective. On superimposition of values of coefficient of transmissibility of aquifer from Kriging and Cluster techniques it was observed that these values were consistent with each other. Test of consistency of predicted and observed values of rain fall regime showed that the coefficient of correlation was always greater than 72 percent during the year of assessment. The above findings achieved the final objective of the study. The technique developed predicted recharge possible in any location . A map was produced to identify the depth to water level for sitting a well for cultivation.