RAINFALL EROSIVITY IN TANZANIA

BY

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ABSTRACT

A study was conducted with the main aim of making an iso-erodent map of Tanzania. The specific objectives/steps in this study were, first, to collect rainfall data from a few selected meteorological stations; second, to select erosivity index for calculating the erosivity of storms; third, to model the erosivity using easily available rainfall parameters; fourth, to extrapolate the model to a large number of rainfall recording stations; fifth, and last, to map the erosivities.

Eleven meteorological stations were selected for studying and modelling erosivity. Using EI_{30} index, (Wischmeier and Smith, 1958) daily erosivities of 10 217 storms from the stations have been calculated using information obtained from the charts of daily recording raingauge. Average monthly erosivities have been found. Ten-year averages have been used in order to portray long term trends. A highly significant correlation between daily amount of rainfall and erosivity has been observed.

A multivariate linear prediction model has been obtained for predicting monthly erosivity. The model is based on more easily available rainfall parameters of average monthly total rainfall, average number of days per month

receiving rainfall of at least one millimetre, and the average maximum daily rainfall of the month.

The prediction model has been used to calculate mean monthly erosivities of 347 stations from all over the country; the mean annual erosivities of the stations have been obtained by summation of the mean monthly erosivities. The rainfall parameters fed in the model have been averaged for a period of at least ten years.

The mean annual erosivities of the stations have been entered in the map of Tanzania which has been drawn at a scale of 1:7000 000, and an iso-erodent map has been obtained.

Areas of high erosivity have been found to be associated with areas of high rainfall. Highest risk areas have been found to be in Rungwe/Ileje districts in the Southern Highlands of Mbeya region where erosivity values of up to 2105 joules per hectare have been observed. Other potential risk areas include the areas around Mt. Kilimanjaro in northern Tanzania, western parts of Lake Victoria, and eastern parts of Lake Tanganyika. Other areas include some areas of Ruvuma region, especially the eastern parts of Lake Nyasa, the Zanzibar Island, and the coastal areas.

Low risk areas have been found to be the central regions of Dodoma and Singida and some areas bordering these regions, and some parts of Kilimanjaro region particularly in Same district where erosivity values as low as 176 joules per hectare have been observed.

An erosivity map shows in general, the areas where concerted efforts needed to conserve natural resources may be required (high risk areas). Knowledge of potential erosivity is important for development planning.

Since plant cover is an important factor which determines the impact of rain drops on soil, and since low rainfall contributes to sparsity of cover, emphasis has been put on soil conservation in drier areas of Tanzania where erosivity is relatively low but the rains fall on poorly protected soils thus increasing the chances of erosion.

Conservation planning has also been found to be important in high risk areas particularly where plant cover is removed, e.g. in the process of opening up new lands for agriculture.

DECLARATION

I, ELEUTER T.S. NYENZA, do hereby declare to the Senate of the Sokoine University of Agriculture that this thesis is my own original work and has not been submitted in any other University for a degree award.

Date: 20.11.1995 Signature: .....

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DEDICATION

This thesis is dedicated to my beloved mother, Mhanila Givangumtemi Mkangutangu Sekasike.

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CHAPTER ONE

INTRODUCTION

1.1 Background information

Erosion is the disruption of the soil mantle, the pedosphere, or the underlying rock base, the lithosphere, by the action of matter of exogenous origin, i.e. by external geomorphic factors. Soil erosion generally means the destruction of soil by the action of water and wind (Zachar, 1982). The influence of water and wind is accelerated by human activity.

Today, soil erosion is universally recognized as a serious threat to man's well being, if not to his very existence, and this is shown by the fact that most governments outside Europe give active support to programs of soil conservation (Hudson, 1981). The effects of erosion are felt not only in the areas where top soil is removed by water and wind, the subsoil and bedrock exposed and the land entrenched by gullies, but also in the areas down-valley or downwind where the ground is covered with sand and silt deposits, ditches and canals are clogged with sediment and reservoirs silt up. Deterioration in the quality of cropping and grazing land as a result of erosion reduces productivity and increases expenditure of fertilizers to maintain

fertility. In extreme cases yields become so poor that land has to be taken out of cultivation. Siltation of reservoirs and rivers reduce their capacity creating a flood hazard, and the sediment is a major pollutant lowering water quality (Morgan, 1986).

A comprehensive review of soil erosion problems in Tanzania has been published by Rapp et al. (1972). Rapp (1975) reported that annual sediment yields from the semiarid plains of Dodoma area of central Tanzania and Arusha district of northern Tanzania were as high as 200-730 m^3 km^{-2}. In another study from semiarid Tanzania, Christiansson (1981) reported high erosion rates corresponding to sediment yields of 174 to 602 m^3 km^{-2} per year. Watson (1973) and The Tanga Water Master Plan (1976) reported that the soils on the slopes of the Usambara Mountains in Tanzania are highly susceptible to erosion. Some areas of Tanzania are among the areas which have been delineated in Africa where human-induced water erosion is estimated to have permanently reduced soil productivity by more than 20% during the past 100 years. Erosion has impaired long term soil productivity in the Dodoma region and in the Uluguru Mountains in Tanzania (Dregne, 1990).

Soil erosion is a three-phase process. The first phase consists of the detachment of individual particles of the

soil mass. The second phase involves their transport by erosive agents such as running water and wind. A third phase, deposition, occurs when sufficient energy is no longer available to transport the particles.

Soil erosion is a function of five important factors, namely rainfall erosivity, soil erodibility, length and angle of slope, crop or vegetation cover and conservation practice. Rainfall is the driving force behind most soil erosion processes, through its creation of particle detachment and overland flow.

Rainfall erosivity is the potential ability of rainfall to cause erosion (Smith and Wischmeier, 1962). Soil erodibility is the vulnerability of soil to erosion. Predominant soils of Tanzania are Alfisols with generally low erodibility values (Kayombo, 1992). Under natural conditions, these soils have moderate to high permeability. With exposure to raindrop impact, they slake readily and develop an impermeable crust. As a result, runoff increases with continuous cultivation. Soils derived from volcanic ash also have low to moderate erodibility (Lundgren and Lundgren, 1972; Kussow et al.,1982). Susceptibility of these soils to erosion by water has been attributed to rainfall erosivity rather than to high soil erodibility (Roose, 1977; Ahn, 1977; Ulsaker and Onstad, 1984).

In developing countries where new lands are opened up for agriculture and old lands are often heavily populated and overstocked, the ability to assess numerically the erosive power of rainfall has a very important application in soil conservation work, i.e. it helps to improve the design of conservation structures. The soil conservation techniques used to combat and control erosion must be designed to do their job efficiently. This can only be achieved if we know the severity of the problem which has to be faced, and a quantitative measure of erosivity makes it possible to identify the basic erosion risk in different areas. With sufficiently detailed rainfall data, maps of erosivity can be produced for the whole country. The total annual erosivity can be used to predict annual erosion losses. Information can also be tabulated on how erosivity varies during the year at any given location and this can be used for the detailed planning of conservation farming systems.

There is, however, very little information available in sub-Saharan Africa on characterization of rains for their erosive potential. Although patterns of rainfall erosivity have been established in Zimbabwe (Stocking and Elwell, 1976a), West Africa (Roose, 1977), and Zambia (Pauwelyn et al.,1988a,b), no such studies have been specifically made for Tanzania. This study attempts to assess rainfall erosivity parameters in Tanzania.

1.2 Objectives of the Study

The main objective in this study was to make an iso-erodent map of Tanzania.

The specific objectives in this study were

1. To collect rainfall data,
2. To select erosivity index for calculating erosivity,
3. To model the erosivity,
4. To extrapolate the model to a large number of rainfall stations, and finally,
5. To map the results.

CHAPTER TWO

LITERATURE REVIEW

2.1 Factors which influence erosion

The fundamental cause of soil erosion is that rain acts upon the soil, so the study of erosion can be divided into how it will be affected by different kinds of rain, and how it will vary for different conditions of soil. Erosion is thus a function of the erosivity of the rain and the erodibility of the soil, or

$$Erosion = f\ (Erosivity,\ Erodibility) \qquad \ldots \ (1)$$

Erosivity is defined as the potential ability of the rain to cause erosion. Erodibility is defined as the vulnerability of the soil to erosion.

Erodibility of the soil depends on the inherent characteristics of the soil, i.e. its mechanical, chemical and physical composition; the topographic features, especially the slope of the land; and the treatment given to the soil i.e. how it is managed.

2.2 Rainfall

Soil loss is closely related to rainfall partly through the

detaching power of rain drops striking the soil surface and partly through the contribution of rain to runoff. This applies particularly to erosion by overland flow and rills for which intensity is generally considered to be the most important rainfall characteristic.Fournier (1972) showed that the average soil loss per rain event increases with increasing intensity of the storm.

Tropical rains are more erosive than temperate rains because of the high intensity of the tropical storms (Lal, 1977). A majority of the tropical rainstorms fall in the category of 'erosive' storms while only 5% to 10% of temperate storms are erosive. Tropical storms are generally accompanied by high- intensity winds which further increase their aggressiveness.

Lal (1976a) observed that at Ibadan, Nigeria, 15, 10, and 30 per cent of storms during 1972, 1973 and 1974, respectively, had 7.5- minute maximum intensities greater than 75 mm h^{-1}. He also observed storms with intensities greater than 130 mm h^{-1}. At Samaru (in the Northern Guinea Savannah zone with an average annual rainfall of 1100 mm), Kowal and Kassam (1976) reported individual storms exceeding 50 mm and peak intensities of 120 to 160 mm h^{-1}. Roose (1971) observed in Abidjan, Ivory Coast, that it is common for 150 to 200 mm to be received in 24 hours with a

sustained intensity of 40 mm h^{-1}. Dunne and Leopold (1978) who prepared an iso-hyetal map of Kenya, found that in tropical areas with high annual rainfall, the rains sustain maximum intensity for one hour with a return period of two years. High rainfall intensities have been reported elsewhere in the tropics. Kampen (1974) reported intensities of 85-100 mm h^{-1} sustained for 30 minutes in Hyderabad, India. Ramaiah and Sreenivas (1975) reported maximum 30-minute values of 84 mm h^{-1} in the Mysore region of southern India. Rains as intense as 100 mm h^{-1} commonly occur in Sri Lanka (Joshua,1977). High intensity rains are particularly damaging at times when the vegetation cover is poor (Wilkinson, 1975b; Stocking and Elwell, 1976a).

Erosion is related to two types of rain event, the short duration intense storm where the infiltration capacity of the soil is exceeded and the prolonged storm of low intensity which saturates the soil. In many instances, it is difficult to separate the effects of these two types of event in accounting for soil loss (Morgan, 1986).

The question arises of how much rain is required to induce significant erosion. Many authors agree that most erosion occurs in moderate events exemplified by rainstorms yielding 30 to 60 mm. Similar opinions are evident in attempts to define a critical rainfall for erosion. Hudson

(1981) gives a figure , based on his studies in Zimbabwe, of 25 mm h^{-1}, a value which has also been found appropriate in Tanzania (Rapp et al.,1972) and in Malaysia (Morgan, 1986). Van Asch and Epema (1983) show that an even lower threshold of 2.5 mm h^{-1} may be more appropriate. Stocking and Elwell (1976a) used arbitrary criteria to construct a composite erosivity map of Zimbabwe based on EI_{30} index. They considered only rainfall occurrences greater than 12.5 mm as storms, and that a storm must have a maximum five-minute intensity (I_5) greater than 25 mm h^{-1}.

Threshold level of intensity will depend upon the resistance to detachment offered by each individual soil. In addition, since flowing water has the ability to cause detachment, this energy will not be accounted for in the rainfall erosivity values and, consequently, this phenomenon may mask the threshold value associated with soil detachment. Threshold values also vary with the erosion process. Morgan (1986), in his earlier works in Malaysia in 1972, found that overland flow occurs in the Kuala Lumpur area of Malaysia with rainfall intensities of 60 to 75 mm h^{-1}.

2.3 Erosion and Energy

There is a great deal of experimental evidence to suggest

a link between erosive power and the mass and velocity of falling drops.

In separate and similar laboratory experiments, Ellison (1944) and Bisal (1960) found that erosive power is linked with the combinations of drop mass and drop velocity and thus it is associated with kinetic energy. Ellison (1947) reported that the detachment hazard (D_1) is directly proportional to the product of detachability (D_2) and the detaching capacity of the rain (D_3) and inversely proportional to the resistance factor R of the surface covers and mulches in reducing runoff velocity.

$$D_1 = \frac{[D_2 * D_3]}{R} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Mihara (1951) found that splash erosion is directly correlated with kinetic energy. Rose (1960) carried out a laboratory study of high-intensity rainfall on East African soils, and found momentum to be significant in explaining soil loss than energy. In Australia, Williams (1969) conducted field studies on vegetated plots under natural rainfall. He concluded that momentum was the most significant parameter, and pointed out that the climate, soils, slopes, and vegetation under which his study was conducted were similar to those in tropical Africa and

South America. He suggested that similar results may, therefore apply to these countries. However, it has been shown that for natural rain, the relationships between intensity and either momentum or kinetic energy are of similar form (Hudson, 1981).

2.4 Rainfall erosivity indices

Morgan (1986) asserts that the most suitable expression of the erosivity of rainfall is an index based on the kinetic energy of the rain. Thus the erosivity of rainstorm is a function of its intensity and duration, and of mass, diameter and velocity of the rain drops.

To compute erosivity requires an analysis of drop-size distributions of rain. Laws and Parsons (1943), based on studies of rain in the Eastern United States, show that drop size characteristics vary with the intensity of the rain, for example the median drop diameter (d_{50}) increases with rainfall intensity. In his studies of tropical rainfall in 1963, Hudson (1981) indicates that this relationship holds only for rainfall intensities of up to 100 mm h^{-1}. At greater intensities, median drop size decreases with increasing intensity, probably because greater turbulence makes larger drop sizes unstable.

Wischmeier and Smith (1958), based on the work of Laws and Parsons (1943), obtained the equation,

$$KE = 11.87 + 8.73 \log_{10} I \quad \ldots\ldots\ldots\ldots \quad (3)$$

where I is the rainfall intensity in mm h^{-1} and KE is the kinetic energy, ($Jm^{-2}mm^{-1}$).

Kinetic energy of individual rainstorms can be computed from equation (3) if a recording raingauge record is available. The intensity increments from the chart are substituted in the equation. The energy value determined from this intensity multiplied by the millimetres of rain falling at this rate gives the energy value of that increment of the storm. These partial products are summed to obtain the total kinetic energy value for the storm.

For tropical rainfall, Hudson (1981) gives the equation,

$$KE = 29.8 - \frac{127.5}{I} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

which is based on measurements of rainfall properties in Zimbabwe. Calculation of kinetic energy and total kinetic energy of a storm using this index is similar to that of equation (3) explained above.

In Italy, Zanchi and Torri (1980) carried out similar research and obtained,

$$KE = 9.81 + 11.25 \log_{10} I \quad \text{(5)}$$

Wischmeier and Smith (1958) found that soil loss by splash, overland flow and rill erosion is related to a compound index of kinetic energy and the maximum 30-minute rainfall intensity (I_{30}). This index is known as EI_{30}. The 30-minute intensity is the greatest average intensity experienced in any 30-minute period during a storm. It is computed from recording raingauge charts by locating the greatest amount of rain which falls in any 30 consecutive minutes, and then doubling this amount to get intensity in mm h^{-1}. A break between storms was defined by Wischmeier (1959) as a period of six consecutive hours with less than 1.27 mm of rainfall. This index was selected as the most appropriate rainfall parameter for use in the soil loss prediction equation.

The EI_{30} index explained from 72% to 97% of the variation in individual-storm erosion from tilled continuous fallow on six widely scattered soils. The percentage of the soil loss variance explained by the index was greater than that explained by rain amount and maximum 5-, 15-, and 30-minute intensities, all combined in a multiple regression

equation.

Equation (3) tends to overestimate kinetic energies at high levels of rainfall intensities because Laws and Parsons (1943), upon which Wischmeier's (1958) work is based, measured rain drop sizes at relatively low rainfall intensities (2.5-50.8 mm h^{-1}). Because of this, a maximum value of 76 mm h^{-1} has been imposed to estimate rainfall kinetic energy per unit rain and 63.5 mm h^{-1} for I_{30} (Wischmeier and Smith, 1978).

Kinnel (1981), found that the relationships between the kinetic energy per unity quantity of rain (E_{RA}) and rainfall intensity (I) in Zimbabwe and at Miami, Florida, are expressed best by the equation,

$$E_{RA} = z\ [1 - pe^{-hI}] \quad \text{(6)}$$

where e is the base of the natural logarithms and z, p, and h are empirical constants. For I>20 mm h^{-1} the equation provides a better description of I-E_{RA} relationship in Zimbabwe and Miami than can be achieved by equation (3) of Wischmeier and Smith (1958). Kinnel's equation also takes better into account that above a certain intensity, kinetic energy per unit rainfall amount is no longer increasing.

Hudson (1981) uses KE>25 as an alternative erosivity index. To compute KE>25 for a single storm, the kinetic energy received in those time increments when rainfall intensity equals 25 mm h^{-1} or greater are summed.

The calculation for KE>25 is similar to the one for EI_{30}. The amount of rainfall in each intensity class is multiplied by the appropriate energy value calculated using equation (4) above. The total energy of the storm is obtained by summing only products from intensities of 25 mm per hour or more. This index can be used with less detailed rainfall records because the I_{30} value, which can only be obtained from autographic raingauge charts and is not ordinarily recorded by meteorological stations, is not required.

When applied in Zimbabwe a better correlation was obtained between this index and the soil loss than by using EI_{30}. However, Stocking and Elwell (1973b) have reworked Hudson's data and have suggested that EI_{30} is the better index after all.

Lal (1976a) also found KE>25 to be well correlated with soil loss from a bare plot at 10 % slope, with a weighted-mean average correlation coefficient of 0.60, just slightly less than that of EI_{30} (r=0.65).

Hudson attributed the significance of KE>25 parameter to the presence of a value of rainfall intensity below which rainfall is not erosive. Threshold values have been recorded elsewhere in Africa (Fournier, 1967).

Lal (1976a), after conducting soil erosion studies at the International Institute of Tropical Agriculture (IITA) near Ibadan, in Nigeria, reported a better correlation of soil loss with the product of total rainfall amount A, and its peak storm intensity $I_{m.}$ than EI_{30}. The annual index $AI_{m.}$ is calculated according to equation,

$$AI_m = [\sum_{1}^{12} \sum_{1}^{n} (ai_m)] \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

where a is the amount of rain in one storm in centimetres and i_m is the maximum intensity of an individual storm in cm h^{-1}; and n, which represents the number of rain days in a month, varies from 1 to 31. Therefore it is the summation of the product ai over all rain days in the year. AI_m index has units $cm^2\ h^{-1}$.

Lal (1976a) has argued that combining maximum intensity and total rainfall into AI_m index, provides a more accurate indication of rainstorm erosivity than using either of the parameters alone. Another advantage of the AI_m index has

been demonstrated to be its simplicity to compute.

The AI_m index includes the maximum intensity which is an important factor in tropical rainstorms, and the total rainfall, which takes into account the fact that a very intense storm that lasts only a short period and results in low total rainfall, is usually non-erosive. However this index needs wider applicability and evaluation.

The AI_m index was found to be more highly correlated with soil loss than the EI_{30} and KE>25 indices. The weighted-mean average correlation coefficients for all slopes and all years between soil loss and the KE>25, EI_{30} and AI_m indices were 0.60, 0.65 and 0.69 respectively.

In an attempt to establish a general method of comparison in order to estimate the relative importance of water erosion and judge the urgency of soil conservation measures, Fournier (1956) and Fournier and Henin (1959) analyzed the sediment load values of more than 140 rivers in Europe, Asia and the United States and found a significant correlation between total annual erosion (tonnes km^{-2}) and the rainfall coefficient C,

$$c = \frac{p^2}{P} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

where p is the mean monthly rainfall in the wettest month of the year and P is the mean annual rainfall.

The soil loss or specific degradation D, in tonnes km^{-2} of the catchment area of the river, was expressed in four highly significant linear correlation equations of the general form:

$$D = aC - b \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

where a and b are coefficients whose magnitude depend upon the orographic coefficient O, of the equation,

$$O = \frac{H^2}{S} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (10)$$

where H is the mean height of the terrain above its base level and S is its projected area.

Fournier showed that erosion was a function of the 'aggressiveness' of climate, as expressed by a high degree of rainfall concentration in a short period of the year and the steepness of the terrain. The established relationship

did not apply to torrential watersheds or those that had a very thin soil mantle or no soils at all.

Low (1967) produced a tentative annual soil erosion map of Peru using p^2/P index, and found a national average erosion value of 1 501 tons per square kilometre to be more than double the value quoted by Fournier for South America. Low explained this anomaly as resulting from the extremely hilly conditions in Peru and the tendency for rainfall to be concentrated in relatively short periods during the year.

Arnoldus (1980) proposed a modification of Fournier's p^2/P value. He used $\Sigma pi^2/P$ in which pi is monthly precipitation and P is the annual precipitation, and obtained a correlation coefficient of 0.83 between this index and EI_{30} for 14 West African raingauge stations.

An element of doubt is cast on the applicability of Fournier's index to small catchments. Moreover, the correlations which he established relate to normal erosion on the earth's surface, which has little influence by man. It is the actions of man on the earth's surface at farm or field scale that soil conservationists are concerned about.

2.4.1 Erosivity indices and soil loss

To be valid as an index of potential erosion, an erosivity index must be significantly correlated with actual soil loss in the field.

Wischmeier and Smith (1958) and Wischmeier (1959) found in the USA an average coefficient of determination (R^2) of 0.71 when only kinetic energy and of 0.88 when EI_{30} was correlated with the soil loss. Lal (1976a) attained a comparable conclusion while studying an Alfisol in western Nigeria on a slope of 1, 5, 10 and 15 percent (section 2.4). Bolls (1979) found that for Indonesia, the average coefficients of determination between soil loss and the EI_{30}, KE>25, and AI_m, were around 0.8, and not significantly different. Kayombo (1977) used meteorological and soil loss data from Henderson Research Station, Zimbabwe and found that AI_m index was highly correlated with soil loss from a bare plot.

Support of EI_{30} index outside the United States of America has been considerable. Hudson (1961) tested EI_{30} index on bare plot and concluded that it was only marginally less significant than his index, KE>25. However his tests applied to very limited field conditions. Later, when data from other plots in the same study were analyzed by Elwell

and Stocking (1973a,b, 1975) and Stocking and Elwell (1973a,b, 1976a,b) it was shown that for a wide range of plots, an energy-intensity parameter was the best predictor of soil erosion. On balance, significant results were obtained from more plots under varying conditions. EI_{30} was superseded by EI_5, and EI_{15} (energy times maximum 5- and 15-minute intensity, respectively) on plots with high and medium crop cover, respectively.

Wilkinson (1975a) reported that runoff and soil loss on bare, cultivated Iwo soil in western Nigeria was closely related to an EI_{30} index modified by the time position of the peak intensity.

Ulsacker and Onstad (1984) conducted research in Kenya to evaluate soil and water losses as influenced by climate, soil, and management practices. They used the data obtained from three fallow runoff plots located on the National Dryland Farming Research Station, Katumani. Coefficients of determination of 0.69 and 0.72 were obtained when EI_{30} and AI_{30} (rainfall amount times maximum 30-minute intensity), respectively, were regressed on soil loss. They concluded that for Kenya conditions studies, the EI_{30} is a good erosivity factor.

In Zambia, Lenvain et al (1985, 1988) found that Wischmeier

and Kinnel Indices developed the same level of correlation with soil loss.

Basing on the foregoing discussion on the correlation of erosivity indices and actual soil loss in the field, it appears that most of the erosivity indices other than Wischmeier's EI_{30} are empirical 'local' parameters which have been found to apply to either a fixed set of circumstances or to a limited range of field conditions. The EI_{30} index is a 'geographical' parameter in that it may not be the most significant for individual field plots but which may overall be the most accurate predictor of soil loss from a wide range of field conditions i.e. when as many soil types and conditions as possible are considered. This is substantiated by the fact that the index was the best parameter over the United States on the basis of results from over 40 field experimental stations. On the contrast, Hudson's research, for example, was confined to Henderson Research Station in Zimbabwe.

EI_{30} is the nearest universal parameter that can be expected to explain soil loss from a reliable base of bare or continuous fallow. This base i.e. bare or continuous fallow, has the advantage in that it is readily reproducible in different environments and does not involve the highly complicated interactions of a vegetation system

at the air/soil interface.

Erosivity indices which are simpler to calculate than EI_{30} could be of great advantage especially in developing countries which have inadequate meteorological data, but only if their simplicity goes hand in hand with the accuracy with which they are to predict soil loss.

2.5 Modelling rainfall erosivity

In many developing countries lack of adequate meteorological data limits the use of various erosivity indices. In many cases it is only the rainfall amount which is recorded. Even the raingauge networks are inadequate and those that are available are sited solely on convenience.

Availability of rainfall intensity data is even more scarce than the rainfall amount. Erosivity indices like EI_{30}, KE>25, total KE, and the AI_m require intensity data over a long period to enable the calculation of the mean annual values.

In these cases, where countries lack sufficient rainfall records from autographic gauges to enable to calculate erosivity nationwide, an attempt is made, for the recording stations where erosivity can be determined, to find a more

widely available rainfall parameter which significantly correlates with erosivity and from which erosivity values may be predicted using a least-squares regression equation.

Kayombo (1977) studied data from meteorological stations in England and Wales. He observed a very highly significant relationship between daily erosivity and daily total rainfall, and between annual erosivity and annual precipitation. He used the latter relationship to estimate mean annual erosivity from mean annual rainfall data for 640 stations, and constructed an estimated mean annual erosivity map of England and Wales.

Roose (1977) analyzed data in Ivory Coast and Burkina and found that there existed a simple relation between the mean annual factor R (or EI_{30}) over a 5-10 year period and the mean annual rain H during the same period, such that

$$R = 0.5\,H \quad \text{(11)}$$

where R is the mean annual EI_{30} index in foot-tons per acre and H is the mean annual rainfall in mm. This relationship was found to hold for many locations in West Africa and thus was used to produce a tentative erosivity map (of R) for West Africa.

Ateshian (1974) made an erosivity map of West of the Rock Mountains based on a power function relating mean annual erosivity to the six hour rainfall total with a return period of two years.

Morgan (1986), using rainfall intensity data for a three month period in 1969, derived regression equations between daily erosivity values using Hudson's KE>25 and daily rainfall total for four rainfall regions of Malaysia. The resulting equations enabled him to predict daily erosivity values from daily rainfall data. The annual erosivity obtained showed a highly significant relationship with the annual rainfall amounts:

$$EVa = 9.28P - 8\,838.15 \quad \text{(12)}$$

where EVa is the mean annual erosivity in joules per square metre, and P is the annual precipitation in mm. Morgan used the resulting relationship (equation 12) to produce a map of mean annual erosivity of KE>25 index, for Malaysian Peninsular.

Stocking and Elwell (1976a), Elwell (1976), Bolline et al.(1980), and Pauwelyn et al., (1988a,b), among others, also observed a good linear or exponential relationship between daily, monthly or annual erosivity and the amount

of rainfall. In Tanzania, Mtakwa and Ngaillo (1988), computed EI_{30} and AI_m values from a seven-year data base and observed a high and significant correlation between the two erosivity indices and the rainfall amount. (In their study they found that the average annual erosivity of Sokoine University of Agriculture Farm were 394 Jha^{-1} for EI_{30}, and 148 cm^2h^{-1} for AI_m).

In order to minimize the standard error of prediction, Bols (1978) developed in Indonesia a multiple exponential regression equation, using the parameters of average monthly total amount of rainfall, average number of rain days and average maximum daily rainfall per month. He obtained a coefficient of determination of 0.99. In Zambia, Pauwelyn et al. (1988),used a multiple linear regression model with the same parameters as used by Bols (1978) to calculate erosivity and produced an iso-erodent map of Zambia using the indices EI_{30}, Kinetic Energy (Kinnel, 1981), and AI_m. Daily amount of rainfall explained 96, 95, and 89% of the variation in those indices, respectively.

Moore (1979) examined rainfall erosivity parameters for 35 stations in Kenya, Tanzania, and Uganda. The relationship between the $KE_{15}>25$ parameter and mean annual erosivity was tested for linear, logarithmic and quadratic regression equations. The latter two gave little improvement over the

simple linear forms. The correlation of 0.79 between mean annual rainfall for all 35 stations was observed. But he found that the standard error of the regression equations could be reduced by splitting the stations into four groups: The coastal stations, the inland stations below 1250 m above sea level, the inland stations above 1250 m and the stations on the Uganda plateau. Using the group regressions, Moore produced a map of the $KE_{15}>25$. His erosivity map is based on the mean annual rainfall map, a topographic map, the restriction of the coastal zone to 50 km inland and the smoothing of iso-erodent lines between the group zone. Also he observed that a map based on the $KE_{30}>25$ showed a similar pattern.

Moore, however, admits that the map should be treated with some caution as it has been derived from data from only a few stations and with the assumptions about the kinetic energy-rainfall intensity relationships. Also relatively high standard errors of estimate for the kinetic energy-mean annual rainfall regression equations were observed, and large variations in $KE_{15}>25$ over small areas were noted.

In this chapter, some of the erosivity indices have been reviewed and the attempts to adopt them in several countries have been discussed. In the discussion it has been indicated that no single erosivity has been found

without problems in its application to predict potential erosivity in developing countries of the seasonally wet tropics. However, one big difference noted among the indices is the range of testing the indices have undergone in different places and their correlation with soil loss, as explained in section 2.4. It is felt that with modifications to accurately reflect tropical rainfall characteristics, the EI_{30}, KE>25, and the AI_m indices will continue to be used, where applicable, in the seasonally wet tropics in the foreseeable future until something better or 'universal' comes along.

In this study, EI_{30} index is selected for studying and mapping erosivity in Tanzania. This index is chosen because of the following reasons. The first reason is that it incorporates the kinetic energy of rain which is generally accepted as the driving force of erosion (Wischmeier and Smith, 1958; Hudson, 1981; Kinnel, 1981; Morgan, 1986). The second reason is that the index reflects considerable research data and has shown to be correlated to soil loss in the field in many countries (section 2.4.1). The third reason is that the index enables direct access to the Universal Soil Loss Equation to assess rill and inter-rill erosion. Equation (3) is used to describe intensity-kinetic energy per unit quantity of rain relationship from which the R factor in the Universal Soil Loss Equation is

calculated (section 2.4).

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study area

3.1.1 Location

The study was carried in the whole of Tanzania which is located at about a longitude of 30-40 degrees East, and latitude of about 1-12 degrees South.

3.1.2 Climate

Tanzania has Equatorial type of climate generally modified by altitude. Seasonal changes are more marked in rainfall than in temperature. Temperatures vary considerably with altitude. Daily maximum on the coast exceeds 32 degrees centigrade. On the highlands minimum temperature may fall below 20^{0}C. The mean annual rainfall varies considerably from about 300 mm to about 2700 mm. There are two major rainfall patterns. The two rainy season (bimodal rainfall pattern) in the North (March to May, and October to December) contrast with the one rainy season i.e. unimodal pattern (December to April) in the South. Rainfall totals depend on aspect and altitude. There are three geographical zones: a fertile coastal lowland, a vast interior plateau

and several mountain regions with the famed Mt. Kilimanjaro (5895m asl), which is the highest point in Africa.

3.2 Collection of rainfall data for modelling erosivity

The rainfall data for modelling erosivity were collected from 11 Meteorological stations representative of the whole country. The 11 stations are Dar es Salaam, Morogoro, Zanzibar (Kisauni Airfield), Moshi, Mwanza, Bukoba, Iringa, Mbeya, Songea, Dodoma, and Kigoma. The first six stations have two rainfall peaks while the last five stations have one rainfall peak. The stations are representative of the three geographical zones. The autographic charts, from which the data were extracted were obtained from the Directorate of Meteorology Headquarters, Dar-es-Salaam. Except for Iringa, where an average of seven years was used, all the data from other stations were averaged for a period of ten years. Most of the charts used were those which were recorded before the break up of the East African Community in 1977, under which the Directorate of Meteorology was operating, because, for several years after 1977, many stations had no continuous and reliable data (charts). Table 1 (page 44) shows the details of each station, including location, mean annual rainfall, and the years analyzed. Table 2 (page 45) shows the number of storms analyzed for each station.

3.3 Selection of erosivity index

The EI_{30} index was used to calculate daily erosivity of storms. This index was chosen because of the reasons given in section 2.4 and 2.5.

3.3.1. Calculation of daily erosivity of storms

Computations of rainfall amount, intensity, kinetic energy, and erosivity were done manually and were based on information obtained from the charts of daily recording raingauge.

When calculating erosivity of storms, a threshold value of one millimetre was introduced to distinguish between erosive and non-erosive storms, because, daily storms smaller than one millimetre might yield negative kinetic energy. This is due to the limitations of the energy equations of Wischmeier (1959) and Kinnel (1981).

The autographic raingauge records on a chart cumulative rainfall amount against time. The hyetograph produced during each rainstorm was divided into 15-minutes segments of nearly uniform intensity, from which the amount of rainfall, and later, intensity for each segment were calculated. Storms separated with a period of six

consecutive hours with less than 1.3mm of rainfall were considered as different (Smith and Wischmeier, 1962). Also a limit of 76 mmh^{-1} was imposed on the rainfall intensity (Hudson, 1981; Carter at al., 1974). The total number of storms analyzed from rainfall charts is 10 084 while the grand total of all the storms analyzed (including those from missing charts) is 10 217 (Table 2, page 45).

Kinetic energy was calculated relative to rainfall intensity using the modified Wischmeier and Smith (1978) equation,

$$E_1 = 11.9 + 8.7 \log I \quad \text{(13)}$$

Where I is the rainfall intensity in a segment of a chart, mmh^{-1}, E_1 the kinetic energy in the same segment, $Jm^{-2}mm^{-1}$.

The total kinetic energy for each segment was obtained by multiplying E_1 by the corresponding rainfall in the segment,

$$E\ (Jm^{-2}) = E_1\ (Jm^{-2}\ mm^{-1}) * rainfall\ amount\ (mm). \quad \text{(14)}$$

Where E is the total kinetic energy for each segment with units Jm^{-2}.

The EI_{30} was calculated as the product of the kinetic energy, E, of the storm and the 30-minute maximum intensity, I_{30}. Maximum intensity was defined by Wischmeier (1959) as twice the maximum amount of rain falling in any 30-minute period. The index was calculated as per equation,

$$EI_{30} = E * I_{30} \quad \text{. . . . . (15)}$$

Where E = Total kinetic energy, J m^{-2}; I_{30} = 30-minute maximum intensity, mm h^{-1}; EI_{30} index = J m^{-2}mm h^{-1}. EI_{30} units were converted from J m^{-2}mm h^{-1} to J ha^{-1}mm h^{-1} by multiplying by 10^{4} $m^{2}ha^{-1}$. These were later converted to 'convenient' sized numbers for individual storms and annual values (R) by dividing by 10^{7}mm h^{-1} giving EI_{30} in Jha^{-1}.

Another procedure was to calculate I in cmh^{-1} and E in Jm^{-2} and than to divide EI_{30} by 100 cmh^{-1} to get R in Jm^{-2} which is the same value as R in Jha^{-1}.

3.3.1.1. Missing data

Some of the rainfall charts were found to be missing or could not be analyzed because of defective tracing mechanism of the automatic rain recorder. The erosivities of the corresponding storms were approximated by using the least square lines between the amount of daily rainfall and

the corresponding erosivities for the available charts of each station. Least square lines were established for each station: (i) for storms of all amounts, (ii) for storms of amounts smaller than 10 mm, (iii) for amounts of storms of at least 10 mm. The computer statistical package, MSTATC, was used to create least square lines (Table 3).

3.4 Modelling erosivity

Daily erosivities were summed to get monthly erosivities. The average monthly erosivities were then calculated. In order to minimize the standard error of estimate, multiple linear regression was used. The predictor variables used to model monthly erosivity were the average monthly total rainfall, Rt, mm; average number of days per month with at least one (1) mm of rainfall, Rn; average daily maximum rainfall of month, Rmax, mm; and the number of days per month with at least 10 mm of rainfall, Rn10. EI_{30} index was the response. A threshold value of one mm daily rainfall was introduced to make a distinction between erosive and non-erosive rainfall. The MULTREG function of the statistical package MSTATC, of the computer was used to develop the model. One model was obtained in the form :

$$E_m = a + bx + cy + dz + ew. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (16)$$

Where E_m = Total monthly erosivity, J ha^{-1}; and x, y, z, and w stand for Rt, Rn, Rmax, and Rn10, respectively, as explained above.

However, since addition of the variable Rn10 (average number of days per month receiving rainfall of at least 10 millimetres) did not improve much the prediction model, the model above was reduced to :

$$E_m = a + bx + cy + dz \quad \text{(17)}$$

Where x = Rt, y = Rn, and z = Rmax as above.

3.5 Extrapolation of the model

The model obtained above (equation 17) was used to calculate monthly erosivities of 347 rainfall recording stations selected from all over the country. There are over 1 000 rainfall recording stations in Tanzania, most of which are concentrated along the coastal fertile lowland especially in the sisal estates, and in some of the densely populated parts of the interior, especially in the institutions. The Selous Game Reserve which borders Morogoro and Coast regions, Ruaha National Park and Rungwa Game Reserve, which occupy parts of Iringa and Singida respectively, and Masai Steppe in Arusha region are major

areas with no rainfall records. Other areas, including the eastern central parts of Tanzania have few recording stations. All the rainfall data from different locations were obtained from the Directorate of Meteorology Headquarters, Dar-es-Salaam, where they are kept.

From a map which shows the precise location of all the rainfall recording stations in Tanzania in terms of longitude and latitude, it was possible to select the study stations, taking into consideration an even distribution of the stations over the country and the availability of long term averages of rainfall parameters. Most of the monthly averages fed in the model were averaged for at least ten years.

The monthly erosivity, and the annual erosivity, R, (which is equal to the sum of the monthly erosivities) for each station were calculated by the computer using the Word Perfect Package.

3.6 Preparation of an iso-erodent map of Tanzania

Classes of erosivity were made using a class interval of 100 J ha^{-1}. The annual erosivity of each station was coded by using numbers of the class to which the station belongs, e.g. 3 for a station in class 3 with an annual erosivity of

250 to 349 Jha^{-1} with a median value of 300 (Jha^{-1}). These numbers 3, 4, 5, etc. were then plotted on their respective places on the map of Tanzania using the longitudes and the latitudes to locate the precise location of each station. The original map of Tanzania mainland was drawn at a scale of 1:7 000 000 while the map of Zanzibar was drawn at a scale of 1:1 000 000. Then it was possible to make an iso-erodent map of Tanzania by joining points of equal erosivity (Figure 1, page 53).

CHAPTER FOUR

RESULTS AND DISCUSSION

The four-variable model obtained for predicting erosivity was

$$Y = -2.84 + 1.08x - 4.14y + 0.48z - 6.73w \quad \ldots \quad (18)$$

Where,

x = Rt = Average total monthly rainfall, mm,

y = Rn = Average number of days per month with at least 1 mm of rain (='Number of rain days'),

z =Rmax= Average maximum daily rainfall of the month, mm,

w =Rn10= Average number of days with rainfall of at least 10 mm.

Since adding the fourth variable, Rn10, did not improve much the model in terms of the standard error of estimate (Table 5), this model was reduced to the following three variable model:

$$Y = -2.94 + 0.87x - 4.84y + 0.67z \quad \ldots \quad (19)$$

To test the global usefulness of this linear multivariate model, an analysis of variance F-test was done by the

computer using the MSTATC statistical package. The test statistic, F, is given by

$$F = \frac{(SS_{yy} - SSE)/k}{SSE/[n - (k+1)]} = \frac{R^2/k}{(1-R^2)/[n - (k+1)]} \quad \ldots \quad (20)$$

= Mean square model / Mean square error

Where n is the sample size and k is the number of terms in the model.

The R^2-value is 0.98. This implies that the least square model has explained 98% of the total variation of EI_{30} with the rainfall parameters. So we test the hypothesis

$H_o : \beta_1 = \beta_2 = \beta_3 = 0$

H_a : At least one of the three model coefficients is not zero

The rejection region is $F > F\alpha$

n = 132, k = 3, n - (k + 1) = 128. We chose $\alpha = 0.05$; we will reject H_o, if $F > F_{.05}$ where F is based on k = 3 numerator and n-(k+1) = 128 denominator degrees of freedom, i.e. F > 2.68 (from Tables). The computed value of F-

statistic is 1885.84 (see Appendix 2). This F-value falls in the rejection region. $F = 1885.84 >> F_{.05} = 2.68$. In fact the computer print out (Appendix 4) shows that the results are significant at all values of $\alpha > 0\%$ (highly significant) and we reject the null hypothesis. Thus the data provides strong evidence that at least one of the model coefficients is not zero. Thus the multivariate least square model appears to be useful for predicting EI_{30} index without making error.

Regression between observed or calculated EI_{30} and predicted EI_{30} values showed a high correlation coefficient of 0.99 (Appendix 5).

In this study only linear regression correlations were tested. Bols (1978), and Pauwelyn et al (1988a,b), as explained in section 2.5, developed for Indonesia and Zambia, respectively, multiple exponential regression equations, to predict annual erosivity using the parameters of rainfall amount, number of rain days and maximum daily rainfall per month. Pauwelyn et al (1988a) obtained a coefficient of determination of 0.96, 0.95,and 0.89 when an exponential relationships between daily rainfall and the EI_{30}, kinetic energy, and AI_m indices, respectively, were sought. He used this relationship to calculate EI_{30} for the missing rainfall charts. However, caution should be

exercised when exponential relationships are used since the possibility of overestimating some parameters is high. Models based on multiple exponential regression are also difficult to handle.

When the long term mean annual rainfall is compared to that of the period analyzed (i.e. 10 years except Iringa where seven years mean was used), the discrepancy is less than 10 per cent for all stations except Zanzibar where the discrepancy is 12 per cent (Table 1). This discrepancy is also found in the 20-year and long term mean annual rainfall for Zanzibar meaning that the annual rainfall for Zanzibar is highly variable. Also some doubt is cast on the 10-year mean rainfall of Dodoma during the research period. The 20-year mean and the long term mean appear to be very close (567 and 566 mm, respectively), showing that the annual rainfall in Dodoma station varies very little. However the 10-year mean annual rainfall is only 510 mm, an obvious underestimation.

An attempt was made to group the stations used for modelling erosivity according to physiographic regions e.g. the stations for the Southern Highlands alone (Iringa, Mbeya, and Ruvuma) and the Coastal regions alone (Dar-es-Salaam, Zanzibar and Morogoro). Though the group correlation coefficients slightly increased, the

corresponding standard error of estimate did not increase significantly, and thus the model resulting from the pooled stations was selected as the best and adopted.

When each station used in the modelling was considered separately (Table 3), the correlation coefficients for storms of all sizes were found to be varying from 0.84 to 0.93, and all were highly significant, while the standard error of estimate of the regression equations varied from 4.88 to 8.80 (mm). When all the 10 084 storms were considered, the overall correlation coefficient between daily rainfall amount and the corresponding erosivity index was found to be 0.90, (also highly significant), meaning that the variation in storm size explained 81 per cent of the variation of the EI_{30} index. However, the standard error of estimate of the regression equation was still high (7.02).

Table 1. General information on the selected Met Stations.

Station (Region)	Location (Altitude m asl)	Mean annual rainfall (mm)	Years analyzed
Dodoma (Dodoma)	6°10'S, 35°46'E (1120)	1911-1970: 566 1971-1990: 567 1911-1990: 566	66,67,68,69, 70,71,72,73, 74,76
Iringa (Iringa)	7°38'S, 35°46'E (1428)	1959-1970: 672 1971-1990: 598 1959-1990: 622	72,73,74,75, 76,77,80
Morogoro (Morogoro)	6°50'S, 37°39'E (526)	1971-1990: 858	71,72,74,75, 76,77,80,81, 82,83
Moshi (K'njaro)	3°21'S, 37°20'E (813)	1894-1970: 855 1971-1990: 868 1894-1990: 878	72,73,74,75, 76,77,79,80, 81,82
Mbeya (Mbeya)	8°56'S, 33°28'E (1758)	1932-1970: 930 1971-1990: 916 1932-1990: 919	67,69,70,71, 72,73,74,75, 76,77
Kigoma (Kigoma)	4°53'S, 29°40'E (840)	1937-1970: 965 1971-1990: 1009 1937-1990: 981	62,63,64,65, 66,67,69,71, 76,77
Songea (Ruvuma)	10°40'S,35°35'E (1036)	1956-1970: 1148 1971-1990: 1127 1956-1990: 990	71,72,73,74, 75,76,81,82, 83,84
Mwanza (Mwanza)	2°28'S, 32°55'E (1140)	1949-1970: 1084 1971-1990: 1063 1949-1990: 1074	66,67,68,69, 70,71,72,73, 74,75
D'Salaam (D'Salaam)	6°52'S, 39°12'E (53)	1953-1970: 1133 1971-1990: 1111 1953-1990: 1122	68,69,70,71, 72,73,74,75, 76,77
Zanzibar (Zanzibar)	6°13'S, 39°13'E (18)	1952-1970: 1564 1971-1990: 1707 1952-1990: 1637	68,69,70,71, 72,73,74,75, 76,77
Bukoba (Kagera)	1°20'S, 31°49'E (1144)	1894-1970: 2075 1971-1990: 2091 1894-1990: 2082	69,70,71,72, 73,74,75,76, 77,82

Table 2. Details on number of storms analyzed from selected Met stations.

Station	No.of storms analyzed from charts	Number of missing charts	Total no. of storms	Number of years analyzed
Dodoma	412	6	418	10
Iringa	396	2	398	7
Morogoro	844	9	853	10
Moshi	690	15	705	10
Mbeya	955	6	961	10
Kigoma	965	7	972	10
Songea	918	9	927	10
Mwanza	1007	18	1025	10
D'Salaam	997	16	1013	10
Zanzibar	1247	7	1254	10
Bukoba	1653	38	1691	10
Total	10084	133	10217	107

Table 3. Correlations between daily amount of rain (mm) per storm, x, and corresponding EI_{30} index, Y.

	Regression equation	r	Standard error of estimate
Dodoma:			
x<10mm, n=257	Y=0.26x - 0.46	0.80	0.49
x≥10mm, n=155	Y=1.26x -13.03	0.86	9.89
all x, n=412	Y=0.99x - 4.61	0.88	6.78
Iringa:			
x<10mm, n=273	Y=0.28x - 0.46	0.85	0.43
x≥10mm, n=123	Y=1.61x -17.98	0.88	9.24
all x, n=396	Y=1.13x - 5.00	0.87	6.41
Morogoro:			
x<10mm, n=583	Y=0.22x - 0.34	0.80	0.39
x≥10mm, n=261	Y=1.11x -10.46	0.82	8.76
all x, n=844	Y=0.84x - 3.36	0.85	5.39
Moshi:			
x<10mm, n=474	Y=0.25x - 0.40	0.80	0.44
x≥10mm, n=216	Y=1.55x -20.20	0.94	12.32
all x, n=690	Y=1.24x - 6.53	0.92	8.80
Mbeya:			
x<10mm, n=654	Y=0.25x - 0.41	0.80	0.46
x≥10mm, n=301	Y=1.10x -10.58	0.82	7.72
all x, n=955	Y=0.81x - 3.30	0.84	4.88
Kigoma:			
x<10mm, n=661	Y=0.28x - 0.49	0.82	0.49
x≥10mm, n=304	Y=1.50x -15.31	0.93	8.97
all x, n=965	Y=1.21x - 5.69	0.92	6.37
Songea:			
x<10mm, n=563	Y=0.27x - 0.47	0.80	0.47
x≥10mm, n=355	Y=1.53x -16.96	0.91	9.20
all x, n=918	Y=1.18x - 6.07	0.90	7.08
Mwanza:			
x<10mm, n=681	Y=0.30x - 0.55	0.83	0.50
x≥10mm, n=326	Y=1.68x -18.27	0.96	7.88
all x, n=1007	Y=1.32x - 6.34	0.93	6.42
Dar-es-Salaam:			
x<10mm, n=681	Y=0.30x - 0.53	0.84	0.47
x≥10mm, n=316	Y=1.42x -15.40	0.91	11.27
all x, n=997	Y=1.15x - 5.44	0.90	7.43
Zanzibar:			
x<10mm, n=798	Y=0.30x - 0.53	0.84	0.47
x≥10mm, n=449	Y=1.34x -13.75	0.90	9.76
all x, n=1247	Y=1.09x - 5.10	0.91	6.74
Bukoba:			
x<10mm, n=966	Y=0.25x - 0.45	0.76	0.52
x≥10mm, n=687	Y=1.47x -15.91	0.90	9.91
all x, n=1653	Y=1.17x - 6.20	0.90	7.50
All 11 stations:			
All x, n=10 084	Y=1.14x - 5.55	0.90	7.02

Table 4. Average monthly EI_{30} index (Jha^{-1}) for stations used for modelling erosivity.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Dodoma	70	40	67	34	0	0	0	0	0	0	14	76	301
Iringa	90	47	66	37	10	0	0	0	0	0	11	82	343
Morogoro	53	39	62	87	24	3	3	1	2	12	24	70	380
Moshi	20	15	86	270	60	6	6	2	5	10	51	23	554
Mbeya	74	86	58	38	6	0	0	0	1	6	14	104	387
Kigoma	92	74	50	121	22	2	0	0	14	21	68	96	560
Songea	195	109	155	48	3	0	0	0	0	1	31	143	685
Mwanza	81	112	123	77	35	3	4	9	38	64	115	93	754
D'Salaam	53	31	114	192	95	13	7	4	16	29	77	58	689
Zanzibar	59	33	86	212	135	32	20	8	25	37	151	117	915
Bukoba	116	133	166	251	245	69	23	50	50	101	114	120	1438
Total	903	719	1033	1367	635	128	63	74	151	281	670	982	7006

Table 5 shows stepwise regression (a screening procedure which involves choosing the important variables to be included in the model), of the monthly prediction model. It is evident that as the number of variables in the model increases, the R-square also increases, while the error sum of squares decreases markedly, and also the standard error of estimate decreases, thus making the prediction model more accurate. However, adding the fourth variable, Rn10 does not appreciably improve the model.

Table 5. Stepwise regression of the multivariate linear prediction model (n = 132).

Step	Variable added	Regression line	R^2	Error SS	Std error of estimate
1	Rt =x	Y = a+bx	0.95	22341	13.11
2	Rn =y	Y = a+bx+cy	0.97	12460	9.83
3	Rmax=z	Y = a+bx+cy+dz	0.98	9700	8.71
4	Rn10=w	Y = a+bx+cy+dz+ew	0.98	9024	8.43

When each variable is considered separately (Table 6), we note that the average monthly total rainfall is the best one-variable predictor of EI_{30} index. Regression explained

95% of the total variation of EI_{30} index with rainfall amount. However, the standard error of estimate is almost two times bigger than when the daily amount of storm is correlated with the corresponding erosivity (Table 3). This leaves daily total rainfall as the best one-predictor variable of daily erosivity, and hence, monthly and annual erosivity.

Table 6. Correlation between monthly variables used for modelling erosivity and monthly EI_{30} index (n = 132).

Variable	r	Residual (Error) SS	Std error of estimate	Student t-value
x (Rt)	0.95	22341	13.11	49.21
y (Rn)	0.76	106199	28.58	20.17
z (Rmax)	0.85	64973	22.36	27.34
w (Rn10)	0.89	49034	19.42	32.13

Interactions of the independent variables used for modelling erosivity are also present. While the Rn10 was the second best one-variable predictor of erosivity, it does not appear in the three-variable least square model (Table 5), nor in the two-variable model, when stepwise

regression is done. Presence of interaction terms means that each of the independent variable does not affect the response (EI_{30} index) independently of the other independent variables.

The coefficient of Rn (-4.84) in the model has a strong moderating effect on the EI_{30} index. High values of Rn greatly decreases the EI_{30} index, especially when it is accompanied with small values of Rmax. Probably frequent storms (big Rn values) come in lighter intensities than less frequent storms (small Rn values).

The model responded well to the following criteria for a model of erosivity:

1. The estimated erosivity should be as accurate as possible, giving minimum error sum of squares when the predicted values are compared with the observed or calculated erosivity (Appendix 4,5);

2. The model should predict a zero or minimal erosivity for zero rainfall (Appendix 6);

3. The erosivity index should increase as rainfall increases (highly significant and positive correlation between storm amount and erosivity index; Tables 3, 5, Appendix 6);

4. The same amount of rainfall having fewer number of storms should give a higher erosivity than one with the same amount but having greater number of storms (this was observed while calculating erosivity values from rainfall amounts);

5. The model should be simple to handle and based on easily available parameters (Pauwelyn et al. 1988b).

The station which recorded the lowest erosivity is Naururu which has an R of 176 joules per hectare. This station is located in one of the driest areas of Kilimanjaro region. The station which recorded the highest R is Manow which has an R of 2105 joules per hectare; the station is located in the mountainous region of Mbeya receiving high amount of rainfall. The iso-erodent map is shown in figure 1. Basing on the collected data the destructive potential of rainfall in Tanzania ranges from 176 Jha^{-1} to 2105 Jha^{-1}.

More than 70% of the destructive potential of the rain is expected in five months of the year i.e. from December to April. April is the most erosive month of the year. It contributes about 20% of the total annual erosivity. Together with March they contribute about 35% of the total

annual erosivity. The least erosive months are June, July, August, and September. Together they contribute only about 6% of the total annual erosivity.

The areas in Rungwe district in the Southern Highlands region of Mbeya recorded the highest erosivity potential. The Northern Highlands, especially areas near Mt. Kilimanjaro also have high erosivity. Other areas with relatively high erosivity are the north eastern parts of the country, particularly the western parts of Lake Victoria and the eastern areas of Lake Tanganyika; the Zanzibar Island as a whole; the coastal areas; and some areas of Ruvuma region, particularly those in the east of Lake Nyasa. The central parts of Tanzania, particularly Dodoma region and the areas bordering Dodoma region viz. Arusha (southern parts), Iringa (northern parts), and Singida region as whole, have low potential of erosivity.

As explained in section 2.2, areas receiving big amounts of rainfall of high intensity can be very erosive especially if they fall on poorly vegetated soil. The present author observed, while analysing rainfall charts, that intensities of 100 mm h^{-1}, sustained for 15 minutes or more were not uncommon in Tanzania, so are the intensities of 80 mm h^{-1} or more sustained for 30 minutes. A 140 mm storm was recorded in Dar-es-Salaam on 6 April, 1968, with an intensity of 110

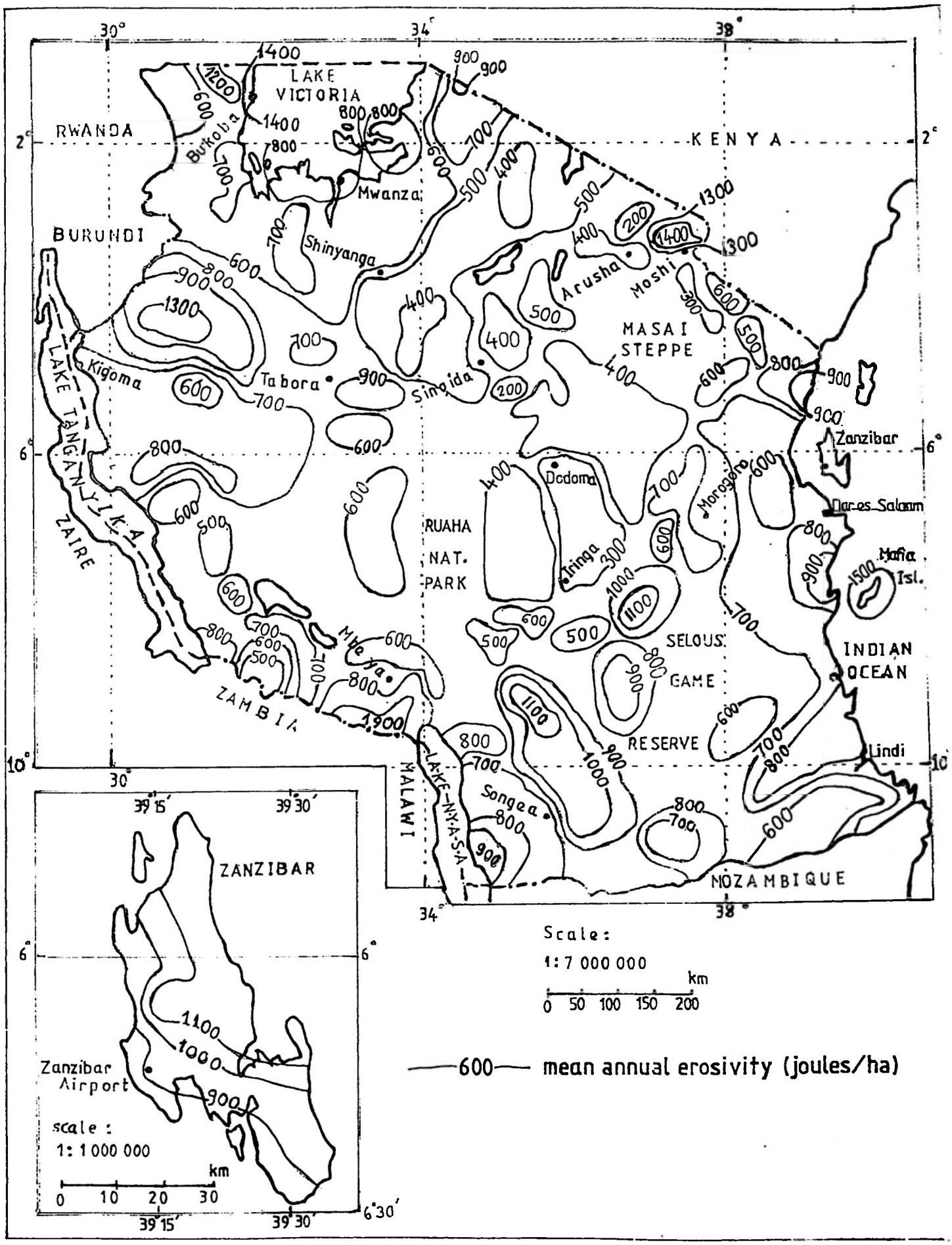

Figure 1. An iso-erodent map of Tanzania based on EI_{30} index

mm h^{-1} which was sustained for one hour; while in Moshi, in northern Tanzania, a storm of 82 mm was recorded on 2 December, 1982, with an intensity of 114 mm h^{-1} sustained for 30 minutes. Rainfall intensity of 160 mm h^{-1} sustained for 15 minutes was observed in Mbeya, which is situated in the Southern Highlands of Tanzania, on 3 December, 1976 when a storm of 42 mm was recorded. In Kigoma, which is located on the shores of Lake Tanganyika, a storm of 161 mm was recorded on 7 April, 1976, with an intensity of 112 mm h^{-1} sustained for 75 minutes; while in Bukoba, which is located on the shores of Lake Victoria, an intensity of 133 mm h^{-1} sustained for 45 minutes was observed on 12 December, 1971, when a storm of 100 mm was recorded.

The potential erosivity is based on assumptions of bare-fallow soil standard. Heavy rains falling on bare soil will cause more erosion than that falling on well vegetated soil. Since areas with low rainfall contributes to sparsity of cover, it may not be surprising that some of the drier areas of Tanzania where rainfall erosivity is relatively low, are the most eroded areas (e.g. some areas of Dodoma region), since the erosive rains often fall on poorly protected soil, so increasing the effective erosion.

Serious erosion hazard may also result in areas where rainfall erosivity is relatively high but annual rainfall

reliability and quantity are inadequate to give a good grass cover.

Moreover, some studies have shown that soils in very high rainfall areas have deep permeable profiles and high infiltration rates, while those in low rainfall areas tend to be more compact and shallow and to have low infiltration rates (Stocking and Elwell, 1973a). Erosion problems in very high rainfall areas begin as a result of human occupation of these areas when the plant cover is removed, or by poor cultivation methods or overgrazing.

Temporal variations in erosion risk are revealed by the mean monthly erosivity values. The highest mean monthly erosivity in most parts of the country occurs in April. Cultivation of land at this time creates a great risk of soil erosion.

Seasonal variations of erosivity may also be a helpful guide when establishing plant cover in soil conservation works, for example when carrying out gully reclamation works which include the establishment of vegetation. In this case, it is essential to have rain to encourage growth, but highly erosive storms, e.g. those which occur in April and March in most parts of the country, are likely to wash out the newly planted material. The best resort

could be to establish the plants either at the beginning or at the end of the rain season.

In Table 7 a comparison is made between erosivity in Tanzania and some of the countries where the same erosivity index has been established.

Table 7. EI_{30} index in other parts of the world.

Country	Minimum EI_{30}	Maximum EI_{30}	Source
Tanzania	176	2105	
Zambia	259	1157	Pauwelyn et al (1988a,b)
Algeria	<48	99	Sarrab (1982)
Indonesia	500	8000	Bols (1978)
United States of America	<34	935	Wischmeier (1978)

Rainfall erosivity in Tanzania, though less than in some of the tropical regions, is much more than in the temperate regions of the world. When compared with neighbouring Zambia, rainfall erosivity in Tanzania is much more

variable and erosive than in Zambia. This is probably because of the location of these two countries relative to the Equator and also due to the fact that while the rainfall regime in Zambia is generally unimodal, the rainfall in Tanzania represents three main regimes, namely the bimodal, unimodal, and the transitional pattern. The transitional pattern has essentially two peaks but with no discernible dry season between the short and long rains (Mhita and Nassib, 1987).

5.0 CONCLUSIONS AND RECOMMENDATIONS

The iso-erodent map of Tanzania has been made using the EI_{30} erosivity index. The map is the result of 10-year average annual erosivities of 358 stations taken from all over the country. The monthly erosivities of the stations, from which the annual erosivities were obtained, were calculated from a linear multivariate least square prediction model which was obtained by studying 10 217 storms. The independent or predictor variables used in the model were the average total monthly rainfall, the average number of days per month with at least one mm of rain, and the average daily maximum rainfall of the month. Averages of at ten years were used in order to predict long term trends.

The erosivity map is the result of only 358 representative stations selected from the whole country. More locations in the country can have their mean monthly and mean annual erosivities (R) determined by using the monthly linear prediction model obtained in this study, so long as the monthly rainfall parameters for the locations are available. In this way a more accurate erosive potential for the different locations can be obtained.

Areas with high erosivity have been found to be associated with areas of high rainfall. This is because of the highly

significant correlation between the daily amount of rainfall and the corresponding erosivity. The areas in Rungwe district in the Southern Highlands region of Mbeya recorded the highest erosivity potential. The Northern Highlands, especially areas near Mt. Kilimanjaro also have high erosivity. Other areas with relatively high erosivity are the north eastern parts of the country, particularly the western parts of Lake Victoria and the eastern areas of Lake Tanganyika; the Zanzibar Island as a whole; the coastal areas; and some areas of Ruvuma region, particularly those in the east of Lake Nyasa. The central parts of Tanzania, particularly Dodoma region and the areas bordering Dodoma region : Arusha (southern parts), Iringa (northern parts), and Singida region as whole, have low potential of rainfall erosivity.

Plant cover is an important factor determining the impact of rainfall on soil. Heavy rains falling on bare soil will cause more erosion than that falling on well vegetated soil. Since areas with low rainfall contributes to sparsity of cover, it may not be surprising that some of the drier areas of Tanzania where erosivity is relatively low, are the most eroded areas since the erosive rains often fall on poorly protected soil, so increasing the effective erosion. Soil conservation planning is more important in these areas.

Moreover studies have shown that soils in very high rainfall areas have deep permeable profiles and high infiltration rates, while those in low rainfall areas tend to be more compact and shallow and to have low infiltration rates. Erosion problems in very high rainfall areas begin as a result of human occupation of these areas when the plant cover is removed, or by poor cultivation methods or overgrazing. National soil conservation strategies should take this into consideration for effective development and conservation planning.

While erosivity is a general guide to soil erosion problems, an erosivity map pinpoints areas where a need to conserve natural resources, i.e. soil-plant-water may be required. In a developing country like Tanzania where new lands are opened up for agriculture and the old lands are often heavily populated and overstocked, a knowledge of potential erosivity is important for development planning. Temporal or seasonal variations of erosivity are important in deciding, for example, which part of the year to cultivate the land or to establish plant cover in soil conservation works.

In order to establish the validity of the EI_{30} index as an erosion indicator, field testing in different parts of the country is necessary in order to show whether the index is

strongly correlated with the actual soil loss in the field.

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7.0 APPENDICES

APPENDIX 1.

Table 1. Erosivity index and the variables which were used for modelling erosivity.

	Rt[a]	Rn[b]	Rmax[c]	Rn10[d]	EI_{30}	Rt	Rn	Rmax	Rn10	EI_{30}
Dodoma:						**Iringa:**				
Jan	113	8.0	43	3.1	70	141	11.7	33	5.3	90
Feb	85	8.5	28	3.1	40	81	8.9	26	2.7	47
Mar	119	8.3	37	4.1	67	113	9.9	32	4.3	66
Apr	52	5.7	20	1.5	34	63	7.7	24	1.9	37
May	4	0.6	3	0.1	0	27	3.6	15	0.8	10
Jun	0	0.0	0	0.0	0	0	0.0	0	0.0	0
Jul	0	0.0	0	0.0	0	0	0.0	0	0.0	0
Aug	0	0.0	0	0.0	0	0	0.0	0	0.0	0
Sep	0	0.0	0	0.0	0	0	0.0	0	0.0	0
Oct	1	0.1	1	0.1	0	1	0.1	0	0.0	0
Nov	25	2.1	15	0.8	14	27	3.7	16	0.9	11
Dec	111	6.7	44	3.7	76	128	12.0	38	3.9	82
Total	510	40.0		16.5	301	581	57.6		19.8	343

[a]Rt = Average total monthly rainfall, mm.

[b]Rn = Average number of days per month with at least 1 mm of rain.

[c]Rmax = Average maximum daily rainfall of the month, mm.

[d]Rn10 = Average number of days per month with rainfall of at least 10 mm.

Appendix 1. continued

Table 2. Erosivity index and the variables which were used for modelling erosivity.

	Rt	Rn	Rmax	Rn10	EI_{30}	Rt	Rn	Rmax	Rn10	EI_{30}
Morogoro:						**Moshi:**				
Jan	101	8.0	31	3.7	53	34	2.8	20	1.0	20
Feb	62	5.1	25	2.0	39	32	3.9	19	1.0	15
Mar	115	10.6	35	4.2	62	90	6.6	38	2.3	86
Apr	187	18.2	34	6.6	87	306	15.7	90	7.4	270
May	92	11.7	29	3.4	24	146	12.4	30	4.8	60
Jun	22	4.3	8	0.5	3	31	3.7	15	1.1	6
Jul	18	3.4	8	0.5	3	22	2.8	13	0.5	6
Aug	7	1.5	5	0.2	1	13	2.2	8	0.4	2
Sep	13	2.8	8	0.3	2	20	2.3	10	0.6	5
Oct	38	4.7	16	1.1	12	31	3.5	12	1.1	10
Nov	42	4.7	19	1.6	24	72	6.1	31	1.9	51
Dec	111	8.6	37	3.8	70	37	5.1	19	0.9	23
Total	808	83.6		27.9	380	834	67.1		23.0	554

Appendix 1. continued

Table 3. Erosivity index and the variables which were used for modelling erosivity.

		Rn	Rmax	Rn10	EI_{30}	Rt	Rn	Rmax	Rn10	EI_{30}
Mbeya:						**Kigoma:**				
Jan	173	18.2	34	5.9	74	133	11.8	32	4.6	92
Feb	176	16.5	38	6.6	86	120	10.0	43	3.7	74
Mar	147	15.9	32	5.9	58	102	11.4	33	3.4	50
Apr	102	12.1	27	3.4	38	197	16.1	53	6.8	121
May	21	3.0	13	0.6	6	58	6.7	24	1.9	22
Jun	1	0.2	1	0.0	0	5	0.7	4	0.2	2
Jul	1	0.2	1	0.0	0	1	0.2	1	0.0	0
Aug	0	0.0	0	0.0	0	3	0.7	2	0.1	0
Sep	2	0.2	1	0.1	1	20	2.0	13	0.6	14
Oct	16	2.6	10	0.6	6	46	5.9	19	1.5	21
Nov	49	6.3	18	1.7	14	127	13.8	32	4.4	68
Dec	197	17.4	42	6.6	104	139	13.2	43	4.2	96
Total	885	92.6		31.4	387	951	92.5		31.4	560

Appendix 1. continued

Table 4. Erosivity index and the variables which were used for modelling erosivity.

	Rt	Rn	Rmax	Rn10	EI_{30}	Rt	Rn	Rmax	Rn10	EI_{30}
Songea:						**Mwanza:**				
Jan	265	17.9	53	9.6	195	103	9.2	42	3.0	81
Feb	188	15.5	41	6.5	109	132	9.2	42	3.9	112
Mar	232	19.1	43	8.4	155	159	11.9	47	4.5	123
Apr	112	11.6	29	4.0	48	147	14.6	28	5.5	77
May	16	2.9	9	0.3	3	64	7.8	21	2.0	35
Jun	1	0.3	1	0.0	0	13	2.1	8	0.4	3
Jul	2	0.8	1	0.0	0	11	1.2	6	0.4	4
Aug	0	0.1	0	0.0	0	15	1.5	9	0.5	9
Sep	0	0.1	0	0.0	0	44	4.4	23	1.2	38
Oct	7	1.5	5	0.2	1	93	8.8	32	2.8	64
Nov	55	4.5	29	1.9	31	159	13.6	34	5.4	115
Dec	191	13.5	58	6.1	143	139	13.1	36	5.1	93
Total	1069	87.8		37.0	685	1079	97.4		34.7	754

Appendix 1. continued

Table 5. Erosivity index and the variables which were used for modelling erosivity.

	Rt	Rn	Rmax	Rn10	EI_{30}	Rt	Rn	Rmax	Rn10	EI_{30}
D'Salaam:						**Zanzibar**				
Jan	69	6.5	30	2.0	53	77	5.9	34	2.0	59
Feb	47	4.4	23	1.5	31	45	4.8	25	1.2	33
Mar	152	12.1	45	4.3	114	139	13.3	37	5.2	86
Apr	295	19.8	60	9.4	192	323	18.8	49	10.6	212
May	173	12.9	43	5.9	95	205	13.5	58	6.4	135
Jun	36	4.8	16	1.0	13	69	5.3	27	2.1	32
Jul	24	4.1	12	0.3	7	47	5.4	19	1.4	20
Aug	20	3.9	9	0.4	4	29	6.1	12	0.5	8
Sep	38	5.0	17	1.0	16	60	6.8	26	1.8	25
Oct	49	4.4	24	1.2	29	71	6.8	27	2.2	37
Nov	104	6.4	44	2.7	77	196	12.8	43	6.2	151
Dec	91	7.0	27	3.2	58	180	13.2	45	6.2	117
Total	1098	91.3		32.9	689	1441	112.7		45.8	915

Appendix 1. continued

Table 6. Erosivity index and the variables which were used for modelling erosivity.

	Rt	Rn	Rmax	Rn10	EI_{30}
Bukoba:					
Jan	188	13.2	44	6.9	116
Feb	198	13.6	47	6.8	133
Mar	244	16.0	53	9.0	166
Apr	370	21.0	63	11.9	251
May	351	18.0	64	10.8	245
Jun	94	6.4	35	2.7	69
Jul	47	4.9	16	2.9	23
Aug	72	6.8	30	2.7	50
Sep	82	9.1	25	3.0	50
Oct	149	12.6	42	4.5	101
Nov	190	17.1	43	6.4	114
Dec	178	14.7	42	5.6	120
Total	2163	153.4		73.2	1438

Appendix 2. Regression analyses between daily storm amount (RT) and corresponding EI30 index.

Data file : NYETH1
Title : Dodoma Met. Station, x<10 mm

Function : MULTIREG
Data case no. 1 to 257

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	1033.20	4.020	5735.14
2	0.00	4.20	152.80	0.595	261.04

257 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	2.6191e-001	1.2371e-002	7.9837e-001	3.7709e-002	21.171	0.000

Intercept = -0.458373

Coefficient of Determination (R-Square) = 0.637
Adjusted R-Square = 0.636
Multiple R = 0.798
Standard Err of Est. = 0.492

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	108.478687	1	108.47869	448.23	0.000
Residual	61.713685	255	0.24201		
Total	170.192372	256			

Appendix 2. continued

Data file : NYETH1
Title : Dodoma Met. Station, x≥10 mm

Function : MULTIREG
Data case no. 258 to 412

RT x1
EI30 Y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	67.00	3629.80	23.418	111536.90
2	0.40	101.00	2564.90	16.548	99733.41

155 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.2632e+000	6.0691e-002	8.5964e-001	4.1304e-002	20.813	0.000

Intercept = -13.032859

Coefficient of Determination (R-Square) = 0.739
Adjusted R-Square = 0.737
Multiple R = 0.860
Standard Err of Est. = 9.886

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	42336.491240	1	42336.49124	433.17	0.000
Residual	14953.615049	153	97.73605		
Total	57290.106289	154			

Appendix 2. continued

Data file : **NYETH1**
Title : Dodoma Met. Station, all x mm

Function : MULTIREG
Data case no. 1 to 412

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	67.00	4663.00	11.318	117272.04
2	0.00	101.00	2717.70	6.596	99994.45

412 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	9.9000e-001	2.6703e-002	8.7764e-001	2.3672e-002	37.075	0.000

Intercept = -4.608377

Coefficient of Determination (R-Square) = 0.770
Adjusted R-Square = 0.770
Multiple R = 0.878
Standard Err of Est. = 6.781

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	63212.401213	1	63212.40121	1374.54	0.000
Residual	18855.122832	410	45.98810		
Total	82067.524046	411			

Appendix 2. continued

Data file : **NYETH1**
Title : Iringa Met. Station, x<10 mm

Function : MULTIREG
Data case no. 4874 to 5146

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	1084.10	3.971	5968.19
2	0.00	3.60	175.80	0.644	291.76

273 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	2.7789e-001	1.0545e-002	8.4812e-001	3.2183e-002	26.353	0.000

Intercept = -0.459566

Coefficient of Determination (R-Square) = 0.719
Adjusted R-Square = 0.718
Multiple R = 0.848
Standard Err of Est. = 0.430

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	128.434808	1	128.43481	694.48	0.000
Residual	50.117720	271	0.18494		
Total	178.552528	272			

Appendix 2. continued

Data file : NYETH1
Title : Iringa Met. Station, x≥10 mm

Function : MULTIREG
Data case no. 5147 to 5269

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	60.00	2613.20	21.246	69741.84
2	1.20	127.30	2005.60	16.306	80053.12

123 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.6136e+000	7.7438e-002	8.8434e-001	4.2441e-002	20.837	0.000

Intercept = -17.975086

Coefficient of Determination (R-Square) = 0.782
Adjusted R-Square = 0.780
Multiple R = 0.884
Standard Err of Est. = 9.235

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	37030.383559	1	37030.38356	434.17	0.000
Residual	10320.044061	121	85.28962		
Total	47350.427619	122			

Appendix 2. continued

Data file : **NYETH1**
Title : Iringa Met. Station, all x mm

Function : MULTIREG
Data case no. 4874 to 5269

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	60.00	3697.30	9.337	75710.03
2	0.00	127.30	2181.40	5.509	80344.88

396 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.1254e+000	3.1561e-002	8.7374e-001	2.4504e-002	35.657	0.000

Intercept = -4.998405

Coefficient of Determination (R-Square) = 0.763
Adjusted R-Square = 0.763
Multiple R = 0.874
Standard Err of Est. = 6.405

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	52163.524940	1	52163.52494	1271.42	0.000
Residual	16164.927699	394	41.02774		
Total	68328.452639	395			

Appendix 2. continued

Data file : **NYETH1**
Title : Moshi Met. Station, x<10 mm

Function : MULTIREG
Data case no. 413 to 886

RT
EI30

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	1756.04	3.705	9201.90
2	0.00	4.40	242.55	0.512	378.95

474 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	2.4567e-001	8.5071e-003	7.9911e-001	2.7672e-002	28.878	0.000

Intercept = -0.398436

Coefficient of Determination (R-Square) = 0.639
Adjusted R-Square = 0.638
Multiple R = 0.799
Standard Err of Est. = 0.442

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	162.730967	1	162.73097	833.96	0.000
Residual	92.101749	472	0.19513		
Total	254.832716	473			

Appendix 2. continued

Data file : NYETH1
Title : Moshi Met. Station, x>10 mm

Function : MULTIREG
Data case no. 887 to 1102

RT
EI30

	Minimum	Maximum	Sum	Mean	Uncorrected Sun of Squares
1	10.00	148.00	5981.90	27.694	266130.17
2	0.60	212.00	4885.70	22.619	383127.28

216 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.5460e+000	3.8865e-002	9.3855e-001	2.3594e-002	39.779	0.000

Intercept = -20.197029

Coefficient of Determination (R-Square) = 0.881
Adjusted R-Square = 0.880
Multiple R = 0.939
Standard Err of Est. = 12.319

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	240141.582499	1	240141.58250	1582.40	0.000
Residual	32476.145240	214	151.75769		
Total	272617.727738	215			

Appendix 2. continued

Data file : **NYETH1**
Title : Moshi Met. Station, all x mm

Function : MULTIREG
Data case no. 413 to 1102

RT
EI30

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	148.00	7737.94	11.214	275332.07
2	0.00	212.00	5128.25	7.432	383506.23

690 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.2446e+000	2.0270e-002	9.1961e-001	1.4977e-002	61.403	0.000

Intercept = -6.525540

Coefficient of Determination (R-Square) = 0.846
Adjusted R-Square = 0.845
Multiple R = 0.920
Standard Err of Est. = 8.802

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	292092.314767	1	292092.31477	3770.38	0.000
Residual	53299.500574	688	77.47020		
Total	345391.815341	689			

Appendix 2. continued

Data file : NYETH1
Title : Morogoro Met. Station, x<10 mm

Function : MULTIREG
Data case no. 1103 to 1685

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	2180.61	3.740	11389.95
2	0.00	3.80	271.70	0.466	366.33

583 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	2.1666e-001	6.8404e-003	7.9577e-001	2.5124e-002	31.674	0.000

Intercept = -0.344339

Coefficient of Determination (R-Square) = 0.633
Adjusted R-Square = 0.633
Multiple R = 0.796
Standard Err of Est. = 0.389

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	151.796616	1	151.79662	1003.22	0.000
Residual	87.910931	581	0.15131		
Total	239.707547	582			

Appendix 2. continued

Data file : **NYETH1**
Title : Morogoro Met. Station, x≥10 mm

Function : MULTIREG
Data case no. 1686 to 1946

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	91.00	5405.00	20.709	144537.18
2	0.30	85.60	3268.50	12.523	100944.73

261 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.1098e+000	4.8485e-002	8.1804e-001	3.5739e-002	22.890	0.000

Intercept = -10.459971

Coefficient of Determination (R-Square) = 0.669
Adjusted R-Square = 0.668
Multiple R = 0.818
Standard Err of Est. = 8.755

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	40160.555108	1	40160.55511	523.94	0.000
Residual	19852.787574	259	76.65169		
Total	60013.342682	260			

Appendix 2. continued

Data file : NYETH1
Title : Morogoro Met. Station, all x mm

Function : MULTIREG
Data case no. 1103 to 1946

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	91.00	7585.61	8.988	155927.13
2	0.00	85.60	3540.20	4.195	101311.06

844 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	8.4071e-001	1.8188e-002	8.4695e-001	1.8323e-002	46.224	0.000

Intercept = -3.361468

Coefficient of Determination (R-Square) = 0.717
Adjusted R-Square = 0.717
Multiple R = 0.847
Standard Err of Est. = 5.388

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	62020.760397	1	62020.76040	2136.66	0.000
Residual	24440.755337	842	29.02703		
Total	86461.515734	843			

Appendix 2. continued

Data file : NYETH1
Title : Mbaya Met. Station, x<10 mm

Function : MULTIREG
Data case no. 1947 to 2600

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	2613.60	3.996	14310.64
2	0.00	4.60	382.23	0.584	601.75

654 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	2.4897e-001	7.4186e-003	7.9584e-001	2.3713e-002	33.561	0.000

Intercept = -0.410534

Coefficient of Determination (R-Square) = 0.633
Adjusted R-Square = 0.633
Multiple R = 0.796
Standard Err of Est. = 0.461

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	239.635958	1	239.63596	1126.34	0.000
Residual	138.716794	652	0.21276		
Total	378.352752	653			

Appendix 2. continued

Data file : **NYETH1**
Title : Mbeya Met. Station, x≥10 mm

Function : MULTIREG
Data case no. 2601 to 2901

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	56.00	5918.80	19.664	146246.34
2	0.20	97.00	3352.55	11.138	91568.22

301 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.1043e+000	4.4664e-002	8.1948e-001	3.3143e-002	24.725	0.000

Intercept = -10.577453

Coefficient of Determination (R-Square) = 0.672
Adjusted R-Square = 0.670
Multiple R = 0.819
Standard Err of Est. = 7.718

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	36416.604106	1	36416.60411	611.35	0.000
Residual	17810.777836	299	59.56782		
Total	54227.381942	300			

Appendix 2. continued

Data file : NYETH1
Title : Mbeya Met. Station, all x mm

Function : MULTIREG
Data case no. 1947 to 2901

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	56.00	8532.40	8.934	160556.98
2	0.00	97.00	3734.78	3.911	92169.96

955 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	8.0666e-001	1.6805e-002	8.4108e-001	1.7522e-002	48.002	0.000

Intercept = -3.296322

Coefficient of Determination (R-Square) = 0.707
Adjusted R-Square = 0.707
Multiple R = 0.841
Standard Err of Est. = 4.880

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	54870.436439	1	54870.43644	2304.23	0.000
Residual	22693.683393	953	23.81289		
Total	77564.119832	954			

Appendix 2. continued

Data file : **NYETH1**
Title : Kigoma Met. Station, x<10 mm

Function : MULTIREG
Data case no. 3909 to 4569

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	2616.50	3.958	14242.35
2	0.00	4.60	416.77	0.631	728.91

661 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	2.8283e-001	7.7894e-003	8.1653e-001	2.2488e-002	36.309	0.000

Intercept = -0.489024

Coefficient of Determination (R-Square) = 0.667
Adjusted R-Square = 0.666
Multiple R = 0.817
Standard Err of Est. = 0.486

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	310.780253	1	310.78025	1318.37	0.000
Residual	155.346774	659	0.23573		
Total	466.127027	660			

Appendix 2. continued

Data file : **NYETH1**
Title : Kigoma Met. Station x≥10 mm

Function : MULTIREG
Data case no. 4570 to 4873

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	161.00	6493.90	21.362	211809.91
2	0.60	242.40	5076.80	16.700	273187.28

304 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.4985e+000	3.3170e-002	9.3332e-001	2.0660e-002	45.175	0.000

Intercept = -15.309589

Coefficient of Determination (R-Square) = 0.871
Adjusted R-Square = 0.871
Multiple R = 0.933
Standard Err of Est. = 8.968

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	164118.064479	1	164118.06448	2040.78	0.000
Residual	24286.653254	302	80.41938		
Total	188404.717733	303			

Appendix 2. continued

Data file : **NYETH1**
Title : Kigoma Met. Station all x, mm

Function : MULTIREG
Data case no. 3909 to 4873

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	161.00	9110.40	9.441	226052.26
2	0.00	242.40	5493.57	5.693	273916.18

965 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.2058e+000	1.7015e-002	9.1602e-001	1.2926e-002	70.865	0.000

Intercept = -5.690483

Coefficient of Determination (R-Square) = 0.839
Adjusted R-Square = 0.839
Multiple R = 0.916
Standard Err of Est. = 6.367

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	203599.236294	1	203599.23629	5021.79	0.000
Residual	39043.050096	963	40.54315		
Total	242642.286389	964			

Appendix 2. continued

Data file : **NYETH1**
Title : Songea Met. Station, x<10 mm

Function : MULTIREG
Data case no. 6267 to 6829

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.60	2259.50	4.013	12129.43
2	0.00	4.70	338.74	0.602	549.15

563 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	2.6763e-001	8.5681e-003	7.9682e-001	2.5510e-002	31.235	0.000

Intercept = -0.472407

Coefficient of Determination (R-Square) = 0.635
Adjusted R-Square = 0.634
Multiple R = 0.797
Standard Err of Est. = 0.474

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	219.266899	1	219.26690	975.65	0.000
Residual	126.078528	561	0.22474		
Total	345.345427	562			

Appendix 2. continued

Data file : NYETH1
Title : Songea Met. Station, x≥10 mm

Function : MULTIREG
Data case no. 6830 to 7184

RT x1
EI30 Y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	90.00	7909.55	22.280	240607.94
2	0.70	144.60	6116.30	17.229	286851.13

355 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.5344e+000	3.6276e-002	9.1389e-001	2.1607e-002	42.297	0.000

Intercept = -16.957193

Coefficient of Determination (R-Square) = 0.835
Adjusted R-Square = 0.835
Multiple R = 0.914
Standard Err of Est. = 9.204

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	151567.048056	1	151567.04806	1789.03	0.000
Residual	29906.264701	353	84.72030		
Total	181473.312757	354			

Appendix 2. continued

Data file : NYETH1
Title : Songea Met. Station, all x mm

Function : MULTIREG
Data case no. 6267 to 7184

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	90.00	10169.05	11.077	252737.37
2	0.00	144.60	6455.04	7.032	287400.29

918 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.1830e+000	1.8923e-002	9.0007e-001	1.4397e-002	62.517	0.000

Intercept = -6.073083

Coefficient of Determination (R-Square) = 0.810
Adjusted R-Square = 0.810
Multiple R = 0.900
Standard Err of Est. = 7.083

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	196060.175708	1	196060.17571	3908.35	0.000
Residual	45950.632421	916	50.16445		
Total	242010.808129	917			

Appendix 2. continued

Data file : NYETH1
Title : Mwanza Met. Station, x<10 mm

Function : MULTIREG
Data case no. 2902 to 3582

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	2632.90	3.866	14079.97
2	0.00	4.40	429.33	0.630	799.39

681 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	3.0422e-001	7.9578e-003	8.2631e-001	2.1614e-002	38.230	0.000

Intercept = -0.545760

Coefficient of Determination (R-Square) = 0.683
Adjusted R-Square = 0.682
Multiple R = 0.826
Standard Err of Est. = 0.497

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	361.009005	1	361.00901	1461.53	0.000
Residual	167.718467	679	0.24701		
Total	528.727472	680			

Appendix 2. continued

Data file : NYETH1
Title : Mwanza Met. Station, x≥10 mm

Function : MULTIREG
Data case no. 3583 to 3908

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	149.00	7445.10	22.838	248917.11
2	0.70	252.80	6535.30	20.047	373132.79

326 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.6776e+000	2.8046e-002	9.5758e-001	1.6009e-002	59.815	0.000

Intercept = -18.265397

Coefficient of Determination (R-Square) = 0.917
Adjusted R-Square = 0.917
Multiple R = 0.958
Standard Err of Est. = 7.877

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	222014.723384	1	222014.72338	3577.79	0.000
Residual	20105.345813	324	62.05354		
Total	242120.069197	325			

Appendix 2. continued

Data file : NYETH1
Title : Nwanza Met. Station, all x mm

Function : MULTIREG
Data case no. 2902 to 3908

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	149.00	10078.00	10.008	262997.08
2	0.00	252.80	6964.63	6.916	373932.18

1007 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.3244e+000	1.5932e-002	9.3436e-001	1.1240e-002	83.131	0.000

Intercept = -6.338527

Coefficient of Determination (R-Square) = 0.873
Adjusted R-Square = 0.873
Multiple R = 0.934
Standard Err of Est. = 6.415

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	284403.581467	1	284403.58147	6910.73	0.000
Residual	41359.711025	1005	41.15394		
Total	325763.292492	1006			

Appendix 2. continued

Data file : NYETH1
Title : Dar-es-Salaam Met. Station, x<10 mm

Function : MULTIREG
Data case no. 5270 to 5950

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.60	2672.80	3.925	14290.36
2	0.00	4.70	444.01	0.652	782.18

681 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	3.0088e-001	7.5908e-003	8.3561e-001	2.1081e-002	39.637	0.000

Intercept = -0.528891

Coefficient of Determination (R-Square) = 0.698
Adjusted R-Square = 0.698
Multiple R = 0.836
Standard Err of Est. = 0.468

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	344.013316	1	344.01332	1571.11	0.000
Residual	148.675556	679	0.21896		
Total	492.688872	680			

Appendix 2. continued

Data file : NYETH1
Title : Dar-es-Salaam Met. Station, x210 mm

Function : MULTIREG
Data case no. 5951 to 6266

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	140.00	7656.50	24.229	277788.09
2	0.70	219.30	6020.33	19.052	341172.03

316 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.4220e+000	3.7104e-002	9.0767e-001	2.3684e-002	38.325	0.000

Intercept = -15.402315

Coefficient of Determination (R-Square) = 0.824
Adjusted R-Square = 0.823
Multiple R = 0.908
Standard Err of Est. = 11.271

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	186585.936841	1	186585.93684	1468.79	0.000
Residual	39888.707399	314	127.03410		
Total	226474.644240	315			

Appendix 2. continued

Data file : **NYETH1**
Title : Dar-es-Salaam Met. Station, all x mm

Function : MULTIREG
Data case no. 5270 to 6266

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	140.00	10329.30	10.360	292078.45
2	0.00	219.30	6464.34	6.484	341954.21

997 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.1509e+000	1.7266e-002	9.0391e-001	1.3560e-002	66.660	0.000

Intercept = -5.440415

Coefficient of Determination (R-Square) = 0.817
Adjusted R-Square = 0.817
Multiple R = 0.904
Standard Err of Est. = 7.428

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	245147.226835	1	245147.22684	4443.54	0.000
Residual	54893.551301	995	55.16940		
Total	300040.778137	996			

Appendix 2. continued

Data file : NYETH1
Title : Zanzibar Met. Station, x<10 mm

Function : MULTIREG
Data case no. 7185 to 7982

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	3225.80	4.042	17597.14
2	0.00	4.50	558.10	0.699	981.45

796 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	3.0321e-001	6.8889e-003	8.4189e-001	1.9128e-002	44.014	0.000

Intercept = -0.526300

Coefficient of Determination (R-Square) = 0.709
Adjusted R-Square = 0.708
Multiple R = 0.842
Standard Err of Est. = 0.465

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	418.975851	1	418.97585	1937.25	0.000
Residual	172.153843	796	0.21627		
Total	591.129694	797			

Appendix 2. continued

Data file : **NYETH1**
Title : Zanzibar Met. Station, x≥10 mm

Function : MULTIREG
Data case no. 7983 to 8431

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	102.00	10861.82	24.191	365189.72
2	0.40	178.40	8424.80	18.763	385697.66

449 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.3441e+000	3.0494e-002	9.0164e-001	2.0456e-002	44.077	0.000

Intercept = -13.751294

Coefficient of Determination (R-Square) = 0.813
Adjusted R-Square = 0.813
Multiple R = 0.902
Standard Err of Est. = 9.759

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	185044.333041	1	185044.33304	1942.81	0.000
Residual	42574.807697	447	95.24565		
Total	227619.140738	448			

Appendix 2. continued

Data file : NYETH1
Title : Zanzibar Met. Station, all x mm

Function : MULTIREG
Data case no. 7185 to 8431

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	102.00	14087.62	11.297	382786.86
2	0.00	178.40	8982.90	7.204	386679.11

1247 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	1.0894e+000	1.4251e-002	9.0795e-001	1.1877e-002	76.445	0.000

Intercept = -5.103891

Coefficient of Determination (R-Square) = 0.824
Adjusted R-Square = 0.824
Multiple R = 0.908
Standard Err of Est. = 6.739

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	265423.359859	1	265423.35986	5843.90	0.000
Residual	56546.453846	1245	45.41884		
Total	321969.813705	1246			

Appendix 2. continued

Data file : **NYETH1**
Title : Bukoba Met. station, x<10 mm

Function : MULTIREG
Data case no. 8432 to 9397

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	9.50	4076.59	4.220	23015.47
2	0.00	4.30	587.73	0.608	986.54

966 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	2.5120e-001	6.8411e-003	7.6361e-001	2.0796e-002	36.719	0.000

Intercept = -0.451668

Coefficient of Determination (R-Square) = 0.583
Adjusted R-Square = 0.583
Multiple R = 0.764
Standard Err of Est. = 0.522

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	366.744851	1	366.74485	1348.31	0.000
Residual	262.211625	964	0.27200		
Total	628.956476	965			

Appendix 2. continued

Data file NYETH1
Title: Bukoba Met. Station, x≥10 mm

Function: MULTIREG
Data case no. 9398 to 10084
Without selection

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	10.00	103.00	16155.30	23.516	514340.84
2	0.20	182.40	12789.16	18.616	595247.75

687 cases read 0 missing cases discarded

Determinant of matrix is= .9999999

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T value	Prob
1	1.4684E+00	2.7032E-02	0.9009E+00	1.6585E-02	54.320	.00

Intercept =-15.91444

Coefficient of Determination (R-Square)= 0.812
Adjusted R-Square = 0.811
Multiple R = 0.901
Standard Err of Est. = 9.912

A N A L Y S I S O F V A R I A N C E T A B L E

	Sum of Squares	df	Mean Square	F	Signif
Regression	289871.968750	1	289871.96875	2950.70	.000
Residual	67293.375000	685	98.23850		
Total	357165.343750	686			

Appendix 2. continued

Data file NVETH1
Title: Bukoba Met. Station, all x mm

Function: MULTIREG
Data case no. 8432 to 10084
Without selection

RT x1
EI30 Y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	103.00	20231.89	12.239	537356.38
2	0.00	182.40	13376.89	8.092	596234.25

1653 cases read 0 missing cases discarded

Determinant of matrix is= 1

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T value	Prob
1	1.1679E+00	1.3929E-02	0.8999E+00	1.0733E-02	83.844	.00

Intercept =-6.201754

Coefficient of Determination (R-Square)= 0.810
Adjusted R-Square = 0.810
Multiple R = 0.900
Standard Err of Est. = 7.498

A N A L Y S I S O F V A R I A N C E T A B L E

	Sum of Squares	df	Mean Square	F	Signif
Regression	395172.000000	1	395172.00000	%7029.74	.000
Residual	92809.875000	1651	56.21434		
Total	487981.875000	1652			

Appendix 3. Regression analysis between storm size (mm) and corresponding EI30 ndex for all storms.

Data file NYETH1
Title: All 11 Met. Stations, all x mm

Function: MULTIREG
Data case no. 1 to 10084
Without selection

RT x1
EI30 y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	1.00	161.00	106222.67	10.534	2738812.25
2	0.00	252.80	65039.79	6.450	3017420.50

10084 cases read 0 missing cases discarded

Determinant of matrix is= 1

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T value	Prob
1	1.1389E+00	5.5143E-03	0.8994E+00	4.3543E-03	206.543	.00

Intercept =-5.547616

Coefficient of Determination (R-Square)= 0.809
Adjusted R-Square = 0.809
Multiple R = 0.899
Standard Err of Est. = 7.018

A N A L Y S I S O F V A R I A N C E T A B L E

	Sum of Squares	df	Mean Square	F	Signif
Regression	2101314.250000	1	2101314.25000	42659.92	.000
Residual	496612.500000	10082	49.25734		
Total	2597926.750000	10083			

Appendix 4. Multiple regression analysis of the monthly variables used for modelling erosivity.

Data file : **NYENZAT3**
Title : All 11 Met. Stations: Dod., Iri., Mor., Mos., Mbe., Kig., Son., Mwa., Dar., Zan., & Bukoba.

Function : MULTIREG
Data case no. 1 to 132

Rt x2
Rn x3
Rmax x4
EI30 Y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
2	0.00	370.00	11417.90	86.499	1876878.65
3	0.00	21.00	976.00	7.394	11486.06
4	0.00	90.00	3300.40	25.003	123734.68
1	0.00	270.00	7006.00	53.076	810284.00

132 Cases read 0 Missing cases discarded

Determinant of matrix = 0.016301

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
2	8.6827e-001	3.4210e-002	1.2366e+000	4.8720e-002	25.381	0.000
3	-4.8374e+000	4.0635e-001	-4.7736e-001	4.0100e-002	-11.904	0.000
4	6.6714e-001	1.1054e-001	2.0455e-001	3.3891e-002	6.035	0.000

Intercept = -2.942810

Coefficient of Determination (R-Square) = 0.978
Adjusted R-Square = 0.977
Multiple R = 0.989
Standard Err of Est. = 8.705

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	428735.219008	3	142911.73967	1885.84	0.000
Residual	9700.023416	128	75.78143		
Total	438435.242424	131			

RESIDUAL TABLE

Case#	Observed	Predicted	Residual	Std. Res
1	90.000	84.903	5.0975	0.5856
2	47.000	41.681	5.3193	0.6110
3	66.000	68.631	-2.6310	-0.3022
4	37.000	30.522	6.4777	0.7441
5	10.000	13.093	-3.0933	-0.3553
6	0.000	-2.943	2.9428	0.3380
7	0.000	-2.769	2.7692	0.3181
8	0.000	-2.943	2.9428	0.3380
9	0.000	-2.943	2.9428	0.3380
10	0.000	-2.792	2.7923	0.3208
11	11.000	13.430	-2.4302	-0.2792
12	82.000	75.233	6.7674	0.7774
13	74.000	81.912	-7.9117	-0.9088
14	86.000	95.275	-9.2751	-1.0655
15	58.000	69.128	-11.1282	-1.2783
16	38.000	45.102	-7.1021	-0.8158
17	6.000	9.452	-3.4518	-0.3965
18	0.000	-2.375	2.3749	0.2728
19	0.000	-2.375	2.3749	0.2728
20	0.000	-2.789	2.7893	0.3204
21	1.000	-1.440	2.4399	0.2803
22	6.000	5.044	0.9561	0.1098
23	14.000	21.136	-7.1359	-0.8197
24	104.000	111.957	-7.9573	-0.9141
25	195.000	175.920	19.0802	2.1918
26	109.000	112.667	-3.6666	-0.4212
27	155.000	134.791	20.2095	2.3215
28	48.000	57.538	-9.5378	-1.0956
29	3.000	2.725	0.2746	0.0315
30	0.000	-3.125	3.1255	0.3590
31	0.000	-4.669	4.6695	0.5364
32	0.000	-3.119	3.1195	0.3583
33	0.000	-3.273	3.2730	0.3760
34	1.000	-0.965	1.9652	0.2258
35	31.000	41.777	-10.7772	-1.2380
36	143.000	136.154	6.8458	0.7864
37	92.000	76.805	15.1945	1.7454
38	74.000	81.564	-7.5637	-0.8689
39	50.000	52.491	-2.4911	-0.2862
40	121.000	125.584	-4.5844	-0.5266
41	22.000	31.018	-9.0183	-1.0360
42	2.000	0.681	1.3190	0.1515
43	0.000	-2.642	2.6417	0.3035
44	0.000	-2.784	2.7838	0.3198
45	14.000	13.621	0.3790	0.0435
46	21.000	21.133	-0.1331	-0.0153
47	68.000	61.921	6.0789	0.6983
48	96.000	82.581	13.4186	1.5414
49	20.000	26.377	-6.3768	-0.7325
50	15.000	18.785	-3.7854	-0.4348
51	86.000	68.627	17.3732	1.9957
52	270.000	246.846	23.1545	2.6598
53	60.000	83.856	-23.8563	-2.7405
54	6.000	16.083	-10.0826	-1.1582
55	6.000	11.287	-5.2875	-0.6074
56	2.000	2.840	-0.8396	-0.0964
57	5.000	9.968	-4.9682	-0.5707
58	10.000	15.049	-5.0487	-0.5800
59	51.000	50.747	0.2535	0.0291

60	23.000	17.295	5.7045	0.6553
61	70.000	85.161	-15.1605	-1.7415
62	40.000	48.423	-8.4230	-0.9676
63	67.000	84.916	-17.9161	-2.0581
64	34.000	27.977	6.0226	0.6918
65	0.000	-0.504	0.5041	0.0579
66	0.000	-2.943	2.9428	0.3380
67	0.000	-2.943	2.9428	0.3380
68	0.000	-2.943	2.9428	0.3380
69	0.000	-2.943	2.9428	0.3380
70	0.000	-1.277	1.2770	0.1467
71	14.000	18.613	-4.6128	-0.5299
72	76.000	90.046	-14.0461	-1.6135
73	53.000	67.002	-14.0024	-1.6085
74	39.000	42.731	-3.7310	-0.4286
75	62.000	68.916	-6.9161	-0.7945
76	87.000	94.068	-7.0675	-0.8119
77	24.000	39.889	-15.8887	-1.8252
78	3.000	0.896	2.1041	0.2417
79	3.000	2.190	0.8096	0.0930
80	1.000	-0.852	1.8519	0.2127
81	2.000	-0.430	2.4303	0.2792
82	12.000	18.257	-6.2572	-0.7188
83	24.000	23.665	0.3350	0.0385
84	70.000	76.385	-6.3853	-0.7335
85	53.000	45.273	7.7272	0.8877
86	31.000	31.993	-0.9927	-0.1140
87	114.000	100.191	13.8092	1.5863
88	192.000	197.447	-5.4471	-0.6257
89	95.000	113.554	-18.5539	-2.1313
90	13.000	15.489	-2.4895	-0.2860
91	7.000	6.109	0.8914	0.1024
92	4.000	1.141	2.8591	0.3284
93	16.000	16.859	-0.8590	-0.0987
94	29.000	34.196	-5.1963	-0.5969
95	77.000	85.620	-8.6195	-0.9902
96	58.000	59.787	-1.7874	-0.2053
97	59.000	58.257	0.7431	0.0854
98	33.000	29.322	3.6780	0.4225
99	86.000	77.895	8.1053	0.9311
100	212.000	219.171	-7.1707	-0.8237
101	135.000	148.710	-13.7103	-1.5749
102	32.000	49.470	-17.4701	-2.0068
103	20.000	24.968	-4.9675	-0.5706
104	8.000	0.735	7.2650	0.8346
105	25.000	33.605	-8.6054	-0.9885
106	37.000	43.824	-6.8235	-0.7838
107	151.000	134.008	16.9920	1.9519
108	117.000	119.515	-2.5149	-0.2889
109	81.000	70.006	10.9942	1.2629
110	112.000	95.052	16.9477	1.9468
111	123.000	108.904	14.0960	1.6192
112	77.000	72.835	4.1650	0.4784
113	35.000	29.032	5.9676	0.6855
114	3.000	3.564	-0.5637	-0.0648
115	4.000	5.420	-1.4204	-0.1632
116	9.000	8.389	0.6109	0.0702
117	38.000	29.101	8.8991	1.0223
118	64.000	56.320	7.6803	0.8823
119	115.000	92.208	22.7922	2.6182
120	93.000	78.128	14.8717	1.7084
121	116.000	125.794	-9.7940	-1.1251
122	133.000	134.543	-1.5432	-0.1773
123	166.000	166.877	-0.8770	-0.1007
124	251.000	258.764	-7.7642	-0.8919

125	245.000	257.446	-12.4462	-1.4297
126	69.000	71.066	-2.0659	-0.2373
127	23.000	24.837	-1.8373	-0.2111
128	50.000	46.259	3.7409	0.4297
129	50.000	40.914	9.0863	1.0437
130	101.000	93.299	7.7007	0.8846
131	114.000	107.998	6.0023	0.6895
132	120.000	108.521	11.4791	1.3186

Durbin-Watson Statistic = 1.564879

Appendix 5. Regression analysis between observed and predicted values of erosivity.

Data file : NYENZAT4
Title : MODEL: OBSERVED (CALCULATED) & PREDICTED EROSIVITY

Function : MULTIREG
Data case no. 1 to 132

EI30 OBS x1
EI30 PRE y

	Minimum	Maximum	Sum	Mean	Uncorrected Sum of Squares
1	0.00	270.00	7006.00	53.076	810284.00
2	-5.00	259.00	7011.00	53.114	801421.00

132 Cases read 0 Missing cases discarded

Determinant of matrix = 1.000000

Variable Number	Regression Coefficient	Standard Error	Std. Partial Regr. Coeff.	Std. Err. of Partial Coef	Student T Value	Prob.
1	9.7818e-001	1.2929e-002	9.8883e-001	1.3070e-002	75.656	0.000

Intercept = 1.195837

Coefficient of Determination (R-Square) = 0.978
Adjusted R-Square = 0.978
Multiple R = 0.989
Standard Err of Est. = 8.561

ANALYSIS OF VARIANCE TABLE

	Sum of Squares	df	Mean Square	F	Signif
Regression	419513.173527	1	419513.17353	5723.76	0.000
Residual	9528.121928	130	73.29325		
Total	429041.295455	131			

APPENDIX 6. Tables showing particulars, rainfall parameters, and erosivity values of diferent stations used for mapping erosivity.

1.0 ARUSHA REGION

Table 1.1 Loliondo

Station no.	Location	Altitude (m asl)	District
923500	2.03S,35.37E	2134	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt[a]	108	102	133	171	61	23	22	13	9	31	61	69	803
Rn[b]	7.7	6.9	8.3	12.2	6.4	2.2	1.5	1.8	0.7	2.4	6.9	6.2	63.2
Rmax[c]	27	40	43	40	18	9	9	65	8	14	22	23	
EI_{30}	72	79	101	114	31	12	15	43	7	22	31	42	569

Table 1.2 Lake Ndutu Lodge

Station no.	Location	Altitude (m asl)	District
923509	2.35S,35.13E	610	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	100	77	103	96	52	15	4	9	7	19	61	92	635
Rn	8.9	7.0	7.8	8.3	4.3	1.6	0.6	0.9	1.1	3.4	5.2	8.6	57.7
Rmax	30	28	35	29	21	8	2	5	7	8	25	27	
EI_{30}	61	49	72	60	36	8	0	4	3	2	42	54	391

Table 1.3 Engaruka

Station no.	Location	Altitude (m asl)	District
923503	2.59S,35.58E	914	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	96	73	97	102	42	6	0	0	0	13	111	106	646
Rn	6.0	6.1	7.3	8.3	2.4	0.4	0	0	0	1.7	8.5	6.1	46.8
Rmax	26	23	36	36	17	3	0	0	0	7	31	46	
EI_{30}	69	46	70	70	33	2	0	0	0	5	73	91	459

Table 1.4 Olduvai Camp

Station no.	Location	Altitude (m asl)	District
923505	2.58S,35.21E	1524	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	88	74	69	128	41	5	11	4	3	12	42	56	533
Rn	6.9	5.3	6.2	10.6	4.2	0.7	1.5	0.7	0.7	1.9	4.8	5.4	48.9
Rmax	28	34	27	29	18	3	4	4	2	8	20	31	
EI_{30}	59	59	45	77	24	0	2	0	0	4	24	40	334

[a]Rt = Average total monthly rainfall, mm.

[b]Rn = Average number of days per month with at least 1 mm of rain.

[c]Rmax= Average maximum daily rainfall of month, mm.

Appendix 6. continued

Table 1.5 Arash

Station no.	Location	Altitude (m asl)	District
923507	2.25S,35.22E	NA	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	75	96	72	110	24	2	0	1	2	7	70	90	549
Rn	5.6	4.0	6.9	9.5	2.4	0.3	0	0.3	0.1	0.8	4.0	6.1	40.0
Rmax	29	31	22	28	14	2	0	1	2	3	22	33	
EI_{30}	55	82	41	66	16	0	0	0	0	1	53	70	384

Table 1.6 Engare Naibor

Station no.	Location	Altitude (m asl)	District
923615	2.24S,36.25E	1524	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	92	58	99	117	61	8	0	0	3	28	85	65	616
Rn	4.9	3.1	5.7	7.0	4.6	0.6	0	0	0.4	2.1	7.0	4.5	39.9
Rmax	36	23	50	34	24	6	0	0	3	14	26	36	
EI_{30}	78	48	89	88	44	5	0	0	0	21	55	56	484

Table 1.7 Tingatinga Pr. School

Station no.	Location	Altitude (m asl)	District
923619	2.56S,36.57E	1219	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	23	17	45	62	25	2	2	1	3	21	86	60	347
Rn	1.6	2.5	3.4	5.2	3.3	0.3	0.2	0.1	0.5	3.0	9.6	4.1	33.8
Rmax	13	8	22	23	9	2	2	1	3	9	23	26	
EI_{30}	18	5	34	41	9	0	0	0	0	7	41	47	202

Table 1.8 Endulen

Station no.	Location	Altitude (m asl)	District
933513	3.13S,35.16E	1829	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	130	118	137	170	30	2	8	2	4	23	91	147	862
Rn	12.1	10.2	13.3	15.3	4.4	1.0	0.6	0.4	0.8	4.0	11.3	14.1	87.5
Rmax	32	37	34	34	13	1	2	1	3	11	21	38	
EI_{30}	73	75	75	94	11	0	2	0	0	5	36	82	453

Table 1.9 Oldeani (Ndamakai Estates)

Station no.	Location	Altitude (m asl)	District
933503	3.23S,35.28E	1768	Mbulu

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	131	111	171	217	58	12	6	3	6	24	60	113	912
Rn	8.7	7.8	10.0	13.4	8.3	1.9	1.1	0.6	0.7	1.7	5.9	8.5	68.6
Rmax	31	35	43	51	18	8	3	1	5	11	21	36	
EI_{30}	90	79	126	155	19	4	0	0	2	17	35	78	605

Appendix 6. continued

Table 1.10 Yaida Chini

Station no.	Location	Altitude (m asl)	District
933528	3.55S,35.10E	1311	Mbulu

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	86	84	55	79	9	3	0	1	7	14	56	92	486
Rn	5.3	4.9	5.9	6.4	1.1	0.6	0	0.3	0.7	1.0	5.7	5.3	37.2
Rmax	33	33	32	25	7	2	0	0	7	12	24	28	
EI_{30}	68	69	38	52	4	0	0	0	4	12	34	70	351

Table 1.11 Ardai Ranch

Station no.	Location	Altitude (m asl)	District
933643	3.30S,36.20E	NA	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	99	65	100	117	31	2	2	1	5	8	44	51	525
Rn	7.0	5.4	7.2	8.8	3.8	0.8	0.3	0.3	0.6	1.1	4.6	4.9	44.8
Rmax	33	27	31	45	13	1	2	0	3	4	20	20	
EI_{30}	71	46	70	86	14	0	0	0	1	1	26	31	346

Table 1.12 Makuyuni JKT

Station no.	Location	Altitude (m asl)	District
933662	3.25S,36.02E	1097	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	94	67	129	176	31	1	0	0	2	8	43	53	604
Rn	6.6	5.0	9.4	8.5	6.0	0.3	0	0	0.8	0.5	3.0	5.0	45.1
Rmax	37	32	42	63	13	1	0	0	1	5	16	24	
EI_{30}	72	53	92	151	4	0	0	0	0	5	31	35	443

Table 1.13 Oldonyo Sambu

Station no.	Location	Altitude (m asl)	District
933660	3.09S,36.42E	1768	Arumeru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	61	36	52	97	33	2	1	0	2	17	98	91	490
Rn	4.0	3.9	6.6	11.5	6.4	0.5	0.4	0	0.5	2.1	10.9	8.8	55.6
Rmax	22	14	19	23	14	2	0	0	2	11	23	31	
EI_{30}	46	19	23	41	4	0	0	0	0	9	45	54	241

Table 1.14 Lucy Sisal Estates

Station no.	Location	Altitude (m asl)	District
933641	3.33S,36.49E	NA	Arumeru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	32	56	81	145	50	4	2	4	12	11	39	44	480
Rn	1.6	2.3	4.2	4.7	4.9	0.9	0.2	0.6	1.1	1.3	3.1	2.4	27.3
Rmax	17	23	32	44	19	2	2	3	9	6	20	21	
EI_{30}	29	50	69	130	30	0	0	0	8	4	29	38	387

Appendix 6. continued

Table 1.15 Monduli (Monduli Masai)

Station no.	Location	Altitude (m asl)	District
933614	3.19S,36.27E	1585	Monduli

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	77	99	137	176	59	17	1	2	3	19	71	63	724
Rn	5.3	6.9	9.7	12.0	4.8	1.4	0.2	0.3	0.5	1.3	6.5	5.4	54.3
Rmax	27	32	40	41	25	11	1	2	3	12	19	23	
EI_{30}	56	71	96	120	42	12	0	0	0	15	40	41	493

Table 1.16 Arusha Met.Station

Station no.	Location	Altitude (m asl)	District
933633	3.22S,36.38E	1387	Arumeru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	74	108	115	187	74	17	6	5	10	16	66	93	771
Rn	7.2	8.7	10.0	15.2	9.5	3.4	1.8	1.0	1.4	2.2	7.5	8.9	76.8
Rmax	23	38	38	42	21	9	3	3	5	8	21	34	
EI_{30}	42	74	74	114	30	1	0	0	2	6	32	58	433

Table 1.17 Kilimanjaro International Airport

Station no.	Location	Altitude (m asl)	District
9337115	3.25S,37.04E	891	Arumeru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	48	63	68	166	77	9	4	7	11	23	28	36	540
Rn	4.2	3.8	5.3	12.8	9.7	2.0	1.2	1.7	1.5	2.3	4.8	4.4	53.7
Rmax	21	42	36	46	22	4	3	3	6	16	12	18	
EI_{30}	33	62	55	110	32	0	0	0	3	17	6	19	337

Table 1.18 Basotu Plantation

Station no.	Location	Altitude (m asl)	District
943537	4.25S,35.07E	1722	Hanang

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	118	122	101	85	11	0	1	0	0	6	74	115	633
Rn	9.6	10.8	9.9	9.1	1.7	0.1	0.6	0	0	0.8	5.3	9.0	56.9
Rmax	39	32	30	28	6	0	0	0	0	5	24	41	
EI_{30}	79	72	57	46	2	0	0	0	0	2	52	81	391

Table 1.19 Bashay Pr.School

Station no.	Location	Altitude (m asl)	District
943536	4.01S,35.18E	NA	Mbulu

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	108	106	104	92	15	24	12	0	0	2	56	121	640
Rn	7.9	7.7	6.5	6.8	2.2	0.8	1.0	0	0	0.2	5.0	7.0	45.1
Rmax	36	27	32	24	9	21	9	0	0	2	15	37	
EI_{30}	77	70	78	60	5	28	9	0	0	0	32	93	452

Appendix 6. continued

Table 1.20 Talamai Masai

Station no.	Location	Altitude (m asl)	District
953700	5.22S,37.21E	1311	Kiteto

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	86	58	66	92	32	6	7	2	6	16	28	71	470
Rn	5.4	4.7	4.9	8.8	6.1	1.0	0.4	0.6	1.1	2.1	3.3	6.7	45.1
Rmax	25	21	23	27	10	4	3	1	2	7	13	26	
EI_{30}	62	39	46	53	2	0	3	0	0	6	14	44	269

Table 1.21 Babati

Station no.	Location	Altitude (m asl)	District
943530	4.13S,35.45E	NA	Hanang

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	81	98	117	147	22	2	1	1	0	7	103	121	700
Rn	7.6	5.9	7.7	11.3	3.3	0.6	0.3	0.2	0.1	0.9	7.2	10.0	55.1
Rmax	29	34	45	40	14	2	0	1	0	4	39	36	
EI_{30}	50	77	92	97	10	0	0	0	0	1	78	78	483

Table 1.22 Kibaya

Station no.	Location	Altitude (m asl)	District
953600	5.17S,36.34E	1457	Kiteto

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	110	107	119	111	24	3	1	1	1	13	59	102	651
Rn	8.7	6.4	9.4	12.0	6.9	1.2	0.2	0.4	0.4	1.6	5.3	8.3	60.8
Rmax	32	43	33	28	7	2	1	1	1	6	24	41	
EI_{30}	72	88	77	54	0	0	0	0	0	5	39	73	408

Table 1.23 Engasumet

Station no.	Location	Altitude (m asl)	District
943706	4.28S,37.09E	1524	Kiteto

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	69	89	127	86	48	16	9	6	12	16	75	115	668
Rn	4.7	5.8	7.6	5.6	5.5	1.7	0.8	1.0	1.0	2.2	5.4	4.3	45.6
Rmax	26	39	35	39	19	9	7	3	5	11	37	36	
EI_{30}	52	73	94	71	25	9	6	0	6	8	61	100	505

2.0 COAST REGION

Table 2.1 Stiegler's Gorge

Station no.	Location	Altitude (m asl)	District
973721	7.48S,37.55E	152	Rufiji

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	133	102	157	208	90	25	7	3	20	27	54	122	948
Rn	8.7	6.4	10.5	15.6	7.9	2.4	1.4	0.6	2.5	2.7	5.4	7.1	71.2
Rmax	51	45	53	42	29	10	5	3	11	14	19	42	
EI_{30}	105	85	118	131	57	14	0	0	10	17	31	97	665

Appendix 6. continued

Table 2.2 Kikale

Station no.	Location	Altitude (m asl)	District
973905	7.50S,39.13E	3	Rufiji

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	173	70	174	305	139	44	13	29	28	31	108	160	1274
Rn	5.3	2.6	6.5	10.6	5.7	1.5	0.5	0.9	1.1	0.9	3.6	5.1	44.3
Rmax	65	36	55	76	45	34	13	26	21	20	47	67	
EI_{30}	165	69	154	262	121	51	15	35	30	33	105	156	1196

Table 2.3 Mafia Kilindoni

Station no.	Location	Altitude (m asl)	District
973903	7.55S,39.40E	21	Mafia

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	112	110	236	612	287	90	66	37	19	41	94	163	1867
Rn	6.6	6.5	11.0	19.6	13.8	6.3	7.0	3.6	3.0	4.0	6.7	8.3	96.4
Rmax	39	42	58	105	64	27	25	24	10	19	36	59	
EI_{30}	89	89	188	505	223	63	37	28	6	26	71	138	1463

Table 2.4 Muhoro dispensary

Station no.	Location	Altitude (m asl)	District
983906	8.09S,39.11E	NA	Rufiji

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	131	107	116	240	53	12	29	3	11	27	39	87	855
Rn	7.4	5.6	6.4	11.4	4.0	1.4	1.6	0.3	1.0	2.0	2.6	5.7	49.4
Rmax	42	34	41	49	22	7	23	3	7	14	15	30	
EI_{30}	103	86	94	184	39	5	30	0	6	20	28	65	660

Table 2.5 Sungwi

Station no.	Location	Altitude (m asl)	District
973814	7.02S,38.58E	152	Kisarawe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	62	107	172	311	143	28	44	30	73	57	165	79	1271
Rn	7.6	7.6	13.6	21.2	15.4	5.8	5.6	5.2	7.2	4.2	10.2	7.6	111.2
Rmax	25	42	43	62	26	10	16	19	30	23	49	34	
EI_{30}	31	82	110	207	64	0	19	11	46	42	124	52	788

Table 2.6 Miombo (Kingupira Wildlife)

Station no.	Location	Altitude (m asl)	District
983808	8.23S,38.37E	108	Rufiji

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	129	130	168	161	55	38	1	38	7	43	54	161	985
Rn	11.8	7.3	15.7	13.5	6.0	2.3	0.5	1.5	1.5	3.0	7.0	11.5	81.6
Rmax	51	43	39	43	24	18	1	13	5	31	23	47	
EI_{30}	86	104	93	101	32	31	0	32	0	41	26	113	689

Appendix 6. continued

Table 2.7 Kifumangao Salt Project

Station no.	Location	Altitude (m asl)	District
973920	7.31S,39.17E	NA	Kisarawe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	77	76	144	260	187	55	26	17	20	64	158	149	1233
Rn	5.0	6.2	8.8	15.4	11.8	4.3	3.0	3.2	3.2	4.8	8.0	10.0	83.7
Rmax	37	44	45	75	47	24	18	11	10	36	63	48	
EI_{30}	65	63	110	199	134	40	17	4	6	54	138	110	940

Table 2.8.Kibiti Health Centre

Station no.	Location	Altitude (m asl)	District
973815	7.40S,39.00E	NA	Kisarawe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	164	114	211	281	108	4	2	10	19	36	154	210	1313
Rn	13.7	9.8	18.0	20.7	11.0	0.5	0.5	1.8	2.5	4.0	11.0	15.8	109.3
Rmax	38	31	34	41	25	4	2	5	9	15	33	46	
EI_{30}	99	70	116	169	55	1	0	0	8	19	100	134	771

Table 2.9 Bagamoyo

Station no.	Location	Altitude (m asl)	District
963800	6.25S,38.55E	9	Bagamoyo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	76	64	146	216	152	33	38	11	44	32	43	101	955
Rn	4.3	3.0	6.4	12.0	10.0	2.4	5.4	1.7	2.2	3.4	4.3	6.3	61.4
Rmax	30	38	57	52	38	21	13	5	21	15	14	37	
EI_{30}	62	64	131	162	106	28	13	2	39	18	23	79	727

Table 2.10 Kisarawe Agriculture

Station no.	Location	Altitude (m asl)	District
963943	6.54S,39.04E	274	Kisarawe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	92	63	155	252	184	38	31	17	35	42	102	134	1145
Rn	6.1	4.9	11.5	19.6	13.2	4.3	3.7	2.5	2.9	3.0	6.3	8.7	86.7
Rmax	38	30	43	39	51	15	18	10	18	28	28	42	
EI_{30}	73	48	105	148	127	19	18	6	26	38	74	100	782

Table 2.11 Lugoba Mission

Station no.	Location	Altitude (m asl)	District
963805	6.28S,38.19E	244	Kisarawe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	77	75	145	199	77	30	14	13	51	64	114	94	953
Rn	5.5	5.4	9.5	14.5	9.2	2.6	2.4	2.0	4.2	5.2	9.0	7.0	76.5
Rmax	37	29	38	43	25	14	8	8	33	28	30	34	
EI_{30}	62	56	103	129	36	20	3	4	43	46	73	68	643

Appendix 6. continued

Table 2.12 Mandera Mission

Station no.	Location	Altitude (m asl)	District
963804	6.13S,38.23E	213	Bagamoyo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	81	70	120	200	121	31	20	16	46	47	92	81	925
Rn	6.2	5.0	9.7	16.6	11.6	3.9	3.4	2.8	4.5	5.7	7.2	6.0	82.6
Rmax	37	34	48	36	32	12	9	8	27	18	29	27	
EI_{30}	62	57	87	115	68	13	4	3	33	22	62	57	583

Table 2.13 Kwaruhombo

Station no.	Location	Altitude (m asl)	District
963812	6.05S,38.08E	457	Bagamoyo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	136	65	129	231	153	21	20	29	42	53	70	113	1062
Rn	7.2	4.3	9.1	14.5	10.2	2.8	2.5	4.0	3.7	4.1	5.7	9.4	77.5
Rmax	42	32	44	52	34	8	10	9	21	24	23	21	
EI_{30}	109	54	95	163	104	7	9	9	30	39	46	64	729

Table 2.14 Vikindu Forest

Station no.	Location	Altitude (m asl)	District
973915	7.20S,39.18E	91	Kisarawe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	61	57	174	334	178	36	35	23	34	26	123	103	1184
Rn	4.2	4.1	9.4	15.8	10.2	3.1	3.3	2.2	2.6	2.5	6.9	6.6	70.9
Rmax	30	29	48	59	47	14	19	12	18	15	36	38	
EI_{30}	50	46	135	251	134	23	24	14	26	18	95	80	896

Table 2.15 Chambezi

Station no.	Location	Altitude (m asl)	District
963823	6.35S,38.55E	15	Bagamoyo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	72	50	151	231	177	39	40	13	52	44	94	97	1060
Rn	5.5	3.7	9.4	16.2	12.4	3.5	4.9	3.4	3.7	3.6	6.1	6.9	79.3
Rmax	30	25	47	51	49	15	16	4	26	20	26	36	
EI_{30}	53	39	114	154	124	24	19	0	42	31	67	72	739

Table 2.16 Ruvu Farm

Station no.	Location	Altitude (m asl)	District
963830	6.45S,38.45E	61	Bagamoyo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	55	59	108	212	125	19	13	17	43	33	97	107	888
Rn	4.1	3.7	8.8	14.8	10.3	3.3	2.5	2.0	3.7	3.5	6.8	6.8	70.3
Rmax	29	31	31	44	35	8	5	9	23	20	28	40	
EI_{30}	44	51	69	139	79	3	0	8	32	22	67	84	598

Appendix 6. continued

Table 2.17 Wami Railways

Station no.	Location	Altitude (m asl)	District
963835	6.14S,38.43E	NA	Bagamoyo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	102	38	128	168	101	28	35	24	34	51	70	146	925
Rn	6.9	3.8	8.5	13.5	9.9	5.3	4.6	3.9	3.9	4.7	6.6	9.9	81.5
max	52	22	47	43	29	11	9	11	20	27	22	53	
EI_{30}	87	26	99	107	56	3	11	6	21	37	41	112	606

Table 2.18 Chalinze Mission

Station no.	Location	Altitude (m asl)	District
963834	6.38S,38.20E	NA	Bagamoyo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	112	64	152	176	95	20	7	10	43	44	89	101	913
Rn	8.1	4.6	9.3	14.5	9.5	1.8	1.0	2.2	3.7	3.9	8.2	9.2	76.0
Rmax	47	37	50	37	27	13	6	6	22	20	22	40	
EI_{30}	87	55	118	105	52	14	2	0	31	30	50	67	611

3.0 DAR-ES-SALAAM REGION

Table 3.1 Wazo Hill

Station no.	Location	Altitude (m asl)	District
963940	6.40S,39.10E	111	Kinondoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	67	58	126	185	140	33	30	17	30	31	76	880	880
Rn	6.8	3.5	9.5	15.8	12.5	4.4	5.3	3.4	3.6	3.7	6.0	80.8	80.8
Rmax	29	39	49	41	38	13	13	8	19	16	27		-
EI_{30}	42	57	94	109	84	13	6	1	18	17	52	559	559

4.0 DODOMA REGION

Table 4.1 Hombolo Leprosy Centre

Station no.	Location	Altitude (m asl)	District
953511	5.56S,35.57E	1036	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	145	130	97	88	7	1	0	0	0	3	21	118	610
Rn	8.4	7.9	7.5	5.8	1.1	0.1	0.1	0	0	0.4	2.4	7.5	41.2
Rmax	46	44	36	37	5	1	0	0	0	2	11	46	
EI_{30}	113	101	69	70	1	0	0	0	0	0	11	94	459

Table 4.2 Zanka School

Station no.	Location	Altitude (m asl)	District
953506	5.53S,35.45E	1133	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	135	137	88	63	13	0	0	0	0	4	51	134	625
Rn	8.9	10.3	8.0	4.2	1.2	0.1	0.1	0	0	0.6	2.9	10.0	46.3
Rmax	39	41	36	27	11	0	0	0	0	3	26	33	
EI_{30}	98	94	59	50	10	0	0	0	0	0	45	87	443

Appendix 6. continued

Table 4.3 Chamkoroma Pr. School

Station no.	Location	Altitude (m asl)	District
963634	6.20S,36.40E	NA	Mpwapwa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	130	95	116	155	35	1	1	0	0	6	16	82	637
Rn	9.2	6.8	8.4	11.3	4.2	0.3	0.3	0	0.1	0.1	2.0	6.0	48.7
Rmax	41	34	36	38	15	1	1	0	0	6	9	31	
EI_{30}	93	70	81	103	17	0	0	0	0	6	7	60	437

Table 4.4 Chipogolo Pr. School

Station no.	Location	Altitude (m asl)	District
963639	6.52S,36.02E	NA	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	80	90	72	49	5	0	0	0	0	1	41	93	431
Rn	7.3	7.5	7.0	5.6	0.7	0	0	0	0	0.5	3.4	7.9	39.9
Rmax	28	28	27	18	4	0	0	0	0	1	22	33	
EI_{30}	50	58	44	25	1	0	0	0	0	0	31	62	271

Table 4.5 Mlowa Dam

Station no.	Location	Altitude (m asl)	District
963513	6.33S,35.45E	914	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	121	94	81	40	6	0	1	0	0	3	19	77	442
Rn	7.8	6.5	6.0	4.7	1.2	0	0.1	0	0.1	0.5	1.4	6.4	34.7
Rmax	38	33	29	17	4	0	1	0	0	2	11	27	
EI_{30}	90	69	58	21	0	0	0	0	0	0	14	51	303

Table 4.6 Kinunguru

Station no.	Location	Altitude (m asl)	District
963510	6.54S,35.28E	NA	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	103	104	78	63	4	0	0	0	0	0	40	130	522
Rn	8.5	7.8	6.7	6.3	0.8	0	0	0	0	0.1	2.8	8.4	41.4
Rmax	34	32	38	20	3	0	0	0	0	0	24	44	
EI_{30}	68	71	58	35	0	0	0	0	0	0	34	99	365

Table 4.7 Mpwapwa Vet. Centre

Station no.	Location	Altitude (m asl)	District
963600	6.20S,36.30E	1036	Mpwapwa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	146	131	112	118	26	5	0	0	1	5	32	123	699
Rn	12.2	10.3	9.6	11.5	4.9	0.8	0.2	0.1	0.3	0.7	4.5	11.5	66.6
Rmax	43	49	39	35	13	3	0	0	1	4	16	38	
EI_{30}	94	94	74	68	5	0	0	0	0	1	14	74	424

Appendix 6. continued

Table 4.8 Chamwale

Station no.	Location	Altitude (m asl)	District
963516	6.30S,35.56E	1158	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	77	98	104	65	13	0	0	0	0	5	25	92	479
Rn	5.9	6.5	5.8	6.9	1.8	0	0.1	0	0	0.7	1.6	5.3	34.6
Rmax	30	36	39	24	10	0	0	0	0	3	17	36	
EI_{30}	56	75	86	36	6	0	0	0	0	0	22	76	357

Table 4.9 Bahi Maji

Station no.	Location	Altitude (m asl)	District
953808	5.57S,35.18E	NA	Kondoa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	111	119	116	86	6	0	0	0	1	2	33	114	588
Rn	8.7	8.6	8.5	7.9	1.8	0.1	0.2	0	0.1	0.4	2.8	8.7	47.8
Rmax	37	49	40	35	3	0	0	0	1	1	21	36	
EI_{30}	76	92	84	57	0	0	0	0	0	0	26	78	413

Table 4.10 Mponde II

Station no.	Location	Altitude (m asl)	District
953514	5.31S,35.12E	NA	Kondoa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	85	81	119	111	26	0	1	0	1	5	38	122	589
Rn	7.3	6.4	6.9	9.4	2.8	0.2	0.1	0	0.3	1.1	4.4	9.7	48.6
Rmax	28	28	41	38	19	0	1	0	1	3	19	31	
EI_{30}	54	55	95	74	19	0	0	0	0	0	22	77	396

Table 4.11 Mbuyuni

Station no.	Location	Altitude (m asl)	District
953509	5.24S,35.50E	1219	Kondoa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	84	96	79	90	12	0	0	0	0	7	47	109	524
Rn	7.6	7.9	7.4	8.2	2.0	0.2	0	0	0	1.4	4.6	9.1	48.4
Rmax	31	37	25	25	7	0	0	0	0	5	23	29	
EI_{30}	54	67	47	52	3	0	0	0	0	0	31	67	321

Table 4.12 Kurio Mission

Station no.	Location	Altitude (m asl)	District
953500	5.13S,35.23E	1372	Kondoa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	71	112	81	52	11	4	0	0	1	3	33	91	459
Rn	7.0	9.3	8.2	7.0	1.8	0.7	0.1	0	0.2	0.2	2.8	8.7	46.0
Rmax	20	31	21	16	6	2	0	0	1	2	16	23	
EI_{30}	38	70	42	19	2	0	0	0	0	0	23	50	244

Appendix 6. continued

Table 4.13 Kondoa Maji

Station no.	Location	Altitude (m asl)	District
943525	4.55S,35.48E	1372	Kondoa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	124	103	117	90	21	1	1	0	0	3	38	131	629
Rn	9.5	9.2	8.5	8.8	3.2	0.1	0.3	0	0	0.7	3.9	10.2	54.4
Rmax	40	36	46	31	12	1	1	0	0	2	17	41	
EI_{30}	86	66	89	54	8	0	0	0	0	0	23	89	415

Table 4.14 Farkwa Mission

Station no.	Location	Altitude (m asl)	District
953502	5.24S,35.36E	1219	Kondoa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	119	93	97	110	21	0	0	0	2	7	39	118	606
Rn	10.0	9.0	9.7	9.8	2.9	0	0.1	0	0.2	1.1	3.9	12.2	58.9
Rmax	39	33	33	34	14	0	0	0	2	6	26	39	
EI_{30}	78	57	57	68	11	0	0	0	0	2	30	67	370

Table 4.15 Zoissa School

Station no.	Location	Altitude (m asl)	District
953605	5.40S,36.23E	914	Mpwapwa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	152	119	110	97	20	1	2	0	2	4	22	98	627
Rn	9.4	8.3	8.1	10.4	2.8	0.4	0.5	0.1	0.5	0.6	2.0	7.5	50.6
Rmax	44	39	39	24	10	1	1	0	1	3	12	31	
EI_{30}	113	87	80	47	8	0	0	0	0	0	15	67	417

Table 4.16 Buigiri Dam

Station no.	Location	Altitude (m asl)	District
963622	6.11S,36.07E	1067	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	97	82	63	57	12	1	0	0	0	1	15	120	448
Rn	6.3	7.4	5.2	5.3	1.2	0.3	0	0	0	0.2	1.5	6.5	33.9
Rmax	34	28	26	24	9	1	0	0	0	1	8	48	
EI_{30}	74	51	44	37	8	0	0	0	0	0	8	102	324

Table 4.17 Pandambili Pr. School

Station no.	Location	Altitude (m asl)	District
963642	6.05S,36.43E	NA	Mpwapwa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	70	69	67	45	18	0	0	0	0	11	7	100	387
Rn	5.3	6.2	5.5	4.5	3.7	0	0.2	0.2	0	0.5	0.6	5.8	32.5
Rmax	23	27	27	17	7	0	0	0	0	10	6	28	
EI_{30}	48	45	47	26	0	0	0	0	0	11	4	75	256

Appendix 6. continued

Table 4.18 Izava

Station no.	Location	Altitude (m asl)	District
953614	5.30S,36.10E	NA	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	125	70	173	86	10	1	0	6	2	2	7	103	585
Rn	7.8	4.4	11.2	7.0	1.6	0.2	0	0.8	0.8	0.3	1.0	6.3	41.4
Rmax	40	31	36	31	4	1	0	2	1	2	5	39	
EI_{30}	95	57	117	59	1	0	0	0	0	0	2	82	413

Table 4.19 Ilangali

Station no.	Location	Altitude (m asl)	District
963511	6.48S,35.05E	762	Dodoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	155	126	110	83	11	0	0	0	0	2	32	120	639
Rn	9.7	10.6	9.9	8.0	1.6	0	0.1	0	0.1	0.5	2.9	11.3	54.7
Rmax	45	34	33	28	8	0	0	0	0	2	19	36	
EI_{30}	115	78	67	49	4	0	0	0	0	0	24	71	408

5.0 IRINGA REGION

Table 5.1 Ismani

Station no.	Location	Altitude (m asl)	District
973510	7.27S,35.48E	1494	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	162	156	119	85	9	1	0	0	1	5	24	137	699
Rn	12.7	9.4	11.3	7.5	1.4	0.1	0	0	0.1	0.4	1.9	10.3	55.1
Rmax	40	43	45	32	6	1	0	0	1	3	20	37	
EI_{30}	103	116	76	56	2	0	0	0	0	1	22	91	467

Table 5.2 Mtandika

Station no.	Location	Altitude (m asl)	District
973620	7.01S,36.27E	NA	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	113	59	104	44	12	0	0	0	0	4	0	76	412
Rn	6.8	3.6	6.4	4.6	1.2	0	0	0	0	0.4	0	4.6	27.6
Rmax	42	26	35	18	9	0	0	0	0	2	0	29	
EI_{30}	91	48	80	25	8	0	0	0	0	0	0	60	312

Table 5.3 Mazombwe

Station no.	Location	Altitude (m asl)	District
973605	7.40S,36.02E	1676	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	146	122	96	48	6	0	0	0	0	5	26	85	534
Rn	9.9	9.5	10.0	7.6	1.4	0	0.1	0	0	0.6	4.1	6.6	49.8
Rmax	52	27	24	16	3	0	0	0	0	4	11	31	
EI_{30}	111	75	48	13	0	0	0	0	0	1	7	60	315

Appendix 6. continued

Table 5.4 Izazi Maji

Station no.	Location	Altitude (m asl)	District
973524	7.10S,35.45E	NA	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	66	88	76	41	1	0	0	0	0	4	19	129	424
Rn	4.3	5.4	5.9	4.6	0.2	0.1	0	0	0	0.3	1.8	7.4	30.0
Rmax	23	34	29	21	1	0	0	0	0	4	12	44	
EI_{30}	49	70	54	25	0	0	0	0	0	2	13	103	316

Table 5.5 John's Corner (Mafinga)

Station no.	Location	Altitude (m asl)	District
983533	8.15S,35.20E	1829	Mufindi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	228	179	229	81	17	2	2	0	1	8	55	198	1000
Rn	18.9	16.2	16.0	8.7	2.2	0.3	0.2	0.2	0.2	1.5	6.1	15.8	86.3
Rmax	48	42	48	29	11	2	2	0	1	5	25	40	
EI_{30}	136	103	151	45	9	0	0	0	0	0	32	120	596

Table 5.6 Ulete Mission

Station no.	Location	Altitude (m asl)	District
983517	8.07S,35.24E	1676	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	162	173	170	115	21	0	0	0	1	20	70	192	924
Rn	14.4	11.7	14.2	9.5	1.7	0.1	0.1	0	0.2	1.8	5.4	13.4	72.5
Rmax	28	47	32	30	9	0	0	0	1	13	26	40	
EI_{30}	87	122	98	71	13	0	0	0	0	14	49	126	580

Table 5.7 Sadani

Station no.	Location	Altitude (m asl)	District
983542	8.15S,35.00E	NA	Mufindi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	180	136	170	120	32	0	1	0	2	18	61	149	869
Rn	16.4	12.6	14.1	11.3	3.3	0	0.2	0	0.3	2.1	6.0	14.7	81.0
Rmax	36	33	38	27	12	0	1	0	2	11	27	34	
EI_{30}	98	77	102	65	17	0	0	0	0	10	39	78	486

Table 5.8 Matamba

Station no.	Location	Altitude (m asl)	District
983413	8.56S,34.01E	NA	Njombe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	166	159	240	127	41	3	2	1	6	27	70	211	1053
Rn	17.2	16.4	20.2	13.6	4.9	0.3	0.4	0.1	1.0	2.6	7.3	14.8	98.8
Rmax	29	28	36	29	16	1	1	1	2	14	21	44	
EI_{30}	78	75	132	61	20	0	0	0	0	17	37	138	558

Appendix 6. continued

Table 5.9 Malangali Sec. School

Station no.	Location	Altitude (m asl)	District
983401	8.34S,34.55E	1524	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	164	178	175	41	2	0	1	0	1	28	46	175	811
Rn	14.0	14.2	13.3	5.0	0.4	0.1	0.2	0	0.1	0.9	4.7	13.1	66.0
Rmax	32	44	38	13	2	0	0	0	1	15	17	35	
EI_{30}	93	113	110	17	0	0	0	0	0	27	26	109	495

Table 5.10 Lyadebwe

Station no.	Location	Altitude (m asl)	District
983418	8.46S,34.34E	1295	Njombe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	102	75	109	50	6	0	1	0	0	0	31	85	459
Rn	8.0	6.8	8.0	3.1	0.4	0	0.3	0	0	0	2.4	7.3	36.3
Rmax	29	26	39	31	3	0	1	0	0	0	17	19	
EI_{30}	67	47	79	46	2	0	0	0	0	0	24	48	313

Table 5.11 Kibwele (Kilima Estate)

Station no.	Location	Altitude (m asl)	District
983509	8.35S,35.20E	1859	Mufindi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	221	137	215	278	119	22	12	11	10	19	46	182	1272
Rn	19.8	14.6	20.2	21.1	13.2	4.0	3.4	2.5	1.6	1.9	5.6	14.3	122.2
Rmax	44	27	45	50	30	7	5	7	7	13	16	52	
EI_{30}	123	64	116	170	57	2	0	0	3	13	21	121	690

Table 5.12 Lusitu Farm

Station no.	Location	Altitude (m asl)	District
993426	9.42S,34.43E	1981	Ludewa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	265	206	288	244	71	7	5	1	5	20	75	236	1423
Rn	21.9	16.6	22.0	19.4	8.1	2.2	1.6	0.3	1.2	2.0	6.4	16.2	117.9
Rmax	38	42	46	40	23	3	3	1	4	10	25	46	
EI_{30}	147	124	172	142	35	0	0	0	0	11	48	155	834

Table 5.13 Ndolela

Station no.	Location	Altitude (m asl)	District
993515	9.54S,35.12E	1100	Ludewa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	223	238	349	266	61	3	1	2	0	5	114	224	1486
Rn	16.8	17.0	18.3	16.3	5.3	1.1	0.4	0.2	0.2	0.9	6.4	14.0	96.9
Rmax	41	46	66	51	20	2	1	2	0	4	45	51	
EI_{30}	137	153	256	184	38	0	0	0	0	0	95	158	821

Appendix 6. continued

Table 5.14 Kifanya Mission

Station no.	Location	Altitude (m asl)	District
993503	9.31S,35.08E	1676	Njombe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	248	258	266	229	48	11	7	7	8	14	89	239	1424
Rn	17.6	18.8	21.2	17.7	7.1	2.7	2.1	0.8	1.8	1.0	5.6	16.2	112.6
Rmax	43	39	34	46	13	4	3	1	4	10	33	43	
EI_{30}	156	157	149	141	13	0	0	0	0	11	69	155	851

Table 5.15 Wasa Mission

Station no.	Location	Altitude (m asl)	District
983513	8.07S,35.15E	1676	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	178	195	190	96	10	5	2	0	4	23	55	199	957
Rn	14.9	13.6	14.0	9.2	1.1	0.4	0.2	0	0.3	1.3	4.7	14.5	74.2
Rmax	35	38	38	28	8	2	1	0	4	14	23	38	
EI_{30}	103	126	120	55	6	1	0	0	2	20	38	125	596

Table 5.16 Madunda Mission

Station no.	Location	Altitude (m asl)	District
993409	9.52S,34.28E	1372	Ludewa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	297	245	242	151	72	4	3	0	0	6	89	234	1343
Rn	15.7	14.2	17.2	12.8	5.3	0.4	0.6	0	0.3	0.4	5.9	15.8	88.6
Rmax	69	57	48	37	40	3	1	0	0	6	33	53	
EI_{30}	226	180	157	91	61	1	0	0	0	4	68	160	948

Table 5.17 Matembwe Mission

Station no.	Location	Altitude (m asl)	District
993505	9.15S,35.09E	1585	Njombe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	252	199	324	217	29	9	2	9	16	19	102	245	1423
Rn	12.4	11.7	13.5	11.6	3.0	0.7	0.3	0.6	1.1	1.5	6.2	12.2	74.8
Rmax	51	43	54	46	12	6	1	5	11	11	38	49	
EI_{30}	190	142	250	161	16	6	0	5	13	14	81	184	1062

Table 5.18 Ludewa Bomani

Station no.	Location	Altitude (m asl)	District
1003421	10.00S,34.40E	1554	Ludewa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	299	142	248	129	33	2	1	0	0	1	49	218	1122
Rn	17.3	12.2	17.7	13.7	5.7	0.7	0.2	0	0	0.2	3.8	15.8	87.3
Rmax	36	34	48	22	14	1	1	0	0	1	21	39	
EI_{30}	198	84	159	58	8	0	0	0	0	0	35	136	678

Appendix 6. continued

Table 5.19 Njombe Boma

Station no.	Location	Altitude (m asl)	District
993401	9.20S,34.46E	1829	Njombe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	211	195	205	135	30	3	3	0	3	15	60	202	1062
Rn	16.4	14.4	17.2	12.7	3.5	0.9	0.3	0	0.5	1.8	4.7	13.3	85.7
Rmax	41	33	37	29	15	2	3	0	2	12	28	49	
EI_{30}	129	119	117	72	16	0	0	0	0	9	45	141	648

Table 5.20 Image (Lyassa)

Station no.	Location	Altitude (m asl)	District
973612	7.28S,36.07E	1341	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	112	113	114	63	21	3	0	1	0	7	37	162	633
Rn	11.1	10.3	8.6	7.1	3.0	0.4	0	0.1	0.3	1.2	4.6	12.9	59.6
Rmax	27	30	27	12	13	2	0	1	0	5	17	37	
EI_{30}	59	66	73	26	10	0	0	0	0	1	18	100	353

Table 5.21 Kibengu

Station no.	Location	Altitude (m asl)	District
983543	8.16S,35.43E	NA	Mufindi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	217	177	180	157	57	8	3	4	1	4	7	151	966
Rn	18.4	14.0	15.3	14.3	7.5	2.3	1.2	1.2	0.6	1.0	2.2	12.0	90.0
Rmax	39	33	37	29	15	3	2	3	1	3	4	33	
EI_{30}	123	105	104	84	20	0	0	0	0	0	0	92	528

Table 5.22 Maboga

Station no.	Location	Altitude (m asl)	District
993440	9.53S,34.48E	305	Ludewa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	290	252	288	234	21	5	0	0	1	4	83	164	1342
Rn	15.9	14.9	17.8	16.1	3.1	0.7	0	0.1	0.3	0.6	5.2	12.8	87.5
Rmax	45	58	51	40	10	4	0	0	1	4	27	33	
EI_{30}	203	183	196	150	7	1	0	0	0	0	62	100	902

Table 5.23 Mkwawa High School

Station no.	Location	Altitude (m asl)	District
973516	7.45S,35.41E	1571	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	146	129	147	69	18	1	0	0	0	11	46	123	690
Rn	12.3	11.1	12.9	8.4	2.7	0.1	0.2	0	0	0.9	5.1	13.0	66.7
Rmax	34	30	30	20	12	1	0	0	0	10	18	22	
EI_{30}	87	76	83	30	8	0	0	0	0	9	24	56	373

Appendix 6. continued

Table 5.24 Msembe National Park

Station no.	Location	Altitude (m asl)	District
973401	7.45S,34.54E	NA	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	143	112	95	81	12	0	0	0	3	4	14	127	591
Rn	10.2	9.1	7.8	8.4	1.7	0	0	0	0.5	0.6	2.3	9.5	50.1
Rmax	43	32	35	20	7	0	0	0	2	4	9	45	
EI_{30}	101	72	65	40	4	0	0	0	0	0	4	92	378

Table 5.25 Madibira

Station no.	Location	Altitude (m asl)	District
983400	8.14S,34.49E	1158	Iringa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	159	136	128	106	21	3	0	0	1	12	43	150	759
Rn	11.0	10.4	13.3	12.3	2.8	0.5	0.2	0.1	0.2	1.3	5.2	12.1	69.4
Rmax	47	36	30	30	11	1	0	0	1	10	20	50	
EI_{30}	114	89	64	50	9	0	0	0	0	8	23	102	459

Table 5.26 Ifinga Mission

Station no.	Location	Altitude (m asl)	District
993502	9.30S,35.29E	792	Njombe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	263	230	377	336	56	7	8	6	10	26	106	273	1698
Rn	16.8	16.3	18.2	16.5	5.4	1.0	1.2	1.3	1.7	2.2	7.0	13.2	100.8
Rmax	55	48	75	72	23	4	4	4	5	18	34	66	
EI_{30}	181	150	287	258	35	1	1	0	1	21	78	215	1228

Appendix 6. continued

6.0 KAGERA REGION

Table 6.1 Biharamulo

Station no.	Location	Altitude (m asl)	District
923100	2.38S,31.19E	1478	Biharamulo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	103	112	124	136	71	10	4	16	57	59	136	109	937
Rn	9.2	10.3	10.9	13.1	7.0	1.4	0.5	1.7	5.8	8.2	14.3	12.1	94.5
Rmax	29	30	36	29	20	6	3	11	21	23	31	29	
EI_{30}	62	65	76	71	38	3	0	10	33	24	67	53	502

Table 6.2 Buyango

Station no.	Location	Altitude (m asl)	District
913131	1.09S,31.38E	NA	Bukoba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	55	96	121	259	146	23	24	21	38	98	157	112	1150
Rn	5.3	7.6	11.0	17.3	10.9	3.3	2.7	2.4	4.8	7.8	11.5	8.8	93.4
Rmax	21	25	26	37	38	10	9	11	15	20	36	20	
EI_{30}	33	61	67	163	97	8	11	11	17	58	102	65	693

Table 6.3 Kayanga Hydromet

Station no.	Location	Altitude (m asl)	District
913128	1.32S,31.10E	1646	Karagwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	80	109	110	205	108	18	14	38	74	86	151	89	1082
Rn	8.5	10.4	13.3	17.1	11.0	2.2	2.0	4.1	8.2	11.5	15.8	11.0	115.1
Rmax	33	34	25	50	36	8	9	22	27	28	31	27	
EI_{30}	48	64	45	126	62	7	6	25	40	35	73	39	570

Table 6.4 Kitundu

Station no.	Location	Altitude (m asl)	District
913122	1.27S,31.10E	1646	Karagwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	51	110	121	229	111	18	5	42	74	88	148	83	1080
Rn	6.6	8.4	12.4	15.1	11.6	2.3	0.6	3.9	7.4	10.1	13.6	8.9	100.9
Rmax	21	42	36	56	36	10	5	19	29	27	34	25	
EI_{30}	24	80	66	161	62	8	2	27	45	43	83	43	644

Table 6.5 Nyakato Sec.School

Station no.	Location	Altitude (m asl)	District
913105	1.20S,31.44E	1280	Bukoba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	74	131	215	337	286	93	43	102	120	122	142	171	1836
Rn	6.6	7.9	14.0	15.1	13.3	5.0	3.8	8.1	9.0	12.0	13.0	10.2	118.0
Rmax	27	35	46	60	63	51	26	28	35	23	28	41	
EI_{30}	48	96	147	257	224	88	33	65	81	61	76	124	1300

Appendix 6. continued

Table 6.6 Mubunda (Kitaba Pr. School)

Station no.	Location	Altitude (m asl)	District
913143	1.57S,31.32E	NA	Muleba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	82	122	122	208	99	3	21	11	36	65	109	53	931
Rn	9.4	10.1	13.3	16.9	8.9	0.6	1.1	1.9	4.6	5.6	11.8	9.2	93.4
Rmax	23	30	26	35	29	3	18	7	13	25	20	13	
EI_{30}	38	74	56	120	60	0	22	2	15	43	48	7	485

Table 6.7 Ngara

Station no.	Location	Altitude (m asl)	District
923000	2.28S,30.38E	1798	Ngara

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	99	111	118	173	78	14	6	10	66	74	151	87	987
Rn	9.1	9.5	11.2	14.1	8.1	1.8	0.4	1.0	5.2	8.4	13.1	10.1	92.0
Rmax	28	30	25	37	21	6	4	7	28	20	37	23	
EI_{30}	58	68	62	104	40	5	3	6	48	34	90	39	557

Table 6.8 Kyerwa

Station no.	Location	Altitude (m asl)	District
913006	1.23S,30.48E	1402	Karagwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	47	73	109	130	73	16	2	45	76	95	138	76	880
Rn	5.0	4.2	7.7	10.7	6.3	1.8	0.6	3.1	8.0	9.0	11.9	7.8	76.1
Rmax	20	29	29	46	27	10	2	26	26	32	32	23	
EI_{30}	27	60	74	89	48	9	0	39	42	58	81	41	568

Table 6.9 Kaisho

Station no.	Location	Altitude (m asl)	District
913012	1.15S,30.41E	1372	Karagwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	39	71	114	151	98	26	18	36	94	112	126	67	952
Rn	4.1	6.5	9.8	13.4	10.0	2.3	1.3	4.2	8.2	9.0	12.6	6.1	87.5
Rmax	16	25	26	29	25	19	11	16	32	28	29	22	
EI_{30}	22	44	66	83	51	21	14	19	61	70	65	41	557

Table 6.10 Murusagamba

Station no.	Location	Altitude (m asl)	District
923004	2.58S,30.51E	1341	Ngara

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	110	105	136	165	93	10	0	7	26	47	154	111	964
Rn	8.7	8.1	10.6	12.6	7.3	0.7	0	0.8	3.3	6.6	11.8	10.1	80.6
Rmax	33	34	37	35	25	7	0	4	12	14	40	30	
EI_{30}	73	72	89	103	59	7	0	2	12	15	101	65	598

Appendix 6. continued

Table 6.11 Buzirayombo

Station no.	Location	Altitude (m asl)	District
923109	2.45S,31.50E	1128	Biharamulo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	66	94	113	132	64	5	0	10	29	58	113	79	763
Rn	6.5	6.6	8.3	9.4	4.9	0.4	0.1	1.0	3.0	5.8	9.7	7.0	62.7
Rmax	22	30	30	34	25	4	0	6	15	25	29	26	
EI_{30}	38	67	75	89	46	2	0	5	18	36	68	49	493

Table 6.12 Bitaraka

Station no.	Location	Altitude (m asl)	District
913018	1.47S,30.52E	NA	Karagwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	66	67	99	172	93	11	10	14	67	92	136	82	909
Rn	5.7	6.0	10.4	12.6	8.5	1.5	0.7	1.4	6.4	9.1	13.3	7.7	83.3
Rmax	26	23	22	36	29	7	7	9	28	23	24	28	
EI_{30}	44	42	48	110	56	4	7	8	43	48	67	50	527

Table 6.13 Nyamirembe

Station no.	Location	Altitude (m asl)	District
923104	2.32S,31.42E	1143	Biharamulo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	65	91	121	181	61	1	0	12	40	76	131	78	857
Rn	4.0	5.1	5.7	10.3	3.2	0.1	0.1	0.4	2.6	4.2	8.7	5.2	49.6
Rmax	35	32	45	44	28	1	0	11	19	35	30	26	
EI_{30}	58	73	105	134	53	0	0	13	32	66	89	57	680

Table 6.14 Rubafu

Station no.	Location	Altitude (m asl)	District
913130	1.03S,31.50E	NA	Bukoba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	106	108	227	322	281	118	103	64	82	155	156	127	1849
Rn	8.9	8.3	11.8	16.6	13.1	5.4	5.2	3.9	5.8	9.6	10.0	8.6	107.2
Rmax	28	34	51	58	59	25	41	25	29	33	41	34	
EI_{30}	65	74	172	236	218	90	89	51	60	108	112	89	1364

6.15 Keza

Station no.	Location	Altitude (m asl)	District
923002	2.48S,30.43E	1524	Ngara

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	114	85	107	148	74	13	8	12	52	74	119	95	901
Rn	7.2	6.9	7.8	10.8	4.3	0.9	0.5	1.0	4.6	5.8	8.4	7.3	65.5
Rmax	42	27	29	36	29	7	5	6	18	28	36	25	
EI_{30}	90	56	72	98	60	9	5	7	32	52	84	61	626

Appendix 6. continued

Table 6.16 Kishanda Hydromet

Station no.	Location	Altitude (m asl)	District
913129	1.42S,31.34E	1463	Muleba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	81	119	139	222	119	9	6	37	71	84	147	92	1126
Rn	10.3	10.7	14.0	17.7	12.1	1.5	1.6	4.3	7.4	10.9	14.1	11.7	116.3
Rmax	21	36	32	47	31	6	4	15	24	24	38	23	
EI_{30}	32	73	72	136	63	2	0	18	39	33	82	36	586

Table 6.17 Kimwani-Kabonde

Station no.	Location	Altitude (m asl)	District
923113	2.09S,31.42E	NA	Muleba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	123	154	208	276	134	14	14	43	75	113	158	143	1455
Rn	7.9	9.3	13.2	15.2	8.3	1.5	1.8	4.4	5.2	7.4	13.2	11.0	98.4
Rmax	42	46	48	56	49	7	7	19	34	38	38	35	
EI_{30}	94	117	146	201	106	7	5	26	60	85	96	92	1035

Table 6.18 Lusahunga

Station no.	Location	Altitude (m asl)	District
923108	2.54S,31.17E	1372	Biharamulo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	101	117	150	193	93	8	0	17	36	45	121	120	1001
Rn	7.1	7.4	10.2	11.7	6.6	1.0	0.1	1.2	3.8	3.8	10.4	10.1	73.4
Rmax	29	32	43	42	29	6	0	11	20	17	25	27	
EI_{30}	70	84	107	136	65	3	0	13	23	29	69	71	670

Table 6.19 Kitengule Ranch

Station no.	Location	Altitude (m asl)	District
913161	1.15S,31.15E	1372	Karagwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	121	108	180	243	121	14	4	48	137	87	165	187	1415
Rn	6.3	4.2	8.7	9.3	4.8	0.7	0.4	2.2	5.9	6.8	9.2	9.4	67.9
Rmax	50	52	62	54	42	9	4	23	50	30	64	52	
EI_{30}	105	106	153	200	107	12	1	44	121	60	139	149	119

7.0 KIGOMA REGION

Table 7.1 Kagera Rainfall Station

Station no.	Location	Altitude (m asl)	District
943009	4.45S,30.40E	NA	Kasulu

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	163	146	174	182	69	0	0	2	14	64	220	177	1211
Rn	12.1	10.5	11.3	11.8	5.2	0.2	0	0.3	1.6	6.7	14.6	14.3	88.6
Rmax	47	35	54	50	25	0	0	2	10	16	46	43	
EI_{30}	112	97	130	132	49	0	0	0	8	31	149	111	819

Appendix 6. continued

Table 7.2 Matendo Ujamaa Village

Station no.	Location	Altitude (m asl)	District
942915	4.53S,29.53E	1219	Kigoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	155	130	170	192	80	7	0	0	8	102	211	184	1239
Rn	10.9	9.2	10.5	10.7	4.1	0.2	0	0	0.6	8.4	14.0	13.1	81.7
Rmax	38	32	43	48	34	7	0	0	6	30	44	40	
EI_{30}	105	87	123	144	70	7	0	0	5	65	142	121	869

Table 7.3 Kalinzi Agric. Station

Station no.	Location	Altitude (m asl)	District
942911	4.38S,29.43E	1494	Kigoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	156	146	203	269	78	8	5	9	24	116	191	233	1438
Rn	12.6	12.1	15.3	18.6	7.5	0.5	0.8	1.0	3.2	14.2	16.0	16.7	118.5
Rmax	35	33	44	46	29	5	3	6	11	28	34	39	
EI_{30}	95	88	129	172	48	5	0	4	10	48	109	145	853

Table 7.4 Heri Mission

Station no.	Location	Altitude (m asl)	District
942906	4.29S,29.50E	1585	Kasulu

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	194	182	207	284	112	3	1	7	20	69	154	136	1369
Rn	12.6	12.0	13.6	15.9	7.7	0.5	0.2	1.1	2.1	5.5	13.3	11.3	95.8
Rmax	38	35	31	46	30	1	0	3	13	23	27	21	
EI_{30}	130	121	132	198	77	0	0	0	13	46	85	75	877

Table 7.5 Kakonko Pr. School

Station no.	Location	Altitude (m asl)	District
933002	3.17S,30.57E	1219	Kibondo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	105	121	153	225	87	7	0	11	21	40	130	102	1002
Rn	9.3	8.5	11.8	13.9	6.0	0.5	0	1.3	3.3	4.8	10.6	9.3	79.3
Rmax	38	42	32	41	18	4	0	7	10	16	26	32	
EI_{30}	69	89	95	153	56	3	0	5	6	19	76	62	633

Table 7.6 Nyarwonga Mission

Station no.	Location	Altitude (m asl)	District
963003	3.01S,30.52E	1585	Kibondo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	110	107	158	131	66	2	8	7	39	52	103	115	898
Rn	6.5	6.8	9.2	9.2	5.0	0.3	0.5	0.9	3.3	3.9	6.0	7.3	58.9
Rmax	39	36	43	34	25	1	4	5	20	21	36	34	
EI_{30}	87	81	119	89	47	0	4	2	28	37	82	85	661

Appendix 6. continued

Table 7.7 Kibondo

Station no.	Location	Altitude (m asl)	District
933005	3.34S,30.40E	1515	Kibondo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	152	175	198	231	79	2	6	5	30	39	158	160	1235
Rn	11.0	9.8	12.3	15.6	5.3	0.3	0.5	0.6	2.4	4.6	11.4	12.0	85.8
Rmax	38	51	42	43	27	1	4	3	15	19	38	47	
EI_{30}	102	136	138	151	58	0	3	1	22	21	105	110	847

Table 7.8 Kasoje

Station no.	Location	Altitude (m asl)	District
962900	6.08S,29.44E	NA	Kigoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	234	193	294	300	69	0	3	30	18	120	317	327	1905
Rn	14.4	11.0	16.7	17.0	7.0	0.1	0.3	1.2	1.3	8.8	17.0	17.1	111.9
Rmax	67	62	75	64	28	0	1	10	11	39	64	75	
EI_{30}	176	153	222	219	42	0	0	24	14	85	233	249	1417

Table 7.9 Nyanza Salt Mines

Station no.	Location	Altitude (m asl)	District
953004	5.05S,30.22E	1128	Kigoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	138	107	156	157	56	1	3	2	17	79	184	170	1070
Rn	11.7	10.2	13.2	13.6	5.3	0.2	0.4	0.4	1.8	7.1	13.7	16.2	93.8
Rmax	45	36	35	36	25	1	3	2	11	31	47	34	
EI_{30}	91	65	92	92	37	0	0	0	11	52	122	89	651

Table 7.10 Bulombora J.K.T

Station no.	Location	Altitude (m asl)	District
952902	5.02S,29.47E	NA	Kigoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	119	152	162	116	45	2	0	9	7	83	173	167	1035
Rn	7.3	6.2	8.4	8.0	2.5	0.3	0	0.6	1.0	6.4	10.8	11.5	63.0
Rmax	33	52	48	36	25	1	0	5	4	30	37	42	
EI_{30}	87	134	130	83	41	0	0	5	1	58	120	115	774

Table 7.11 Malagarassi

Station no.	Location	Altitude (m asl)	District
953002	5.07S,30.51E	1060	Kigoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	135	145	133	135	31	0	0	0	1	25	94	152	851
Rn	11.1	12.3	10.7	10.7	2.1	0	0	0	0.1	3.7	10.2	12.8	73.7
Rmax	27	30	28	33	18	0	0	0	1	8	19	34	
EI_{30}	79	84	80	85	26	0	0	0	0	6	42	90	492

Appendix 6. continued

Table 7.12 Mgambo

Station no.	Location	Altitude (m asl)	District
952901	5.08S,29.52E	914	Kigoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	103	89	174	166	54	0	0	1	3	45	107	151	893
Rn	6.3	4.8	8.3	7.4	2.8	0	0.1	0.1	0.3	3.3	8.9	9.8	52.1
Rmax	33	39	53	60	23	0	0	1	3	21	28	41	
EI_{30}	78	77	144	146	46	0	0	0	0	34	66	108	699

7.13 Kifura (Mayowosi)

Station no.	Location	Altitude (m asl)	District
933008	3.52S,30.38E	NA	Kibondo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	202	198	161	189	51	14	0	9	39	89	171	205	1328
Rn	13.4	11.7	9.3	10.6	4.3	1.3	0	0.7	4.0	6.5	14.3	14.6	90.7
Rmax	38	63	47	44	19	6	0	7	19	35	35	43	
EI_{30}	133	155	124	140	33	7	0	6	24	66	100	134	922

Table 7.14 Makere Mission

Station no.	Location	Altitude (m asl)	District
943002	4.17S,30.25E	NA	Kasulu

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	218	163	266	288	178	4	3	15	20	118	192	266	1731
Rn	11.6	8.2	11.2	11.4	4.0	0.3	0.5	0.3	1.5	7.0	15.8	14.7	86.5
Rmax	62	37	52	72	56	4	1	15	8	31	39	48	
EI_{30}	172	124	209	241	170	2	0	19	13	87	114	189	1340

Table 7.15 Kasulu

Station no.	Location	Altitude (m asl)	District
943000	4.34S,30.06E	1381	Kasulu

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	146	165	183	163	60	0	4	19	22	81	184	176	1203
Rn	12.2	11.6	13.8	15.0	4.6	0.1	0.3	1.1	2.6	6.8	12.9	15.1	96.1
Rmax	32	42	43	39	25	0	3	12	10	31	41	34	
EI_{30}	86	113	118	92	44	0	1	16	10	55	122	100	757

Table 7.16 Nguruka

Station no.	Location	Altitude (m asl)	District
953105	5.10S,31.05E	1067	Kigoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	132	120	182	160	36	0	0	1	4	53	134	185	1007
Rn	11.6	9.6	12.7	12.2	2.8	0	0	0.1	1.1	5.4	12.8	15.3	83.6
Rmax	42	33	42	49	20	0	0	1	3	24	32	41	
EI_{30}	84	77	122	110	28	0	0	0	0	33	73	111	638

Appendix 6. continued

8.0 KILIMANJARO REGION

Table 8.1 West Kilimanjaro

Station no.	Location	Altitude (m asl)	District
923733	2.55S,37.04E	1718	Hai

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	47	35	78	135	71	7	0	2	4	52	96	77	604
Rn	5.6	4.7	8.8	13.9	8.3	1.6	0	0.3	1.0	5.1	13.1	9.4	71.8
Rmax	20	13	23	30	21	4	0	2	2	31	26	23	
EI_{30}	24	13	38	67	33	0	0	0	0	38	35	34	282

Table 8.2 Lyakirimu Mwika

Station no.	Location	Altitude (m asl)	District
933785	3.17S,37.34E	1524	Rombo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	140	99	232	429	243	74	71	71	31	75	240	150	1855
Rn	6.8	4.2	11.6	16.9	14.5	8.1	6.7	6.5	4.0	5.9	10.6	6.0	101.8
Rmax	40	40	56	96	64	26	31	33	24	29	61	51	
EI_{30}	113	90	180	353	181	40	47	50	21	53	195	133	1456

Table 8.3 Lyamungu

Station no.	Location	Altitude (m asl)	District
933721	3.14S,37.15E	1250	Hai

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	59	70	113	552	391	103	62	39	29	47	91	91	1647
Rn	5.9	6.4	9.0	21.7	21.3	11.8	10.4	6.8	4.2	3.3	7.9	8.3	117.0
Rmax	23	34	38	115	77	32	16	12	13	20	31	35	
EI_{30}	35	50	77	449	286	51	11	6	11	35	59	60	1130

Table 8.4 Kiyungi T.P.C.

Station no.	Location	Altitude (m asl)	District
933729	3.24S,37.19E	762	Hai

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	51	24	80	311	130	19	8	8	12	30	21	43	737
Rn	2.4	2.7	5.4	12.2	8.5	2.1	0.8	1.5	1.6	2.2	3.1	3.8	46.3
Rmax	33	14	35	84	54	11	5	5	7	13	10	24	
EI_{30}	52	14	64	265	105	11	4	0	4	21	7	32	579

Table 8.5 Masama Estate

Station no.	Location	Altitude (m asl)	District
933702	3.18S,37.13E	975	Hai

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	76	52	123	538	479	170	116	61	29	36	91	60	1831
Rn	4.0	4.4	7.2	18.8	18.6	10.0	9.2	6.3	2.6	1.9	6.1	5.4	94.5
Rmax	36	20	51	95	106	56	34	21	18	16	29	20	
EI_{30}	68	34	103	438	395	134	76	34	22	30	66	37	1437

Appendix 6. continued

Table 8.6 Ngare Nairobi

Station no.	Location	Altitude (m asl)	District
933777	3.02S,37.03E	1463	Hai

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	66	51	93	165	38	4	3	0	3	65	186	92	766
Rn	7.4	7.1	11.1	18.7	6.6	0.7	1.1	0.3	0.9	7.0	15.9	10.4	87.2
Rmax	22	17	26	28	16	3	2	0	2	19	34	30	
EI_{30}	33	18	42	69	9	0	0	0	0	32	105	47	355

Table 8.7 Mweka College of Wildlife

Station no.	Location	Altitude (m asl)	District
933798	3.14S,37.19E	1463	Hai

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	60	52	124	362	446	217	89	38	42	108	99	162	1799
Rn	3.6	3.1	6.3	14.6	17.6	13.0	7.6	4.1	4.1	5.8	6.0	5.6	91.4
Rmax	30	26	42	79	67	41	30	15	15	32	30	75	
EI_{30}	52	45	103	294	345	150	58	20	24	84	74	161	1410

Table 8.8 Rombo Mission

Station no.	Location	Altitude (m asl)	District
933706	3.12S,37.36E	1433	Rombo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	166	125	260	329	147	48	41	55	64	91	335	195	1856
Rn	8.6	8.2	12.4	20.2	12.6	5.4	7.5	8.5	7.2	8.5	16.8	13.0	128.9
Rmax	58	43	96	70	40	22	17	22	29	29	81	52	
EI_{30}	139	95	228	232	91	27	8	19	37	55	261	139	1331

Table 8.9 Kibong'oto

Station no.	Location	Altitude (m asl)	District
933778	3.12S,37.07E	1250	Hai

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	38	38	95	367	305	57	31	24	12	34	123	139	1263
Rn	3.8	4.2	7.2	16.9	19.1	6.6	7.4	4.3	3.9	3.8	10.0	10.5	97.7
Rmax	21	21	42	86	73	20	10	10	4	17	36	72	
EI_{30}	26	24	73	292	219	28	0	4	0	20	80	115	881

8.10 Nyumba ya Mungu

Station no.	Location	Altitude (m asl)	District
933790	3.47S,37.27E	NA	Mwanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	78	34	78	94	43	21	2	9	12	27	39	35	472
Rn	3.9	3.5	6.1	9.4	5.8	1.6	0.7	0.9	1.0	2.1	5.5	4.3	44.8
Rmax	37	14	30	28	15	15	2	8	7	13	16	12	
EI_{30}	71	19	56	52	16	18	0	6	7	19	15	15	294

Appendix 6. continued

Table 8.11 Hasani Sisal Estate

Station no.	Location	Altitude (m asl)	District
943701	4.20S,37.51E	914	Same

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	53	58	89	53	39	31	3	3	12	19	68	85	513
Rn	5.2	5.0	6.4	6.8	5.9	1.3	0.8	0.9	0.8	2.0	7.6	7.7	50.4
Rmax	30	26	26	21	14	24	2	2	11	8	25	34	
EI_{30}	38	41	61	24	12	34	0	0	11	9	36	57	323

Table 8.12 Same Meteorology

Station no.	Location	Altitude (m asl)	District
943703	4.05S,37.44E	860	Same

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	74	47	81	129	71	10	4	9	22	25	59	72	603
Rn	6.0	4.5	7.1	11.3	7.6	1.9	1.1	1.6	1.8	2.7	6.7	7.5	59.8
Rmax	33	23	34	54	21	8	2	5	14	10	18	28	
EI_{30}	55	32	56	91	36	2	0	1	17	12	28	42	372

Table 8.13 Kwizu Mission

Station no.	Location	Altitude (m asl)	District
943832	4.08S,38.01E	1105	Same

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	69	57	162	137	47	20	12	16	21	56	120	127	844
Rn	4.4	2.9	8.4	9.8	5.6	1.6	1.2	1.7	2.2	4.9	7.9	9.3	59.9
Rmax	31	33	57	41	17	11	8	10	10	23	36	37	
EI_{30}	57	55	136	96	22	14	7	9	11	37	87	87	618

Table 8.14 Naururu

Station no.	Location	Altitude (m asl)	District
943716	4.04S,37.32E	NA	Same

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	30	55	52	62	29	7	3	3	10	25	49	39	364
Rn	2.9	4.0	5.1	9.0	7.4	2.5	1.5	0.8	1.3	3.6	5.9	5.4	49.4
Rmax	11	29	29	22	10	3	2	2	8	13	17	19	
EI_{30}	16	45	37	22	0	0	0	0	5	10	23	18	176

Table 8.15 Ibaya Camp

Station no.	Location	Altitude (m asl)	District
9337104	3.58S,37.52E	884	Same

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	85	56	139	128	47	15	5	3	9	31	119	175	812
Rn	5.2	4.3	5.5	6.0	3.7	1.0	0.7	0.3	1.2	4.5	5.2	7.0	44.6
Rmax	21	17	51	43	23	11	3	3	4	12	42	68	
EI_{30}	60	36	126	108	35	13	0	0	2	10	104	161	655

Appendix 6. continued

9.0 LINDI REGION

Table 9.1 Nachingwea Agriculture.

Station no.	Location	Altitude (m asl)	District
1003807	10.21S,38.45E	463	Nachingwea

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	171	149	215	178	46	7	4	2	4	4	89	115	984
Rn	9.4	10.1	14.9	14.6	4.6	1.3	0.6	0.5	0.5	0.8	5.8	8.8	71.9
Rmax	42	42	55	40	17	4	2	2	3	3	39	42	
EI_{30}	128	106	149	108	26	0	0	0	0	0	73	83	673

Table 9.2 Madawa Pr. School

Station no.	Location	Altitude (m asl)	District
993912	9.22S,39.27E	NA	Kilwa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	185	134	210	129	34	9	0	14	13	13	79	128	948
Rn	7.3	6.3	9.0	6.1	1.8	0.9	0	0.7	0.8	1.8	5.3	6.2	46.2
Rmax	51	34	56	32	29	5	0	5	7	7	28	46	
EI_{30}	157	106	174	101	37	4	0	9	9	4	59	109	769

Table 9.3 Lindi Maji

Station no.	Location	Altitude (m asl)	District
993920	9.59S,39.42E	15	Lindi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	196	126	212	166	66	20	7	4	9	42	89	298	1235
Rn	11.2	7.3	12.1	10.0	5.6	2.0	1.2	0.8	1.7	2.6	4.6	13.0	72.1
Rmax	50	46	52	42	25	16	5	3	6	27	36	117	
EI_{30}	147	102	158	121	44	16	1	0	1	39	76	272	977

Table 9.4 Mahiwa Agric. Centre

Station no.	Location	Altitude (m asl)	District
1003920	10.21S,39.16E	183	Lindi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	208	139	208	179	50	4	2	1	1	24	67	138	1021
Rn	12.2	9.6	13.3	11.9	4.1	0.6	0.5	0.2	0.1	0.9	5.4	9.0	67.8
Rmax	59	43	46	45	25	3	1	1	1	20	29	38	
EI_{30}	159	100	144	125	37	0	0	0	0	27	49	99	740

Table 9.5 Ngongowele School

Station no.	Location	Altitude (m asl)	District
1003708	10.05S,37.48E	NA	Liwale

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	180	168	188	69	27	1	3	0	0	8	92	175	911
Rn	10.3	8.3	9.9	5.8	1.5	0.2	0.1	0	0	1.2	4.7	7.9	49.9
Rmax	46	43	53	27	20	1	3	0	0	6	37	51	
EI_{30}	135	132	148	47	27	0	1	0	0	2	79	145	716

Appendix 6. continued

Table 9.6 Ruangwa Pr.School

Station no.	Location	Altitude (m asl)	District
1003825	10.04S,38.56E	NA	Lindi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	279	178	210	95	19	8	1	2	0	5	76	211	1084
Rn	14.0	6.0	14.4	8.4	2.6	0.6	0.4	0.1	0	0.6	5.7	9.5	62.3
Rmax	48	92*	43	26	7	6	1	2	0	3	30	48	
EI_{30}	204	185	139	56	6	5	0	0	0	1	56	167	819

Table 9.7 Chimbendenga

Station no.	Location	Altitude (m asl)	District
1003827	10.23S, 38.19E	NA	Nachingwea

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	203	138	223	89	63	0	0	0	8	20	130	188	1062
Rn	10.3	8.5	9.3	5.0	4.0	0	0	0	0.3	1.0	5.7	8.6	52.7
Rmax	43	37	49	46	42	0	0	0	8	12	43	52	
EI_{30}	153	101	179	81	61	0	0	0	8	18	111	154	866

Table 9.8 Kimambi Pr. School

Station no.	Location	Altitude (m asl)	District
993803	9.26S,38.26E	NA	Liwale

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	173	98	158	109	22	1	2	0	0	21	73	114	771
Rn	8.4	6.5	9.1	9.8	3.1	0.3	0.3	0.1	0	1.5	5.4	7.6	52.1
Rmax	61	35	43	28	10	0	2	0	0	16	34	37	
EI_{30}	148	74	119	63	8	0	0	0	0	19	57	84	572

Table 9.9 Liwale

Station no.	Location	Altitude (m asl)	District
993701	9.46S,37.57E	NA	Liwale

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	154	176	161	109	38	3	1	0	0	11	63	146	862
Rn	12.0	11.0	13.7	9.4	3.6	0.6	0.4	0	0.2	1.5	4.9	12.2	69.5
Rmax	39	42	43	38	25	2	1	0	0	7	26	42	
EI_{30}	99	125	100	72	29	0	0	0	0	4	46	93	568

Table 9.10 Kikole

Station no.	Location	Altitude (m asl)	District
983909	8.46S,39.09E	NA	Kilwa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	147	78	151	189	68	9	4	2	3	55	54	139	899
Rn	8.9	4.9	9.6	12.0	5.7	1.5	0.3	0.3	0.3	2.9	5.3	9.0	60.7
Rmax	46	29	46	47	30	4	3	2	3	38	30	28	
EI_{30}	113	61	113	135	49	0	1	0	0	56	38	93	659

Appendix 6. continued

Table 9.11 Mitonono

Station no.	Location	Altitude (m asl)	District
993802	9.45S,38.55E	NA	Liwale

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	252	165	177	233	102	10	7	5	6	23	71	155	1206
Rn	14.0	9.4	15.4	19.0	7.4	1.4	1.0	0.6	0.9	1.3	4.6	9.6	84.6
Rmax	52	44	39	39	28	6	5	5	5	17	36	49	
EI_{30}	183	125	103	134	69	3	2	2	1	22	61	118	823

Table 9.12 Njinjo

Station no.	Location	Altitude (m asl)	District
983805	8.49S,38.52E	61	Kilwa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	107	111	121	151	44	6	0	1	16	21	52	125	755
Rn	9.8	8.3	10.9	14.1	4.8	0.6	0.3	0.5	1.7	2.7	5.7	9.0	68.4
Rmax	36	45	33	29	19	5	0	1	6	11	18	37	
EI_{30}	67	84	72	80	25	3	0	0	7	10	27	87	462

10.0 MARA REGION

Table 10.1 Busegwe Mission

Station no.	Location	Altitude (m asl)	District
913301	1.42S,33.56E	1219	Musoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	72	74	102	182	96	39	31	22	35	58	98	80	889
Rn	5.7	5.8	8.4	10.1	8.5	3.2	1.9	1.4	3.4	4.6	7.7	6.6	67.3
Rmax	28	27	27	41	25	22	17	18	16	23	25	27	
EI_{30}	51	51	63	134	56	30	26	21	22	41	62	53	610

Table 10.2 Shirati Mission

Station no.	Location	Altitude (m asl)	District
913302	1.08S,33.59E	1158	Tarime

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	64	68	125	208	118	31	46	28	35	48	108	58	937
Rn	5.1	5.5	8.3	14.8	10.6	4.5	2.9	2.7	4.4	5.3	10.4	7.5	82.0
Rmax	23	26	46	50	28	14	25	20	21	23	36	22	
EI_{30}	43	47	96	140	67	12	40	22	20	29	65	26	607

Table 10.3 Komuge Mission

Station no.	Location	Altitude (m asl)	District
913308	1.25S,33.53E	1189	Tarime

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	61	63	134	182	133	24	23	18	18	49	118	63	886
Rn	4.8	5.6	9.4	13.5	10.6	3.1	2.7	1.6	2.8	6.7	10.6	7.0	78.4
Rmax	26	28	51	42	37	12	15	13	11	15	36	22	
EI_{30}	44	44	102	118	86	11	14	14	7	17	73	33	563

Appendix 6. continued

Table 10.4 Tarime

Station no.	Location	Altitude (m asl)	District
913400	1.22S,34.23E	1524	Tarime

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	93	143	185	249	147	75	38	58	103	133	176	156	1556
Rn	9.4	10.0	13.7	17.0	11.9	6.6	4.9	6.6	10.7	12.2	15.9	14.2	133.1
Rmax	30	42	56	49	40	30	18	24	25	38	38	34	
EI_{30}	53	101	129	164	94	50	18	32	52	79	99	87	958

Table 10.5 Nyabassi

Station no.	Location	Altitude (m asl)	District
913408	1.21S,34.34E	1829	Tarime

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	134	78	122	205	154	83	53	93	111	115	201	127	1476
Rn	9.9	6.5	9.9	14.9	12.2	8.3	4.8	7.5	9.7	8.5	13.4	11.4	117.0
Rmax	39	29	31	47	33	23	21	33	24	29	41	33	
EI_{30}	92	53	76	135	94	45	34	64	63	75	135	74	940

Table 10.6 Kisaka Ngurume

Station no.	Location	Altitude (m asl)	District
913416	1.34S,34.28E	1219	Musoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	67	57	126	191	110	60	32	34	53	81	90	80	981
Rn	5.2	4.8	9.4	9.5	9.3	3.1	2.2	2.4	3.5	6.4	7.5	8.0	71.5
Rmax	27	26	33	58	31	31	18	23	25	24	25	19	
EI_{30}	48	41	83	156	69	55	26	30	43	53	56	41	701

Table 10.7 Buhemba Farmers

Station no.	Location	Altitude (m asl)	District
913429	1.46S,34.05E	1448	Musoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	76	77	122	179	129	30	34	45	73	89	144	102	1100
Rn	7.1	8.0	10.7	13.5	10.2	2.8	3.3	3.4	6.5	8.0	12.0	9.3	94.8
Rmax	29	23	30	41	33	15	18	22	29	28	34	34	
EI_{30}	48	41	72	115	82	20	23	34	49	55	87	64	690

Table 10.8 Mugumu

Station no.	Location	Altitude (m asl)	District
913433	1.52S,34.43E	NA	Serengeti

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	100	122	121	168	97	63	70	66	65	61	151	115	1199
Rn	8.8	8.3	9.8	13.6	9.6	5.6	4.2	8.0	6.5	7.3	11.7	9.8	103.2
Rmax	32	36	36	32	27	27	19	24	29	23	29	34	
EI_{30}	63	87	79	99	53	43	50	32	42	30	91	72	741

Appendix 6. continued

Table 10.9 Nansimo

Station no.	Location	Altitude (m asl)	District
923309	2.10S,33.21E	1137	Serengeti

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	83	78	137	152	76	7	6	13	15	60	179	121	927
Rn	5.0	5.7	7.0	8.6	5.5	0.9	0.4	1.0	0.6	4.1	8.7	6.3	53.8
Rmax	25	23	61	52	33	3	3	10	11	21	52	36	
EI_{30}	62	53	123	123	59	1	2	10	15	43	146	96	733

Table 10.10 Seronera

Station no.	Location	Altitude (m asl)	District
923405	2.20S,34.55E	1540	Serengeti

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	91	89	77	112	85	40	28	36	55	42	56	71	782
Rn	7.7	7.6	6.6	9.9	7.0	4.2	2.0	4.1	3.5	4.6	6.5	9.0	72.7
Rmax	30	38	36	34	27	14	20	19	30	23	20	22	
EI_{30}	59	63	56	69	55	21	25	21	48	27	28	30	502

Table 10.11 Isenye

Station no.	Location	Altitude (m asl)	District
923409	2.01S,34.20E	NA	Serengeti

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	70	89	127	201	74	28	14	66	78	95	119	123	1084
Rn	6.6	6.9	8.9	13.6	6.4	3.0	1.7	4.7	6.3	6.6	8.9	10.0	83.6
Rmax	23	26	44	35	28	10	9	27	30	33	36	30	
EI_{30}	41	59	94	130	49	14	7	50	55	70	82	76	727

Table 10.12 Utegi

Station no.	Location	Altitude (m asl)	District
913434	1.19S,34.13E	NA	Tarime

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	51	63	163	205	167	64	37	25	58	68	142	94	1137
Rn	7.5	6.7	13.7	17.9	12.4	5.8	4.6	3.6	5.1	8.8	13.8	10.5	110.4
Rmax	18	28	35	34	35	22	13	12	22	14	30	21	
EI_{30}	17	38	96	112	106	39	16	9	38	23	74	42	610

Table 10.13 Nyambono Pr.School

Station no.	Location	Altitude (m asl)	District
913318	1.53S,33.41E	NA	Musoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	98	131	201	197	137	22	15	12	42	52	134	106	1147
Rn	7.8	7.2	10.9	14.4	9.1	2.6	1.6	1.8	4.0	6.2	13.7	11.7	91.0
Rmax	51	59	81	38	27	10	13	7	20	23	34	30	
EI_{30}	79	116	173	124	90	10	11	3	28	28	70	53	785

Appendix 6. continued

Table 10.14 Ikoma

Station no.	Location	Altitude (m asl)	District
923410	2.05S,34.37E	NA	Serengeti

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	109	44	77	98	64	17	8	27	27	26	78	99	674
Rn	6.4	4.3	6.8	7.4	5.4	2.1	1.0	1.9	4.0	3.8	7.9	7.3	58.3
Rmax	49	20	19	28	22	8	5	14	14	12	17	32	
EI_{30}	94	28	44	65	41	7	3	21	11	9	38	69	430

Table 10.15 Lobo Wildlife Lodge

Station no.	Location	Altitude (m asl)	District
913525	1.59S,35.10E	NA	Serengeti

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	143	72	149	137	65	19	27	40	27	62	54	102	897
Rn	14.0	7.9	12.0	10.0	6.2	3.3	3.1	4.3	4.6	6.1	6.3	11.1	88.9
Rmax	44	24	39	36	28	9	13	20	11	16	16	25	
EI_{30}	83	38	95	92	42	4	14	24	6	32	24	49	503

Table 10.16 Kiagata School

Station no.	Location	Altitude (m asl)	District
913420	1.40S,34.05E	NA	Musoma

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	73	148	232	292	124	49	12	21	80	91	118	152	1392
Rn	6.0	8.0	14.4	15.9	11.1	5.0	0.9	3.3	6.4	8.9	10.5	11.1	101.5
Rmax	34	45	54	58	32	24	7	11	40	20	33	41	
EI_{30}	54	117	165	213	73	32	8	7	62	47	71	103	952

Appendix 6. continued

11.0 MBEYA REGION

Table 11.1 Ndala

Station no.	Location	Altitude (m asl)	District
993329	9.09S,33.46E	1707	Rungwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	265	222	332	312	231	45	36	13	13	79	172	284	2004
Rn	21.4	16.3	22.3	21.3	13.2	5.7	5.1	1.8	1.8	4.1	12.9	17.3	143.2
Rmax	38	44	43	48	54	18	13	8	7	32	39	43	
EI_{30}	149	141	207	198	170	21	12	5	4	67	110	189	1273

Table 11.2 Miyunga

Station no.	Location	Altitude (m asl)	District
983213	8.47S,32.13E	NA	Mbozi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	139	122	122	82	39	3	0	0	2	21	160	121	811
Rn	14.5	12.0	11.8	8.6	3.0	0.2	0	0.2	0.1	1.6	8.6	12.2	72.8
Rmax	32	37	30	25	24	3	0	0	2	19	69	28	
EI_{30}	69	70	66	44	33	1	0	0	0	20	141	62	506

Table 11.3 Mkulwe Mission

Station no.	Location	Altitude (m asl)	District
983202	8.32S,32.18E	1067	Mbozi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	165	159	169	100	8	1	0	0	6	9	58	161	836
Rn	11.7	10.8	11.7	7.3	0.7	0.1	0	0	0.3	0.5	3.7	11.6	58.4
Rmax	44	44	45	34	8	1	0	0	6	5	28	42	
EI_{30}	113	113	118	72	6	0	0	0	5	6	48	109	590

Table 11.4 Chunya Agriculture

Station no.	Location	Altitude (m asl)	District
983302	8.32S,33.25E	1494	Chunya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	172	192	162	52	14	2	0	0	0	9	35	188	826
Rn	11.2	12.4	9.8	3.7	1.2	0.3	0	0	0	0.6	3.1	11.1	53.4
Rmax	42	49	40	20	9	2	0	0	0	9	17	50	
EI_{30}	121	137	117	38	9	0	0	0	0	8	24	140	594

Table 11.5 Tukuyu Agriculture

Station no.	Location	Altitude (m asl)	District
993307	9.15S,33.38E	1646	Rungwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	527	231	395	469	318	99	105	50	21	35	103	249	2602
Rn	19.0	17.9	22.6	23.6	14.0	8.5	7.8	4.4	1.2	1.6	6.2	15.1	141.9
Rmax	56	41	47	64	75	24	35	26	17	25	38	37	
EI_{30}	401	139	263	334	256	58	74	37	21	37	82	165	1867

Appendix 6. continued

Table 11.6 Kyela Agriculture

Station no.	Location	Altitude (m asl)	District
993310	9.35S,33.51E	549	Kyela

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	145	155	341	413	316	129	85	25	17	19	101	160	1906
Rn	8.5	9.5	12.2	18.2	12.0	7.6	4.6	1.2	0.8	1.3	3.7	9.2	88.8
Rmax	40	45	77	67	63	53	43	19	15	14	49	44	
EI_{30}	109	116	286	313	256	108	78	26	18	17	100	121	1548

Table 11.7 Mbimba Research

Station no.	Location	Altitude (m asl)	District
993205	9.04S,32.58E	1524	Mbozi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	254	212	277	181	44	3	2	1	7	50	98	236	1365
Rn	20.3	17.7	19.3	16.6	5.7	0.7	0.5	0.2	0.9	5.2	10.7	17.9	115.7
Rmax	42	42	48	35	19	2	2	1	5	23	31	40	
EI_{30}	148	124	177	98	20	0	0	0	2	31	51	143	794

Table 11.8 Kamsamba

Station no.	Location	Altitude (m asl)	District
983209	8.21S,32.18E	914	Mbozi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	196	214	210	91	7	0	0	3	2	13	71	226	1033
Rn	12.1	14.0	12.4	8.0	0.9	0.1	0	0.4	0.3	1.4	5.6	13.4	68.6
Rmax	52	58	67	42	5	0	0	2	1	7	37	49	
EI_{30}	144	154	165	66	2	0	0	0	0	6	57	162	756

Table 11.9 Manow

Station no.	Location	Altitude (m asl)	District
993339	9.24S,33.05E	NA	Ileje

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	320	267	425	377	354	170	69	66	15	112	151	338	2664
Rn	18.7	14.4	19.3	16.6	12.1	7.9	4.6	3.4	1.1	3.1	8.7	16.8	126.7
Rmax	48	47	84	66	112	66	31	37	9	52	39	59	
EI_{30}	217	191	330	289	322	151	56	63	11	114	112	249	2105

Table 11.10 Mtanila

Station no.	Location	Altitude (m asl)	District
973302	7.30S,33.30E	NA	Chunya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	178	141	201	86	19	0	0	0	2	12	77	234	950
Rn	14.2	11.5	14.4	8.6	1.4	0	0	0	0.5	1.9	6.8	15.2	74.5
Rmax	40	37	43	24	13	0	0	0	2	7	26	43	
EI_{30}	110	89	131	46	16	0	0	0	0	3	49	156	600

Appendix 6. continued

Table 11.11 Kimani

Station no.	Location	Altitude (m asl)	District
983410	8.50S,34.10E	1189	Mbeya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	217	143	152	67	8	0	1	0	0	5	39	130	762
Rn	13.3	12.5	12.5	7.3	1.9	0.1	0.2	0	0.1	0.6	3.7	11.6	63.8
Rmax	50	35	36	19	5	0	0	0	0	4	20	37	
EI_{30}	155	84	93	33	0	0	0	0	0	1	26	79	471

Table 11.12 Nyara Estate

Station no.	Location	Altitude (m asl)	District
993315	9.11S,33.08E	1676	Mbozi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	203	211	221	213	52	1	1	1	13	25	109	211	1261
Rn	15.4	15.3	16.1	15.7	4.7	0.2	0.5	0.1	1.1	3.4	10.2	16.7	99.4
Rmax	39	39	41	39	25	1	1	1	9	12	32	37	
EI_{30}	125	133	139	133	36	0	0	0	9	10	64	125	774

Table 11.13 Mbarali

Station no.	Location	Altitude (m asl)	District
983408	8.40S,34.15E	1047	Mbeya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	156	155	116	75	7	0	0	0	0	3	29	127	668
Rn	12.3	12.3	10.9	7.1	1.0	0	0	0	0	0.2	3.5	11.0	58.3
Rmax	43	44	35	32	5	0	0	0	0	3	15	39	
EI_{30}	102	102	69	49	2	0	0	0	0	1	15	80	420

Table 11.14 Chiwanda

Station no.	Location	Altitude (m asl)	District
993209	9.10S,32.33E	NA	Mbozi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	228	217	223	139	25	2	0	0	2	12	79	191	1118
Rn	16.5	14.2	13.7	12.1	3.5	0.2	0	0	0.5	1.3	7.3	14.0	83.3
Rmax	47	47	51	33	11	2	0	0	2	6	28	42	
EI_{30}	147	149	159	82	9	0	0	0	0	5	49	124	724

Table 11.15 Njugilo

Station no.	Location	Altitude (m asl)	District
993320	9.28S,33.48E	610	Rungwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	190	175	334	730	409	128	97	25	8	9	97	134	2336
Rn	13.1	13.9	16.5	21.4	14.6	9.4	8.0	2.8	1.1	1.2	5.2	11.4	118.6
Rmax	64	64	83	178	126	41	43	17	6	7	59	43	
EI_{30}	142	125	263	648	367	90	72	17	3	4	96	87	1914

Appendix 6. continued

Table 11.16 Lupatingatinga Hydromet

Station no.	Location	Altitude (m asl)	District
973300	7.40S,33.25E	1524	Chunya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	175	158	205	68	4	0	0	0	3	28	71	181	893
Rn	12.1	10.4	14.1	7.0	0.6	0	0	0	0.1	2.3	7.1	11.4	65.1
Rmax	35	41	38	17	3	0	0	0	3	16	21	37	
EI_{30}	114	112	133	34	0	0	0	0	1	21	39	124	578

Table 11.17 Gua Mission

Station no.	Location	Altitude (m asl)	District
973200	7.49S,32.26E	1166	Chunya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	171	139	211	124	16	0	0	0	1	23	104	209	998
Rn	12.9	11.8	14.9	10.9	1.1	0	0	0	0.2	1.4	7.3	15.5	76.0
Rmax	39	33	44	26	10	0	0	0	1	9	36	41	
EI_{30}	110	83	138	70	12	0	0	0	0	16	76	131	636

Table 11.18 Idiga

Station no.	Location	Altitude (m asl)	District
983332	8.58S,33.16E	1286	Mbeya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	208	119	111	82	5	2	0	3	0	15	55	199	799
Rn	14.8	10.7	11.5	7.5	1.8	0.2	0	0.2	0	1.8	5.2	14.3	68.0
Rmax	41	42	27	31	3	2	0	3	0	9	20	38	
EI_{30}	134	77	56	53	0	0	0	1	0	7	33	126	487

Table 11.19 Igurusi

Station no.	Location	Altitude (m asl)	District
983331	8.47S,33.51E	1100	Mbeya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	195	227	149	87	2	0	0	0	0	7	52	205	924
Rn	14.3	11.7	14.3	8.8	0.2	0	0	0	0	1.4	4.4	14.8	69.9
Rmax	40	58	31	37	2	0	0	0	0	4	27	51	
EI_{30}	124	177	78	55	0	0	0	0	0	0	39	138	611

Table 11.20 Mwambani

Station no.	Location	Altitude (m asl)	District
983210	8.26S,32.59E	NA	Mbozi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	168	122	126	74	11	2	0	0	0	5	76	177	761
Rn	11.0	9.7	9.1	6.7	1.3	0.2	0	0	0	0.8	7.2	13.6	59.6
Rmax	43	35	42	26	6	2	0	0	0	4	25	43	
EI_{30}	119	80	91	46	4	0	0	0	0	0	45	114	499

Appendix 6. continued

Table 11.21 Galula Hydromet

Station no.	Location	Altitude (m asl)	District
983309	8.36S,33.05E	853	Chunya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	205	140	137	41	20	0	0	0	1	17	57	207	825
Rn	12.1	9.9	11.0	4.5	2.0	0	0	0	0.4	1.3	5.7	12.4	59.3
Rmax	48	47	42	16	11	0	0	0	1	9	28	60	
EI_{30}	149	102	91	22	12	0	0	0	0	12	38	157	583

Table 11.22 Igembe

Station no.	Location	Altitude (m asl)	District
993328	9.04S,33.27E	NA	Mbeya

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	127	133	155	141	83	28	13	15	10	41	63	130	939
Rn	14.7	11.3	14.4	13.4	9.8	4.8	3.4	2.6	2.2	2.2	6.6	12.1	97.5
Rmax	25	30	26	26	23	12	5	5	5	24	18	32	
EI_{30}	53	78	80	72	37	6	0	1	0	38	32	73	470

Table 11.23 Kiwira School

Station no.	Location	Altitude (m asl)	District
993324	9.10S,33.33E	NA	Rungwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	211	169	266	245	122	32	31	12	11	35	124	185	1443
Rn	16.5	17.6	19.6	19.1	9.6	5.0	5.9	1.9	0.8	2.4	9.6	16.3	124.3
Rmax	38	34	43	46	37	12	13	7	9	15	36	40	
EI_{30}	126	82	162	149	82	9	4	3	9	26	83	106	841

12.0 MOROGORO REGION

Table 12.1 Tungi Sisal Estate

Station no.	Location	Altitude (m asl)	District
963702	6.46S,37.42E	503	Morogoro

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	136	53	73	133	58	18	11	10	13	83	26	116	730
Rn	7.0	3.1	6.1	11.6	6.2	2.0	1.5	1.8	2.1	3.9	2.7	6.4	54.4
Rmax	55	32	24	40	25	9	7	7	8	30	12	43	
EI_{30}	118	50	47	83	34	9	4	2	4	70	15	96	532

Table 12.2 Kilangali

Station no.	Location	Altitude (m asl)	District
963775	6.57S,37.05E	457	Kilosa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	134	95	129	170	50	7	3	6	11	14	54	129	802
Rn	8.5	5.8	8.8	14.3	5.2	1.0	0.3	1.1	2.2	2.0	3.8	8.2	61.2
Rmax	50	37	40	46	23	4	3	4	8	9	31	42	
EI_{30}	106	76	93	107	31	1	0	0	1	6	46	98	565

Appendix 6. continued

Table 12.3 Maskati Mission

Station no.	Location	Altitude (m asl)	District
963710	6.05S,37.28E	1829	Morogoro

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	110	92	177	312	158	72	27	22	31	64	81	178	1324
Rn	9.7	6.6	11.7	18.9	16.2	3.5	4.5	3.4	3.7	4.3	5.3	10.5	98.3
Rmax	34	38	45	54	39	14	10	9	16	24	27	63	
EI_{30}	69	71	125	213	82	52	5	6	17	48	60	143	891

Table 12.4 Msowero Ginnery

Station no.	Location	Altitude (m asl)	District
963719	6.32S,37.13E	1067	Kilosa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	123	66	126	174	94	14	3	4	12	35	82	127	860
Rn	5.7	5.0	7.0	10.8	6.9	1.3	0.5	0.4	0.7	1.6	3.3	6.8	50.0
Rmax	57	28	43	42	31	12	2	4	10	18	45	56	
EI_{30}	115	49	102	124	66	11	0	1	11	32	83	112	706

Table 12.5 Berega Mission

Station no.	Location	Altitude (m asl)	District
963703	6.12S,37.10E	853	Kilosa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	140	134	118	160	79	14	10	3	7	9	34	129	837
Rn	10.9	8.5	8.6	14.0	9.1	2.2	1.9	0.9	0.9	1.3	2.8	10.7	71.8
Rmax	38	37	35	43	27	9	5	3	4	7	18	30	
EI_{30}	92	97	82	97	40	5	0	0	1	3	25	78	520

Table 12.6 Duthumi Estate

Station no.	Location	Altitude (m asl)	District
973700	7.23S,37.49E	91	Morogoro

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	147	94	184	277	123	37	20	9	31	29	79	122	1152
Rn	7.6	6.9	10.9	16.5	8.1	4.0	2.6	1.2	2.9	2.3	5.1	6.5	74.6
Rmax	65	39	61	58	36	17	9	6	16	18	35	37	
EI_{30}	132	72	145	197	89	21	8	3	21	23	65	97	873

Table 12.7 Mtimbira

Station no.	Location	Altitude (m asl)	District
983611	8.47S,36.22E	330	Ulanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	147	152	226	308	83	9	6	0	4	21	62	115	1133
Rn	7.2	7.5	10.5	12.9	5.5	0.5	0.8	0.1	0.3	1.0	2.3	6.4	55.0
Rmax	56	53	59	73	36	6	4	0	4	9	30	49	
EI_{30}	128	129	182	251	67	6	1	0	2	17	60	99	942

Appendix 6. continued

Table 12.8 Ifakara Trial Farm

Station no.	Location	Altitude (m asl)	District
983613	8.10S,36.40E	251	Kilombelo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	196	139	279	431	120	13	9	6	16	21	66	136	1432
Rn	12.3	10.0	17.3	19.5	10.0	1.8	2.0	0.7	1.0	2.2	3.5	8.9	89.2
Rmax	61	44	56	84	45	8	5	5	13	12	33	37	
EI_{30}	149	99	194	334	83	5	0	2	15	13	60	97	1051

Table 12.9 Athina Sisal Estate

Station no.	Location	Altitude (m asl)	District
963808	6.47S,38.10E	213	Morogoro

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	96	84	166	216	79	21	8	12	42	40	116	101	981
Rn	6.4	5.6	11.3	13.4	8.8	3.3	1.7	2.0	4.0	3.6	8.7	7.6	76.4
Rmax	29	35	44	47	21	9	4	7	22	19	38	37	
EI_{30}	69	66	116	152	37	5	0	3	29	27	81	73	658

Table 12.10 Ilonga Agromet

Station no.	Location	Altitude (m asl)	District
963732	6.46S,37.02E	503	Kilosa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	178	99	183	243	74	12	5	10	21	21	69	133	1048
Rn	11.7	7.8	11.6	16.5	8.2	2.0	1.2	1.6	2.1	2.5	6.6	10.6	82.4
Rmax	50	41	60	66	28	7	4	7	7	13	22	46	
EI_{30}	129	73	140	173	41	3	0	3	10	12	40	92	716

Table 12.11 Kiberege

Station no.	Location	Altitude (m asl)	District
973616	7.59S,36.49E	NA	Kilombero

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	186	130	257	268	144	32	11	6	5	37	99	230	1405
Rn	8.9	7.3	12.0	14.0	9.3	2.3	1.4	0.8	0.7	2.9	5.8	10.6	76.0
Rmax	55	42	59	53	43	15	6	5	3	17	42	49	
EI_{30}	153	103	202	198	106	24	4	2	0	27	83	179	1081

Table 12.12 Kidodi Pr.School

Station no.	Location	Altitude (m asl)	District
973707	7.35S,37.02E	335	Kilosa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	167	117	243	304	160	35	22	12	16	27	119	206	1428
Rn	10.9	8.8	13.7	20.2	12.8	4.8	3.0	2.1	2.2	2.9	9.0	11.9	102.3
Rmax	46	37	63	52	39	14	10	7	10	19	32	48	
EI_{30}	120	81	184	199	100	14	8	2	7	19	78	151	963

Appendix 6. continued

Table 12.13 Mngazi

Station no.	Location	Altitude (m asl)	District
973708	7.28S,37.36E	183	Morogoro

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	122	67	179	276	145	15	11	4	14	31	46	55	965
Rn	5.7	5.0	9.0	13.8	8.7	2.6	1.8	0.7	1.7	1.3	2.4	3.1	55.8
Rmax	54	22	44	50	40	8	5	3	9	24	20	25	
EI_{30}	112	46	139	204	108	3	1	0	7	34	39	47	740

Table 12.14 Lukande

Station no.	Location	Altitude (m asl)	District
983617	8.48S,36.48E	NA	Ulanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	166	163	163	211	78	20	3	1	1	37	103	145	1091
Rn	9.3	7.3	9.0	13.7	5.9	1.8	0.7	0.2	0.2	1.9	5.0	8.1	63.1
Rmax	50	54	43	47	32	10	3	1	1	28	40	36	
EI_{30}	130	140	124	146	58	12	0	0	0	39	89	108	846

Table 12.15 Kinyanguru

Station no.	Location	Altitude (m asl)	District
973821	7.24S,38.06E	NA	Kilosa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	142	53	140	146	73	10	10	10	14	37	106	96	837
Rn	7.4	3.0	7.8	9.4	8.3	2.0	1.6	1.0	2.0	3.2	8.0	8.3	62.0
Rmax	53	31	55	42	19	4	7	8	11	23	32	36	
EI_{30}	120	49	118	107	33	0	3	6	7	29	72	65	609

Table 12.16 Kikoboga Mikumi

Station no.	Location	Altitude (m asl)	District
973730	7.21S,37.09E	549	Kilosa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	143	124	122	158	75	12	7	1	5	11	48	115	821
Rn	9.2	7.3	8.6	11.2	6.4	1.8	1.7	0.1	0.7	1.3	4.4	9.7	62.4
Rmax	41	42	36	39	21	6	4	1	5	7	16	38	
EI_{30}	104	98	86	106	45	3	0	0	1	5	28	76	552

Table 12.17 Doma

Station no.	Location	Altitude (m asl)	District
973741	7.05S,37.17E	NA	Morogoro

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	160	98	139	104	34	4	1	5	2	32	74	202	855
Rn	7.1	6.6	7.3	8.3	5.1	0.6	0.4	0.6	0.2	2.6	5.4	9.4	53.6
Rmax	51	48	45	37	14	3	1	5	2	17	32	51	
EI_{30}	136	83	113	72	11	0	0	2	0	24	57	161	659

Appendix 6. continued

Table 12.18 Luhombero

Station no.	Location	Altitude (m asl)	District
993601	9.03S,36.46E	549	Ulanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	254	193	315	228	26	7	5	5	3	15	82	190	1323
Rn	10.5	11.3	15.0	13.7	3.8	1.2	0.9	0.8	0.6	1.9	5.0	9.4	74.1
Rmax	56	62	71	52	9	5	3	4	3	11	34	49	
EI_{30}	205	152	246	164	7	1	0	0	0	8	67	150	1000

Table 12.19 Lufusi

Station no.	Location	Altitude (m asl)	District
963949	6.51S,36.37E	1143	Morogoro

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	109	103	75	84	14	6	0	1	2	10	31	136	571
Rn	9.8	7.1	7.3	7.6	3.2	0.8	0.1	0.5	0.5	1.5	2.9	9.6	50.9
Rmax	29	42	26	26	6	5	0	1	2	5	15	38	
EI_{30}	64	80	44	51	0	2	0	0	0	2	20	94	357

13.0 MTWARA REGION

Table 13.1 Mtwara Port

Station no.	Location	Altitude (m asl)	District
1004003	10.15S,40.13E	12	Mtwara

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	194	138	154	197	52	14	7	8	22	11	13	106	916
Rn	9.4	7.5	10.8	9.5	4.2	1.2	1.0	1.0	1.9	1.6	1.5	8.0	57.6
Rmax	59	52	43	64	24	14	6	6	13	8	10	38	
EI_{30}	160	116	108	165	38	13	2	3	16	4	8	76	709

Table 13.2 Newala

Station no.	Location	Altitude (m asl)	District
1003902	10.57S,39.18E	792	Newala

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	222	181	198	120	36	2	2	10	5	4	40	124	944
Rn	12.9	11.7	13.3	11.1	2.6	0.6	0.6	0.7	0.6	0.4	3.5	13.3	71.3
Rmax	51	40	43	35	20	2	1	5	4	3	17	40	
EI_{30}	162	125	134	71	29	0	0	6	1	1	26	67	622

Table 13.3 Sindano

Station no.	Location	Altitude (m asl)	District
1013901	11.06S,39.06E	NA	Masasi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	103	101	108	51	33	2	2	1	3	2	47	136	589
Rn	6.1	7.0	7.3	6.8	2.0	0.3	0.8	0.4	0.3	0.4	2.3	6.7	40.4
Rmax	26	38	39	33	16	1	2	1	3	2	29	47	
EI_{30}	75	77	82	31	27	0	0	0	0	0	46	114	452

Appendix 6. continued

Table 13.4 Masuguru

Station no.	Location	Altitude (m asl)	District
1013804	11.22S,38.26E	NA	Masasi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	198	134	159	84	14	4	0	0	0	7	39	161	800
Rn	11.1	8.5	10.5	7.0	1.4	1.0	0.1	0	0	0.3	2.4	10.2	52.5
Rmax	35	41	38	29	4	3	0	0	0	6	25	40	
EI_{30}	139	100	110	56	5	0	0	0	0	6	36	115	567

Table 13.5 Kitangari

Station no.	Location	Altitude (m asl)	District
1003917	10.40S,39.21E	396	Newala

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	197	133	200	145	31	4	3	5	15	11	40	94	878
Rn	10.0	10.2	13.2	11.9	3.3	0.4	0.6	0.5	0.9	1.0	2.5	7.5	62.0
Rmax	60	36	60	37	14	2	3	3	13	8	25	29	
EI_{30}	160	88	147	90	17	0	0	1	14	7	37	62	623

Table 13.6 Tandahimba

Station no.	Location	Altitude (m asl)	District
1003916	10.44S,39.38E	262	Newala

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	214	128	222	136	39	8	0	1	3	22	78	178	1029
Rn	14.6	9.9	16.4	12.4	3.0	1.0	0.3	0.4	0.5	2.4	7.4	9.9	78.2
Rmax	52	40	47	47	20	5	0	1	3	12	34	70	
EI_{30}	147	87	142	87	30	3	0	0	0	13	52	151	712

Table 13.7 Ndanda Mission

Station no.	Location	Altitude (m asl)	District
1003903	10.30S,39.02E	305	Masasi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	203	187	185	196	24	5	2	2	2	16	42	122	986
Rn	12.3	13.5	14.9	15.3	3.9	0.6	0.3	0.6	0.3	1.8	5.2	9.3	78.0
Rmax	49	46	43	46	9	4	2	1	2	14	17	38	
EI_{30}	147	125	115	124	5	1	0	0	0	12	20	84	633

Table 13.8 Lumesule

Station no.	Location	Altitude (m asl)	District
1003818	10.55S,38.02E	NA	Masasi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	138	159	122	83	38	3	1	0	2	4	21	116	687
Rn	11.7	10.1	10.8	8.3	3.0	0.6	0.3	0	0.4	0.4	2.4	8.9	56.9
Rmax	36	35	31	26	20	2	1	0	2	4	14	31	
EI_{30}	85	110	72	47	29	0	0	0	0	1	13	76	433

Appendix 6. continued

Table 13.9 Masasi Girls School

Station no.	Location	Altitude (m asl)	District
1003814	10.40S,38.50E	305	Masasi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	156	149	209	124	15	2	0	4	3	4	54	131	851
Rn	13.1	11.5	10.9	7.7	2.2	0.7	0	0.2	0.3	0.8	5.0	9.2	61.6
Rmax	31	34	45	35	9	1	0	4	3	4	22	31	
EI_{30}	90	94	156	91	5	0	0	2	0	0	35	87	560

Table 13.10 Dihimba

Station no.	Location	Altitude (m asl)	District
1003936	10.25S,39.59E	NA	Mtwara

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	137	125	200	103	52	7	1	1	8	24	30	155	843
Rn	8.6	8.8	11.4	10.9	4.1	0.9	0.2	0.4	0.7	1.4	2.6	7.8	57.8
Rmax	40	43	50	31	23	5	1	1	5	17	13	47	
EI_{30}	101	92	149	55	38	2	0	0	4	23	19	126	609

Table 13.11 Mpapura

Station no.	Location	Altitude (m asl)	District
1003935	10.16S,39.57E	NA	Mtwara

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	159	73	211	142	56	10	9	6	18	11	13	151	859
Rn	9.3	6.0	9.7	10.8	2.5	0.7	1.2	0.6	0.8	0.8	1.2	6.4	50.0
Rmax	47	32	54	43	24	8	7	6	16	8	12	38	
EI_{30}	122	53	170	97	50	8	4	3	20	8	11	123	669

14.0 MWANZA REGION

Table 14.1 Nyanguge School

Station no.	Location	Altitude (m asl)	District
923331	2.33S,33.12E	NA	Magu

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	49	69	76	132	61	5	5	9	10	40	118	74	648
Rn	4.2	4.7	7.5	10.6	5.5	0.8	0.3	0.6	1.0	3.2	8.9	5.8	53.1
Rmax	20	29	26	36	25	3	5	4	9	16	29	20	
EI_{30}	33	54	44	85	40	0	3	5	7	27	76	47	421

Table 14.2 Mabuki

Station no.	Location	Altitude (m asl)	District
923339	2.59S,33.11E	NA	Kwimba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	71	70	141	149	60	4	8	5	22	55	163	105	853
Rn	7.3	5.6	8.8	9.8	4.1	0.5	0.9	0.6	1.4	4.5	9.5	9.5	62.5
Rmax	24	29	44	37	26	1	7	3	15	26	54	33	
EI_{30}	40	50	107	104	47	0	4	1	19	41	129	65	607

Appendix 6. continued

Table 14.3 Ukiriguru Agromet

Station no.	Location	Altitude (m asl)	District
923344	2.46S,33.01E	1189	Mwanza

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	72	77	99	153	80	14	18	16	34	63	119	123	868
Rn	8.5	9.0	10.9	13.5	8.0	1.8	1.6	1.0	3.3	6.8	13.2	13.4	91.0
Rmax	24	32	32	45	31	9	10	12	14	28	31	30	
EI_{30}	35	42	52	95	49	7	12	14	20	38	57	59	480

Table 14.4 Ndagalu

Station no.	Location	Altitude (m asl)	District
923346	2.36S,33.30E	NA	Mwanza

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	78	90	151	158	76	11	8	12	14	58	164	103	923
Rn	9.2	7.4	10.8	14.0	7.9	1.8	1.0	1.0	2.3	5.6	13.3	9.2	83.5
Rmax	25	34	43	37	25	7	6	10	9	20	43	38	
EI_{30}	37	62	105	92	42	3	3	9	4	34	104	68	563

Table 14.5 Nansio

Station no.	Location	Altitude (m asl)	District
923308	2.07S,33.05E	1181	Ukerewe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	90	120	126	189	118	18	19	32	40	80	160	147	1139
Rn	5.7	6.3	7.1	9.9	5.8	1.1	1.4	1.9	2.6	5.5	9.0	7.8	64.1
Rmax	28	48	39	49	40	14	14	17	26	32	43	39	
EI_{30}	67	103	98	146	98	17	16	27	37	61	122	113	905

Table 14.6 Ngudu

Station no.	Location	Altitude (m asl)	District
923305	2.57S,33.21E	1219	Kwimba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	74	105	124	140	61	15	11	7	21	59	144	120	881
Rn	8.1	9.1	10.9	11.7	6.9	2.1	1.3	1.4	2.9	4.8	12.8	13.3	85.3
Rmax	25	37	34	36	23	8	7	5	11	27	36	34	
EI_{30}	39	69	75	86	32	5	5	0	9	43	85	60	508

Table 14.7 Geita Boma

Station no.	Location	Altitude (m asl)	District
923210	2.52S,32.15E	1280	Geita

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	81	120	107	123	83	12	15	9	65	70	143	121	949
Rn	6.7	7.7	8.3	8.7	5.4	1.4	0.9	0.9	3.0	5.0	10.8	9.6	68.4
Rmax	29	39	37	31	33	8	10	9	32	28	31	32	
EI_{30}	55	90	75	83	65	6	12	7	61	53	90	77	674

Appendix 6. continued

Table 14.8 Sengerema Agriculture

Station no.	Location	Altitude (m asl)	District
923222	2.40S,32.40E	NA	Sengerema

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	86	93	125	169	108	21	13	11	50	53	148	172	1049
Rn	4.5	6.4	7.9	9.3	6.3	1.7	0.9	0.6	1.9	3.1	7.9	9.5	60.0
Rmax	26	30	43	50	39	13	11	8	34	19	34	43	
EI_{30}	68	67	96	133	87	16	11	9	54	41	110	130	822

Table 14.9 Nzera Bugando

Station no.	Location	Altitude (m asl)	District
923223	2.32S,32.07E	NA	Geita

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	144	200	127	167	77	25	11	13	53	92	142	129	1180
Rn	9.3	8.9	8.8	10.2	5.1	1.0	1.0	1.7	3.1	7.1	11.0	10.9	78.1
Rmax	38	49	32	28	29	15	6	5	22	29	36	30	
EI_{30}	103	161	86	112	59	24	6	3	43	62	91	77	827

Table 14.10 Ukara Mission

Station no.	Location	Altitude (m asl)	District
913303	1.51S,33.03E	1189	Ukerewe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	153	202	237	262	130	57	11	72	73	120	196	167	1680
Rn	6.9	7.6	8.5	11.1	7.3	3.1	1.2	3.4	3.9	6.1	11.1	8.6	78.8
Rmax	49	67	61	59	43	34	8	26	30	53	52	53	
EI_{30}	130	181	203	211	104	54	6	61	62	107	149	136	1404

Table 14.11 Bwanga Substation

Station no.	Location	Altitude (m asl)	District
933105	3.02S,31.42E	366	Geita

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	95	92	135	174	78	7	10	17	50	65	147	129	999
Rn	10.6	9.1	12.9	16.3	7.9	0.8	1.0	1.7	4.8	7.8	15.2	13.2	101.3
Rmax	26	27	34	33	29	5	8	10	22	29	34	28	
EI_{30}	46	51	75	92	46	3	6	10	32	35	74	64	534

Table 14.12 Kisuke Pr.School

Station no.	Location	Altitude (m asl)	District
943211	3.12S,32.39E	1140	Geita

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	129	101	183	139	42	1	0	8	15	33	151	175	977
Rn	9.8	8.5	12.5	11.2	4.0	0.3	0.1	0.4	1.0	4.3	11.3	13.9	77.3
Rmax	42	34	42	38	16	1	0	6	11	12	41	39	
EI_{30}	90	67	124	89	25	0	0	6	13	13	101	108	636

Appendix 6. continued

15.0 RUKWA REGION

Table 15.1 Sumbawanga Agric.Office

Station no.	Location	Altitude (m asl)	District
973100	7.57S,31.36E	1722	Sumbawanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	151	144	138	96	21	5	0	0	6	22	67	186	836
Rn	13.3	15.5	12.4	9.3	2.5	0.6	0.1	0	0.6	0.8	7.7	15.0	77.8
Rmax	33	30	34	21	11	4	0	0	5	16	19	38	
EI_{30}	86	67	80	50	11	1	0	0	3	23	31	112	464

Table 15.2 Kaengesa

Station no.	Location	Altitude (m asl)	District
983117	8.14S,31.20E	1622	Sumbawanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	143	131	157	90	7	0	0	0	7	9	77	179	800
Rn	14.6	14.8	16.1	10.3	1.7	0.1	0.1	0	0.8	1.7	7.9	17.5	85.6
Rmax	35	27	33	26	5	0	0	0	6	6	26	31	
EI_{30}	74	57	78	43	0	0	0	0	3	1	43	89	388

Table 15.3 Milepa

Station no.	Location	Altitude (m asl)	District
983111	8.05S,31.57E	914	Sumbawanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	172	160	217	128	5	2	0	0	0	10	134	210	1038
Rn	13.3	14.1	14.1	10.5	0.6	0.1	0	0.1	0.1	1.3	8.9	15.1	78.2
Rmax	47	37	58	41	5	2	0	0	0	7	47	53	
EI_{30}	114	93	156	85	2	0	0	0	0	4	102	142	698

15.4 Nkundi State Farm

Station no.	Location	Altitude (m asl)	District
973116	7.51S,31.26E	953	Sumbawanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	124	130	166	133	34	0	0	0	5	29	67	196	884
Rn	7.5	6.7	10.7	9.7	7.0	0	0	0	1.3	1.5	5.3	10.3	60
Rmax	48	43	47	47	14	0	0	0	3	13	24	51	
EI_{30}	101	107	121	97	2	0	0	0	0	24	46	152	650

Table 15.5 Mwazye Hydromet (Ulumi)

Station no.	Location	Altitude (m asl)	District
983115	8.42S,31.44E	792	Sumbawanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	143	125	164	86	22	2	0	1	2	33	86	151	815
Rn	15.0	12.9	15.0	10.4	2.5	0.3	0	0.5	0.1	3.6	8.1	14.7	83.1
Rmax	28	29	42	25	13	1	0	1	2	18	32	29	
EI_{30}	68	63	95	38	13	0	0	0	0	20	54	77	428

Appendix 6. continued

15.6 Kasanga Hydromet

Station no.	Location	Altitude (m asl)	District
983123	8.28S,31.10E	NA	Sumbawanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	258	212	180	66	11	0	0	1	4	48	124	249	1153
Rn	13.7	11.0	10.7	6.6	1.7	0.1	0	0.3	0.4	3.1	7.9	14.3	69.8
Rmax	62	79	52	35	7	0	0	1	4	33	40	52	
EI_{30}	197	181	137	46	3	0	0	0	1	46	94	179	884

Table 15.7 Sopa Pr.School

Station no.	Location	Altitude (m asl)	District
983124	8.29S,31.31E	NA	Sumbawanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	172	133	229	164	40	0	1	2	11	46	97	238	1133
Rn	13.2	11.5	14.1	7.5	1.3	0	0.1	0.2	1.1	3.8	9.2	15.3	77.3
Rmax	52	34	53	53	28	0	1	2	8	23	32	51	
EI_{30}	118	80	164	139	44	0	0	0	7	34	58	164	808

Table 15.8 Chala Mission

Station no.	Location	Altitude (m asl)	District
973106	7.35S,31.16E	1768	Sumbawanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	156	152	139	84	25	1	2	3	0	4	80	164	810
Rn	12.8	11.7	10.9	5.9	2.0	0.3	0.1	0.3	0	0.5	6.5	12.0	63.0
Rmax	29	36	34	23	19	1	2	3	0	4	27	34	
EI_{30}	90	97	88	57	22	0	0	0	0	1	53	104	512

Table 15.9 Mwese

Station no.	Location	Altitude (m asl)	District
963002	6.15S,30.20E	1845	Mpanda

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	180	189	174	179	26	0	2	0	16	90	182	196	1234
Rn	12.6	12.9	14.5	11.8	2.4	0.1	0.3	0.1	0.7	4.9	12.0	15.3	87.6
Rmax	56	47	40	62	13	0	1	0	14	33	39	43	
EI_{30}	130	131	105	137	17	0	0	0	17	74	123	122	856

Table 15.10 Usevya

Station no.	Location	Altitude (m asl)	District
973113	7.06S,31.12E	NA	Mpanda

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	91	128	131	66	2	0	0	0	0	17	94	123	652
Rn	9.6	9.6	8.0	6.5	0.6	0	0	0	0	1.8	9.6	10.9	56.6
Rmax	30	38	46	22	1	0	0	0	0	12	28	36	
EI_{30}	50	87	103	38	0	0	0	0		11	51	75	415

Appendix 6. continued

Table 15.11 Karema Mission

Station no.	Location	Altitude (m asl)	District
963000	6.48S,30.26E	823	Mpanda

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	170	154	172	100	11	0	0	0	8	17	131	170	933
Rn	11.3	10.8	11.0	8.5	1.4	0	0	0.2	0.4	2.5	11.4	14.6	72.1
Rmax	48	50	47	34	5	0	0	0	5	10	43	43	
EI_{30}	122	112	125	66	3	0	0	0	5	6	85	103	627

Table 15.12 Uruwira Mission

Station no.	Location	Altitude (m asl)	District
963100	6.26S,31.21E	1067	Mpanda

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	215	178	172	152	33	0	0	3	3	24	115	142	1037
Rn	10.6	10.9	10.4	11.4	3.7	0	0.2	0.2	0.6	2.1	7.6	8.5	66.2
Rmax	64	52	47	46	15	0	0	3	3	19	27	29	
EI_{30}	176	134	128	105	18	0	0	1	0	21	78	99	760

Table 15.13 Nsimbo

Station no.	Location	Altitude (m asl)	District
963107	6.30S,31.00E	NA	Mpanda

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	164	141	227	167	15	0	0	0	14	37	166	206	1137
Rn	9.7	9.3	13.5	10.8	2.3	0	0	0.1	1.6	3.0	11.6	14.9	76.8
Rmax	43	48	49	43	9	0	0	0	7	17	36	46	
EI_{30}	122	107	162	119	5	0	0	0	6	26	109	135	791

Table 15.14 Inyonga

Station no.	Location	Altitude (m asl)	District
963200	6.45S,32.05E	1128	Mpanda

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	169	134	184	129	29	0	0	0	0	13	82	177	917
Rn	11.8	13.2	12.8	10.8	2.5	0	0.3	0	0	1.3	7.2	14.0	73.9
Rmax	35	33	42	26	12	0	0	0	0	5	29	25	
EI_{30}	110	72	123	74	18	0	0	0	0	5	53	100	555

Table 15.15 Ugala

Station no.	Location	Altitude (m asl)	District
953106	5.46S,31.09E	NA	Mpanda

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	172	133	226	158	11	0	0	0	2	24	134	188	1048
Rn	11.8	9.8	14.0	9.4	1.2	0	0	0	0.2	2.3	9.5	12.3	70.5
Rmax	35	30	35	35	6	0	0	0	2	15	36	31	
EI_{30}	113	85	149	112	5	0	0	0	0	17	92	122	695

Appendix 6. continued

16.0 RUVUMA REGION

Table 16.1 Lituhi Mission

Station no.	Location	Altitude (m asl)	District
1003400	10.34S,34.36E	518	Mbinga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	209	176	221	113	42	2	6	0	0	5	24	170	968
Rn	11.6	11.4	13.9	11.2	4.4	0.3	0.8	0.1	0	0.8	3.7	10.3	68.5
Rmax	66	48	64	32	18	2	3	0	0	4	11	50	
EI_{30}	167	127	165	63	24	0	0	0	0	0	7	129	682

Table 16.2 Ruanda Mission

Station no.	Location	Altitude (m asl)	District
1003403	10.33S,34.56E	975	Mbinga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	157	200	213	202	22	4	1	1	1	10	69	214	1094
Rn	12.2	13.9	18.3	15.6	2.8	0.4	0.3	0.1	0.2	1.3	5.0	15.6	85.7
Rmax	36	45	43	47	12	4	1	1	1	7	31	47	
EI_{30}	99	134	123	129	11	1	0	0	0	4	54	139	694

Table 16.3 Gumbiro

Station no.	Location	Altitude (m asl)	District
1003516	10.16S,35.39E	NA	Songea

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	353	305	392	197	24	5	2	0	0	4	124	229	1635
Rn	14.7	11.2	15.2	11.8	1.6	0.5	0.4	0.1	0	0.3	3.6	9.8	69.2
Rmax	69	87	73	44	14	5	1	0	0	2	37	44	
EI_{30}	279	266	313	141	20	2	0	0	0	0	112	178	1311

Table 16.4 Misechela

Station no.	Location	Altitude (m asl)	District
1013703	11.08S,37.47E	NA	Tunduru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	201	244	184	84	13	1	0	0	1	12	28	193	961
Rn	13.8	13.0	13.0	7.5	1.7	0.2	0.1	0	0.6	0.2	3.3	8.4	61.8
Rmax	38	55	48	26	11	0	0	0	1	12	16	56	
EI_{30}	131	183	126	51	8	0	0	0	0	15	16	162	692

Table 16.5 Litumba Ndyosi

Station no.	Location	Altitude (m asl)	District
1003520	10.18S,35.08E	NA	Songea

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	172	144	229	164	41	5	1	0	1	16	79	181	1033
Rn	12.6	11.8	14.8	12.6	3.4	0.8	0.2	0	0.2	1.4	6.0	11.1	74.9
Rmax	38	38	48	39	12	3	1	0	1	9	35	49	
EI_{30}	111	91	157	105	24	0	0	0	0	10	60	134	692

Appendix 6. continued

Table 16.6 Tunduru D.O.

Station no.	Location	Altitude (m asl)	District
1013700	11.06S,37.22E	701	Tunduru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	188	281	188	63	17	1	2	0	0	3	33	196	972
Rn	11.2	12.1	11.3	6.6	1.4	0.1	0.2	0	0	0.4	1.9	9.6	54.8
Rmax	44	68	48	21	10	1	2	0	0	2	17	56	
EI_{30}	136	229	138	34	12	0	0	0	0	0	28	159	736

Table 16.7 Nampungu Pr.School

Station no.	Location	Altitude (m asl)	District
1003704	10.55S,37.03E	NA	Tunduru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	163	209	243	67	4	0	2	0	0	7	48	179	922
Rn	13.6	10.3	13.1	7.3	0.8	0.1	0.3	0	0	0.3	3.8	8.8	58.4
Rmax	40	58	59	28	3	0	2	0	0	6	18	40	
EI_{30}	100	168	185	39	0	0	0	0	0	6	32	137	667

Table 16.8 Kigonsera

Station no.	Location	Altitude (m asl)	District
1003502	10.49S,35.04E	1219	Mbinga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	239	248	263	165	14	3	5	0	1	11	73	247	1269
Rn	17.1	16.1	18.5	13.6	3.0	0.4	0.5	0	0.2	1.4	7.1	15.5	93.4
Rmax	49	56	48	43	4	2	3	0	1	11	40	52	
EI_{30}	155	172	168	104	0	0	1	0	0	7	53	172	832

Table 16.9 Matimira

Station no.	Location	Altitude (m asl)	District
1003503	10.45S,35.50E	1067	Songea

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	262	260	285	179	30	2	8	0	1	13	77	263	1380
Rn	16.1	16.4	17.6	13.4	3.0	0.7	0.8	0	0.4	1.4	4.7	14.3	88.8
Rmax	52	56	64	49	12	1	5	0	1	9	39	59	
EI_{30}	182	181	203	121	17	0	3	0	0	8	67	196	978

Table 16.10 Nakapanya

Station no.	Location	Altitude (m asl)	District
1003702	10.56S,37.51E	NA	Tunduru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	321	278	191	81	11	1	1	1	0	7	58	187	1137
Rn	15.0	12.7	12.0	7.7	1.8	0.2	0.6	0.1	0.2	0.6	5.2	11.9	68.0
Rmax	64	55	52	37	7	1	1	1	0	6	25	45	
EI_{30}	247	214	140	55	3	0	0	0	0	4	39	132	834

Appendix 6. continued

Table 16.11 Nalasi

Station no.	Location	Altitude (m asl)	District
1013704	11.29S,37.06E	366	Tunduru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	284	242	315	126	12	0	0	0	2	9	53	170	1213
Rn	15.0	13.9	15.3	8.4	1.0	0	0	0	0.2	1.0	2.8	8.3	65.9
Rmax	64	63	65	36	6	0	0	0	2	8	22	43	
EI_{30}	214	183	241	90	7	0	0	0	0	5	44	134	918

Table 16.12 Mbamba bay

Station no.	Location	Altitude (m asl)	District
1013403	11.18S,34.46E	488	Mbinga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	254	223	269	192	76	48	27	23	3	25	90	275	1505
Rn	11.9	11.0	12.6	9.0	3.9	1.6	1.6	0.5	0.3	0.5	3.4	10.0	66.3
Rmax	58	47	59	52	25	37	18	22	2	17	30	74	
EI_{30}	199	169	210	155	61	56	25	29	0	28	79	237	1248

Table 16.13 Litembo Mission

Station no.	Location	Altitude (m asl)	District
1003401	10.57S,34.50E	1433	Mbinga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	247	262	306	139	15	1	0	0	1	15	83	268	1337
Rn	16.7	15.0	17.8	11.1	2.3	0.1	0	0	0.1	1.0	6.1	14.6	84.8
Rmax	49	48	60	33	9	1	0	0	1	12	32	55	
EI_{30}	164	185	217	86	5	0	0	0	0	13	61	196	927

Table 16.14 Matetereka

Station no.	Location	Altitude (m asl)	District
993511	9.50S,35.20E	975	Songea

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	199	198	270	196	44	10	1	0	1	19	56	197	1191
Rn	13.2	13.1	16.3	13.9	4.3	2.3	0.2	0	0.3	1.3	2.6	11.8	79.3
Rmax	40	36	51	46	20	5	1	0	1	11	25	52	
EI_{30}	133	130	187	131	28	0	0	0	0	15	50	146	820

Table 16.15 Hulia

Station no.	Location	Altitude (m asl)	District
1003601	10.46S,36.42E	914	Tunduru

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	249	202	334	172	29	5	2	0	1	13	48	200	1255
Rn	14.4	12.5	17.2	10.3	2.7	0.6	0.6	0	0.2	0.9	3.0	12.6	75.0
Rmax	56	43	66	57	16	4	1	0	1	8	23	67	
EI_{30}	182	141	249	135	20	1	0	0	0	9	40	155	932

Appendix 6. continued

16.16 Namtumbo Maize Project

Station no.	Location	Altitude (m asl)	District
1003605	10.27S,36.08E	NA	Songea

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	334	264	230	119	13	5	1	0	0	5	117	233	1321
Rn	15.2	13.0	13.5	9.2	1.8	0.4	0.2	0	0.1	0.6	5.1	12.1	71.2
Rmax	79	59	51	34	7	4	1	0	0	4	46	49	
EI_{30}	267	203	166	79	4	2	0	0	0	1	105	174	1001

17.0 SHINYANGA REGION

Table 17.1 Usia Dam

Station no.	Location	Altitude (m asl)	District
933327	3.52S,33.09E	1204	Shinyanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	145	152	197	200	56	9	2	4	11	45	136	181	1138
Rn	9.6	11.1	12.2	12.7	4.1	0.8	0.4	0.4	1.7	3.9	10.0	15.0	81.9
Rmax	41	46	54	50	30	6	1	3	6	26	41	38	
EI_{30}	104	106	146	143	46	5	0	1	2	35	94	107	789

Table 17.2 Mwadui

Station no.	Location	Altitude (m asl)	District
933317	3.31S,33.36E	1219	Shinyanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	127	117	166	152	56	8	0	1	5	36	97	157	922
Rn	10.1	9.5	12.8	10.6	4.3	0.6	0.1	0.2	1.0	3.9	9.7	11.9	74.7
Rmax	44	47	50	47	19	7	0	1	3	17	44	50	
EI_{30}	88	84	113	109	38	6	0	0	0	21	64	110	633

Table 17.3 Lubaga

Station no.	Location	Altitude (m asl)	District
933307	3.39S,33.24E	1143	Shinyanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	108	101	138	152	60	4	1	5	7	48	102	138	864
Rn	9.1	8.7	11.9	12.0	4.2	0.6	0.1	0.3	1.3	4.4	8.8	11.2	72.6
Rmax	35	33	39	43	30	3	1	5	5	19	31	46	
EI_{30}	70	65	86	100	49	0	0	3	0	30	64	94	561

Table 17.4 Swedish F.M. Mpera

Station no.	Location	Altitude (m asl)	District
933205	3.56S,32.45E	NA	Kahama

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	109	129	146	144	40	1	0	2	8	46	99	160	884
Rn	8.5	10.2	10.4	9.3	2.7	0.1	0.1	0.2	1.1	3.4	9.8	12.2	68.0
Rmax	36	37	36	51	29	1	0	2	7	18	31	51	
EI_{30}	75	85	98	111	38	0	0	0	3	33	57	111	611

Appendix 6. continued

Table 17.5 Kahama Agriculture

Station no.	Location	Altitude (m asl)	District
933200	3.50S,32.36E	1219	Kahama

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	145	138	165	177	53	2	2	0	12	67	159	169	1089
Rn	8.2	8.7	11.4	11.0	4.0	0.6	0.2	0	1.6	3.9	9.4	11.4	70.4
Rmax	63	40	40	42	25	2	1	0	8	30	56	39	
EI_{30}	126	102	112	126	41	0	0	0	5	57	127	115	811

Table 17.6 Ushirombo Mission

Station no.	Location	Altitude (m asl)	District
933101	3.28S,31.53E	1189	Kahama

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	105	109	139	168	70	10	0	5	15	62	123	141	947
Rn	9.6	10.6	10.4	12.4	5.1	0.3	0	0.5	1.8	5.1	12.1	11.7	79.6
Rmax	33	29	39	38	31	10	0	5	7	22	31	41	
EI_{30}	64	60	94	109	54	11	0	2	6	41	66	91	598

Table 17.7 Maswa Catholic Parish

Station no.	Location	Altitude (m asl)	District
923338	2.40S,33.59E	NA	Bariadi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	98	107	137	170	72	16	18	12	30	41	130	137	968
Rn	8.0	7.2	8.2	11.4	6.0	1.7	0.9	1.1	3.6	2.9	9.6	10.4	71.0
Rmax	29	37	44	48	29	10	8	10	13	23	37	35	
EI_{30}	63	80	106	122	50	9	14	9	14	34	88	89	678

Table 17.8 Mpunze

Station no.	Location	Altitude (m asl)	District
933217	3.54S,32.22E	1220	Kahama

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	128	127	219	133	43	4	2	0	20	41	123	175	1015
Rn	9.6	7.9	12.8	9.8	3.8	0.5	0.2	0.2	1.7	4.0	10.9	12.2	73.6
Rmax	42	38	46	29	19	3	2	0	15	17	26	61	
EI_{30}	90	95	156	85	29	0	0	0	16	25	69	131	696

Table 17.9 Masumbwe

Station no.	Location	Altitude (m asl)	District
933218	3.38S,32.11E	1070	Kahama

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	88	103	149	168	68	5	4	3	25	56	189	181	1039
Rn	8.2	8.6	11.6	11.4	4.6	0.1	0.3	0.2	1.3	3.5	11.7	11.9	73.4
Rmax	33	34	36	45	31	5	2	3	20	25	50	35	
EI_{30}	56	68	95	118	55	4	0	1	26	46	138	120	727

Appendix 6. continued

Table 17.10 Lunguya

Station no.	Location	Altitude (m asl)	District
933213	3.24S,32.24E	NA	Kahama

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	94	93	126	96	62	3	2	2	18	44	111	163	814
Rn	7.9	7.3	10.7	7.4	4.0	0.7	0.3	0.2	1.7	3.9	7.7	9.4	61.2
Rmax	33	30	31	34	22	3	1	2	12	18	32	44	
EI_{30}	63	63	76	68	46	0	0	0	13	29	78	123	559

Table 17.11 Kisesa Pr.School

Station no.	Location	Altitude (m asl)	District
933406	3.03S,34.09E	NA	Bariadi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	98	93	132	153	38	5	1	2	5	12	75	130	744
Rn	6.3	5.6	9.2	10.4	2.4	0.4	0.1	0.3	0.7	1.1	6.8	9.4	52.7
Rmax	33	36	35	42	19	3	1	1	3	7	26	34	
EI_{30}	74	75	91	108	31	1	0	0	0	7	47	87	521

Table 17.12 Paji

Station no.	Location	Altitude (m asl)	District
933410	3.33S,34.27E	NA	Maswa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	107	91	102	162	5	0	1	0	1	14	70	93	646
Rn	7.7	6.8	8.0	7.3	0.3	0	0.2	0	0.4	1.4	5.2	8.8	46.1
Rmax	43	39	28	41	3	0	1	0	1	5	22	27	
EI_{30}	82	69	66	130	2	0	0	0	0	6	48	53	456

Table 17.13 Mwamalasa (Hindawashi)

Station no.	Location	Altitude (m asl)	District
933408	3.49S,34.07E	NA	Shinyanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	153	99	154	95	23	0	7	0	0	22	67	90	710
Rn	7.4	6.3	7.4	6.4	1.4	0.2	0.6	0	0.1	1.6	5.2	7.7	44.3
Rmax	52	41	49	35	12	0	6	0	0	12	23	27	
EI_{30}	129	80	128	72	18	0	4	0	0	16	46	56	549

Table 17.14 Nzunzuli School

Station no.	Location	Altitude (m asl)	District
933212	3.19S,32.53E	NA	Shinyanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	85	78	154	163	72	2	3	2	20	36	134	165	914
Rn	8.9	6.8	10.4	9.5	4.3	0.2	0.4	0.6	2.3	3.1	8.7	11.4	66.6
Rmax	29	35	40	42	27	2	2	2	9	18	34	38	
EI_{30}	47	55	108	121	57	0	0	0	9	25	94	111	627

Appendix 6. continued

Table 17.15 Sagata

Station no.	Location	Altitude (m asl)	District
923411	2.45S,34.15E	NA	Bariadi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	119	88	171	183	56	14	6	19	37	41	136	119	989
Rn	9.9	7.2	11.5	13.4	6.2	1.3	0.8	2.0	3.5	5.3	12.3	10.8	84.2
Rmax	31	28	46	40	19	10	4	9	16	16	39	30	
EI_{30}	73	58	121	118	29	10	1	10	23	18	82	68	611

Table 17.16 Matongo

Station no.	Location	Altitude (m asl)	District
923412	2.25S,34.05E	NA	Bariadi

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	126	72	103	175	92	25	19	12	30	26	121	31	832
Rn	6.8	5.3	6.0	9.8	7.2	3.2	2.5	2.0	3.8	2.5	7.2	2.8	59.1
Rmax	32	24	25	44	31	12	8	6	11	13	33	10	
EI_{30}	95	50	74	131	63	11	7	2	12	16	90	17	568

Table 17.17 Musasa

Station no.	Location	Altitude (m asl)	District
933106	3.22S,31.33E	NA	Kahama

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	113	121	102	182	61	8	3	13	19	71	149	144	986
Rn	10.1	8.5	9.6	11.8	5.4	0.5	0.4	1.2	2.9	7.6	12.5	12.7	83.2
Rmax	30	44	30	49	23	8	2	7	10	22	34	40	
EI_{30}	67	91	59	131	39	7	0	7	6	37	89	88	621

Table 17.18 Kaniha Mission

Station no.	Location	Altitude (m asl)	District
933100	3.13S,31.21E	1250	Kahama

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	95	110	167	247	104	9	10	1	17	59	180	181	1180
Rn	9.0	7.5	10.0	14.4	6.6	1.1	0.7	0.2	1.7	4.5	10.0	12.4	78.1
Rmax	25	36	42	36	43	8	8	1	11	24	42	50	
EI_{30}	53	81	122	166	84	5	8	0	11	43	133	128	834

Table 17.19 Malampaka

Station no.	Location	Altitude (m asl)	District
933332	3.08S,33.32E	NA	Maswa

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	79	111	154	146	38	0	3	1	10	54	156	136	888
Rn	8.6	8.2	11.7	12.6	3.8	0.1	0.1	0.2	1.7	4.3	11.9	10.8	74.0
Rmax	30	42	42	32	20	0	3	1	7	25	38	42	
EI_{30}	44	82	103	85	25	0	1	0	2	40	101	91	574

Appendix 6. continued

18.0 SINGIDA REGION

Table 18.1 Singida Hydromet

Station no.	Location	Altitude (m asl)	District
943440	4.49S,34.44E	1524	Singida

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	123	91	113	73	6	0	0	0	0	5	48	102	561
Rn	11.6	9.3	8.2	7.0	0.9	0	0	0	0.2	0.5	5.5	11.6	54.8
Rmax	32	27	45	27	5	0	0	0	0	5	21	33	
EI_{30}	69	49	86	45	1	0	0	0	0	2	26	52	330

Table 18.2 Kiomboi Boma

Station no.	Location	Altitude (m asl)	District
943417	4.17S,34.24E	1585	Iramba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	152	130	128	132	25	4	0	0	8	14	81	121	795
Rn	9.9	8.3	9.1	8.1	2	0.5	0.1	0	0.6	1.4	6.4	10.2	56.6
Rmax	42	37	36	43	18	3	0	0	7	8	24	29	
EI_{30}	110	95	88	102	21	0	0	0	6	8	53	72	555

Table 18.3 Ilongero

Station no.	Location	Altitude (m asl)	District
943436	4.39S,34.53E	1600	Singida

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	124	90	109	69	14	2	0	0	2	4	49	154	617
Rn	11.8	8.7	9.3	7.5	2.5	0.2	0	0	0.4	0.5	5.0	11.6	57.5
Rmax	34	28	35	20	7	1	0	0	2	4	22	36	
EI_{30}	71	52	70	34	2	0	0	0	0	1	30	99	359

Table 18.4 Sepuka

Station no.	Location	Altitude (m asl)	District
943437	4.45S,34.32E	1463	Singida

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	144	102	169	98	27	0	0	0	0	21	37	116	714
Rn	10.0	8.5	9.8	7.7	2.1	0	0.1	0	0.2	0.3	3.4	10.5	52.6
Rmax	45	30	46	32	10	0	0	0	0	20	10	38	
EI_{30}	104	65	127	66	17	0	0	0	0	27	19	73	498

Table 18.5 Manyoni

Station no.	Location	Altitude (m asl)	District
953400	5.44S,34.50E	1248	Manyoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	137	116	94	68	17	2	1	0	1	3	52	118	609
Rn	9.2	7.7	6.0	5.7	2.0	0.2	0.2	0	0.1	0.3	3.6	9.6	44.6
Rmax	36	43	34	27	9	2	1	0	1	3	26	38	
EI_{30}	96	90	73	47	8	0	0	0	0	0	42	79	435

Appendix 6. continued

Table 18.6 Sekenke

Station no.	Location	Altitude (m asl)	District
943404	4.15S,34.11E	1219	Iramba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	105	112	104	119	25	4	0	0	4	20	102	122	717
Rn	10.1	9.9	11.0	12.0	3.5	0.5	0.1	0.2	1.2	2.7	10.7	13.6	75.5
Rmax	29	37	30	30	13	3	0	0	3	10	33	30	
EI_{30}	59	71	54	63	11	0	0	0	0	8	56	57	379

Table 18.7 Mgandu

Station no.	Location	Altitude (m asl)	District
953414	5.57S,34.08E	NA	Manyoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	230	198	195	128	7	0	0	0	1	4	67	249	1079
Rn	11.7	9.2	8.5	5.6	0.7	0	0	0	0.1	0.6	3.5	12.2	52.1
Rmax	59	66	59	55	7	0	0	0	1	3	29	60	
EI_{30}	180	169	165	118	4	0	0	0	0	0	58	195	889

Table 18.8 Ndago

Station no.	Location	Altitude (m asl)	District
943423	4.36S,34.21E	1515	Iramba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	146	130	120	85	25	3	3	1	3	17	93	168	794
Rn	12.3	9.5	8.8	6.8	1.6	0.5	0.4	0.1	0.5	1.7	7.3	14.5	64.0
Rmax	36	41	42	33	15	2	2	1	2	10	27	41	
EI_{30}	89	92	87	60	21	0	0	0	0	10	61	101	521

Table 18.9 Rungwa

Station no.	Location	Altitude (m asl)	District
963301	6.57S,33.31E	1372	Manyoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	149	155	191	113	15	0	0	0	0	6	42	205	876
Rn	11.5	10.9	12.0	7.5	1.0	0	0	0	0	0.7	5.1	15.1	63.8
Rmax	40	35	44	40	10	0	0	0	0	4	19	46	
EI_{30}	98	103	135	86	12	0	0	0	0	2	22	133	591

Table 18.10 Kilimatinde

Station no.	Location	Altitude (m asl)	District
953403	5.52S,34.56E	1158	Manyoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	160	102	99	84	18	0	0	0	0	13	77	207	760
Rn	9.3	7.2	5.2	6.1	1.9	0.2	0	0	0	1.1	4.9	11.0	46.9
Rmax	44	42	45	35	12	0	0	0	0	12	31	53	
EI_{30}	121	79	88	64	12	0	0	0	0	11	61	159	595

Appendix 6. continued

Table 18.11 Ihanja Mission

Station no.	Location	Altitude (m asl)	District
953404	5.04S,34.41E	NA	Singida

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	133	110	121	71	11	0	0	0	2	2	70	122	642
Rn	9.6	7.8	8.0	4.7	1.1	0	0.1	0	0.3	0.3	3.4	8.8	44.1
Rmax	42	34	45	24	7	0	0	0	2	2	31	34	
EI_{30}	94	78	94	52	6	0	0	0	0	0	62	83	469

Table 18.12 Chikuyu

Station no.	Location	Altitude (m asl)	District
953515	5.52S,35.04E	NA	Manyoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	149	75	122	99	10	1	0	0	0	3	42	150	651
Rn	9.1	4.9	7.1	5.7	1.4	0.4	0	0	0	0.4	3.1	8.3	40.4
Rmax	51	34	35	27	8	1	0	0	0	3	26	44	
EI_{30}	117	61	92	74	4	0	0	0	0	0	36	117	501

Table 18.13 Sanza (Isanza)

Station no.	Location	Altitude (m asl)	District
963521	6.21S,35.13E	NA	Manyoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	105	111	93	82	2	0	0	0	0	1	36	146	576
Rn	6.8	8.9	7.1	6.4	0.8	0	0	0	0.1	0.1	3.3	8.8	42.3
Rmax	39	27	31	34	2	0	0	0	0	0	22	43	
EI_{30}	82	69	64	60	0	0	0	0	0	0	27	110	412

Table 18.14 Mang'onyi

Station no.	Location	Altitude (m asl)	District
953412	5.15S,34.55E	1372	Singida

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	102	60	43	51	4	0	0	0	0	2	22	101	385
Rn	7.8	6.2	4.2	4.8	0.6	0	0	0	0	0.2	2.4	7.4	33.6
Rmax	31	21	17	29	4	0	0	0	0	2	10	32	
EI_{30}	69	33	26	38	0	0	0	0	0	0	11	71	248

Table 18.15 Mwangeza Village

Station no.	Location	Altitude (m asl)	District
943424	4.02S,34.48E	NA	Iramba

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	103	71	100	125	52	7	8	0	8	9	61	119	663
Rn	7.7	5.1	6.9	9.7	6.3	1.2	1.2	0.2	1.6	1.6	6.4	11.4	59.3
Rmax	38	24	45	27	21	5	2	0	4	6	18	27	
EI_{30}	75	50	81	77	26	1	0	0	0	1	31	64	406

Appendix 6. continued

Table 18.16 Ngimo Pr.School

Station no.	Location	Altitude (m asl)	District
943532	4.45S,35.05E	NA	Singida

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	97	69	97	77	6	0	0	0	1	4	69	116	536
Rn	7.1	7.2	5.0	6.8	0.9	0	0	0	0.1	0.5	5.5	10.1	43.2
Rmax	39	26	37	27	5	0	0	0	1	4	34	33	
EI_{30}	73	40	82	49	1	0	0	0	0	1	53	71	370

Table 18.17 Mwamagembe Agriculture

Station no.	Location	Altitude (m asl)	District
963302	6.30S,33.40E	NA	Manyoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	173	165	165	76	12	0	0	0	0	20	49	186	846
Rn	13.3	12.5	11.0	6.3	2.0	0	0	0	0	0.8	5.2	12.2	63.3
Rmax	39	47	41	32	5	0	0	0	0	9	17	34	
EI_{30}	109	112	115	54	1	0	0	0	0	17	26	123	557

Table 18.18 Makanda

Station no.	Location	Altitude (m asl)	District
953516	5.45S,35.18E	NA	Manyoni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	173	137	151	100	11	0	0	0	1	3	62	148	786
Rn	10.6	8.4	8.9	8.4	2.0	0	0	0	0.1	0.5	4.8	10.0	53.7
Rmax	47	44	49	40	6	0	0	0	0	1	27	42	
EI_{30}	128	105	118	70	1	0	0	0	0	0	46	106	574

19.0 TABORA REGION

Table 19.1 Urambo

Station no.	Location	Altitude (m asl)	District
953209	5.04S,32.03E	1106	Urambo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	141	151	153	156	38	0	0	0	2	12	110	133	896
Rn	10.1	11.0	12.4	10.8	3.3	0.1	0	0	0.2	2.0	10.3	13.3	73.5
Rmax	39	40	40	43	21	0	0	0	2	8	34	33	
EI_{30}	97	102	97	109	28	0	0	0	0	3	66	71	573

Table 19.2 Masenge

Station no.	Location	Altitude (m asl)	District
943305	4.48S,33.46E	1143	Tabora

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	160	113	105	77	18	0	1	0	4	19	81	140	718
Rn	11.8	10.6	8.7	7.0	1.9	0	0.3	0	0.6	2.0	8.2	13.0	64.1
Rmax	46	40	35	22	13	0	1	0	3	11	26	32	
EI_{30}	110	71	70	45	12	0	0	0	0	11	45	77	441

Appendix 6. continued

Table 19.3 Kisengi

Station no.	Location	Altitude (m asl)	District
953301	5.21S,33.34E	1155	Tabora

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	226	172	165	159	24	0	0	0	1	26	123	259	1155
Rn	11.3	9.7	9.2	7.3	1.8	0.1	0	0	0.3	1.8	7.7	14.6	63.8
Rmax	65	48	46	50	12	0	0	0	1	13	53	66	
EI_{30}	183	132	127	134	17	0	0	0	0	20	102	196	911

Table 19.4 Mibono

Station no.	Location	Altitude (m asl)	District
953229	5.50S,32.55E	NA	Tabora

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	150	123	123	122	7	0	0	0	0	5	81	155	766
Rn	7.7	8.2	8.3	8.2	0.9	0	0	0	0	1.0	7.6	11.4	53.3
Rmax	57	40	37	47	5	0	0	0	0	4	21	35	
EI_{30}	128	91	89	95	2	0	0	0	0	0	45	100	550

Table 19.5 Kaliua

Station no.	Location	Altitude (m asl)	District
953104	5.04S,31.48E	NA	Urambo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	111	96	127	122	40	0	0	1	3	20	72	145	737
Rn	8.0	7.0	8.9	9.4	2.3	0	0.1	0.1	0.5	2.8	7.3	12.1	58.5
Rmax	37	35	36	44	20	0	0	1	3	12	23	34	
EI_{30}	80	70	89	87	34	0	0	0	0	9	40	87	496

Table 19.6 Kitunda Mission

Station no.	Location	Altitude (m asl)	District
963300	6.48S,33.13E	1372	Tabora

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	175	153	170	69	10	2	0	1	5	21	104	186	896
Rn	13.3	9.7	10.6	5.4	0.9	0.3	0.1	0.1	0.3	1.3	5.0	11.4	58.4
Rmax	45	42	45	19	9	2	0	1	3	15	44	63	
EI_{30}	115	111	124	44	7	0	0	0	2	19	93	146	661

Table 19.7 Mwanhala

Station no.	Location	Altitude (m asl)	District
943302	4.24S,33.09E	1250	Nzega

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	148	122	109	118	31	1	3	1	3	22	100	160	818
Rn	10.4	10.3	9.7	9.0	2.7	0.4	0.4	0.1	0.7	2.6	8.8	12.5	67.6
Rmax	45	37	32	38	17	0	2	1	3	14	39	39	
EI_{30}	106	78	66	82	22	0	0	0	0	13	68	102	537

Appendix 6. continued

Table 19.8 Igalula

Station no.	Location	Altitude (m asl)	District
953303	5.13S,33.00E	NA	Tabora

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	272	183	255	215	66	0	6	0	7	49	171	328	1552
Rn	9.2	8.8	9.4	7.1	1.9	0	0.2	0	0.3	1.0	6.8	10.0	54.7
Rmax	58	55	66	74	51	0	6	0	4	30	49	83	
EI_{30}	228	151	218	199	79	0	5	0	4	55	146	290	1375

Table 19.9 Tabora Obs

Station no.	Location	Altitude (m asl)	District
953200	5.02S,32.49E	1265	Tabora

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	106	108	127	113	21	1	1	0	2	17	101	166	763
Rn	12.0	12.3	11.8	10.6	2.9	0.1	0.1	0	0.7	2.4	10.7	16.3	79.9
Rmax	31	25	30	32	9	1	0	0	1	9	28	36	
EI_{30}	52	48	71	66	7	0	0	0	0	6	52	87	389

Table 19.10 Simbo

Station no.	Location	Altitude (m asl)	District
943308	4.40S,33.27E	1230	Igunga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	163	89	184	112	16	1	0	0	0	34	118	188	905
Rn	10.5	8.0	10.4	7.6	1.6	0.1	0	0	0.1	2.8	8.7	11.9	61.7
Rmax	34	29	43	32	12	1	0	0	0	12	34	40	
EI_{30}	111	55	136	79	11	0	0	0	0	21	80	130	623

Table 19.11 Igunga

Station no.	Location	Altitude (m asl)	District
943303	4.17S,33.52E	1158	Igunga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	99	75	116	88	21	2	0	0	2	19	93	153	668
Rn	8.1	6.0	10.1	6.3	2.4	0.2	0	0.2	0.2	1.1	8.6	11.3	54.5
Rmax	34	30	38	39	13	2	0	0	2	9	29	38	
EI_{30}	67	53	75	69	12	0	0	0	0	14	56	101	447

Table 19.12 Ndala Mission

Station no.	Location	Altitude (m asl)	District
943301	4.45S,33.16E	1372	Nzega

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	156	133	144	130	22	1	3	0	4	17	104	180	894
Rn	12.4	10.3	10.2	8.8	2.1	0.4	0.4	0.1	0.9	1.9	9.5	15.3	72.3
Rmax	35	35	43	42	16	1	2	0	3	11	32	39	
EI_{30}	96	86	102	96	17	0	0	0	0	10	63	106	576

Appendix 6. continued

Table 19.13 Urambo Animal Draught Training Centre

Station no.	Location	Altitude (m asl)	District
953225	5.40S,32.30E	NA	Urambo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	145	128	169	144	19	0	1	1	4	33	161	171	976
Rn	10.4	7.4	12.5	8.9	2.1	0	0.2	0.1	0.7	3.9	9.8	13.0	69.0
Rmax	41	42	41	35	10	0	1	1	3	13	56	40	
EI_{30}	100	101	111	103	10	0	0	0	0	16	127	110	678

Table 19.14 Uyowa Maji

Station no.	Location	Altitude (m asl)	District
943102	4.30S,31.57E	NA	Urambo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	137	127	163	141	27	0	0	2	14	44	135	169	959
Rn	11.9	10.7	13.6	11.5	4.0	0	0	0.2	1.6	5.3	12.1	13.5	84.4
Rmax	39	34	39	46	17	0	0	1	7	14	38	36	
EI_{30}	85	79	99	95	13	0	0	0	6	19	81	103	580

Table 19.15 Nzega Boma

Station no.	Location	Altitude (m asl)	District
943300	4.13S,33.11E	1219	Nzega

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	124	126	114	104	33	4	5	0	7	36	119	157	829
Rn	9.1	7.8	9.0	7.1	3.6	0.4	0.5	0	1.0	2.6	9.6	11.3	62.0
Rmax	36	49	38	38	17	4	3	0	5	20	31	38	
EI_{30}	85	102	78	79	20	1	1	0	2	29	75	104	576

Table 19.16 Choma Chankola

Station no.	Location	Altitude (m asl)	District
943307	4.02S,33.21E	1260	Nzega

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	127	92	98	118	20	9	3	4	8	25	45	174	723
Rn	8.0	7.3	7.2	6.9	2.1	1.1	0.7	0.4	1.1	3.0	6.0	13.6	57.4
Rmax	37	33	36	38	12	6	2	2	6	12	18	46	
EI_{30}	94	64	72	92	12	4	0	0	3	12	19	113	485

Table 19.17 Igurubi

Station no.	Location	Altitude (m asl)	District
943309	4.00S,33.42E	1150	Igunga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	112	124	135	102	21	2	3	1	2	15	78	138	733
Rn	7.1	6.4	8.1	9.0	1.6	0.3	0.8	0.1	0.6	2.3	5.6	9.1	51.0
Rmax	35	46	42	34	12	2	2	1	1	7	36	38	
EI_{30}	84	105	103	65	16	0	0	0	0	4	62	99	538

Appendix 6. continued

Table 19.18 Igombe Dam

Station no.	Location	Altitude (m asl)	District
943206	4.51S,32.43E	1158	Tabora

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	156	129	148	175	39	0	0	1	1	64	127	171	1011
Rn	10.5	8.2	10.5	9.1	2.6	0	0	0.1	0.1	3.5	9.9	13.7	68.2
Rmax	51	42	35	51	21	0	0	0	1	22	39	32	
EI_{30}	116	98	98	139	32	0	0	0	0	51	86	101	721

Table 19.19 Ulyankulu

Station no.	Location	Altitude (m asl)	District
943208	4.45S,32.19E	NA	Urambo

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	150	146	178	153	19	4	2	2	12	33	125	216	1040
Rn	12.0	8.9	11.2	10.3	1.8	0.3	0.2	0.3	1.0	2.8	8.2	12.1	69.1
Rmax	33	43	35	34	6	2	1	1	6	11	39	48	
EI_{30}	92	110	121	103	9	0	0	0	7	20	92	159	713

Table 19.20 Malolo Dam

Station no.	Location	Altitude (m asl)	District
943207	4.07S,32.52E	NA	Nzega

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	87	126	145	140	40	2	0	0	3	37	97	178	855
Rn	8.4	9.9	11.2	10.5	3.4	0.5	0	0.1	0.5	2.5	9.4	12.0	68.4
Rmax	30	35	46	38	18	1	0	0	3	22	27	39	
EI_{30}	52	82	100	94	27	0	0	0	0	32	54	120	561

Appendix 6. continued

20.0 TANGA REGION

Table 20.1 Mtae

Station no.	Location	Altitude (m asl)	District
943866	4.29S,38.14E	640	Lushoto

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	53	51	81	146	94	18	14	14	32	51	82	125	761
Rn	4.8	4.2	6.0	13.0	10.9	2.9	2.2	2.0	2.7	4.7	9.4	10.6	73.4
Rmax	25	29	27	39	25	12	8	7	18	19	26	34	
EI_{30}	37	41	57	87	43	7	4	4	24	31	40	77	452

Table 20.2 Sakura Estate,

Station no.	Location	Altitude (m asl)	District
953809	5.37S,38.53E	40	Pangani

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	45	20	87	184	152	49	48	50	68	66	133	68	970
Rn	2.9	2.2	6.1	10.6	9.8	4.2	4.9	7.1	5.5	5.4	7.2	4.2	70.1
Rmax	26	13	33	49	44	22	21	15	35	38	46	33	
EI_{30}	40	13	65	139	111	34	29	16	53	54	109	58	721

Table 20.3 Mgera Pr.School

Station no.	Location	Altitude (m asl)	District
953701	5.23S,37.32E	1006	Handeni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	86	100	107	148	80	50	26	27	33	67	80	95	899
Rn	5.2	5.1	7.8	11.4	9.1	4.9	5.2	4.7	3.1	4.4	5.5	6.6	73.0
Rmax	38	36	38	39	20	11	9	11	17	27	29	42	
EI_{30}	72	83	78	97	36	24	1	5	22	52	59	76	605

Table 20.4 Mswaki Pr.School

Station no.	Location	Altitude (m asl)	District
953710	5.28S,37.46E	724	Handeni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	46	88	102	148	85	18	18	15	19	48	53	126	766
Rn	4.9	4.9	8.9	12.3	10.5	3	3.6	3.2	3.8	7.3	5.6	10.0	78.0
Rmax	20	37	38	35	20	9	8	8	9	12	19	36	
EI_{30}	27	75	68	90	34	4	1	0	1	12	29	82	423

Table 20.5 Pangani

Station no.	Location	Altitude (m asl)	District
953806	5.26S,38.59E	9	Pangani

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	66	25	78	218	214	72	46	47	81	66	103	70	1086
Rn	2.3	1.5	4.6	10.6	10.3	4.5	4.8	4.4	5.1	3.9	5.2	3.2	60.4
Rmax	40	19	38	60	55	33	17	19	25	29	34	42	
EI_{30}	70	24	68	176	170	60	25	29	60	55	84	71	892

Appendix 6. continued

Table 20.6 Hale Plantation

Station no.	Location	Altitude (m asl)	District
953810	5.18S,38.37E	183	Korogwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	74	46	104	235	189	61	46	49	52	110	110	75	1151
Rn	4.8	3.0	7.9	14.0	13.1	5.9	5.9	7.6	5.8	7.1	6.3	4.8	86.2
Rmax	32	24	32	47	41	24	19	22	25	39	37	34	
EI_{30}	60	39	71	165	126	38	21	18	31	85	87	62	803

Table 20.7 Kwadundwa

Station no.	Location	Altitude (m asl)	District
953704	5.40S,37.40E	853	Handeni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	137	94	132	163	145	20	22	19	49	72	70	113	1036
Rn	7.2	5.6	7.4	10.6	12.7	3.0	3.9	2.6	5.3	6.9	5.9	8.0	79.1
Rmax	38	31	48	38	34	7	8	11	19	16	20	31	
EI_{30}	107	73	108	113	85	5	3	8	27	37	43	77	686

20.8 Mkata Pr.School

Station no.	Location	Altitude (m asl)	District
953869	5.47S,38.17E	NA	Handeni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	102	82	96	166	106	22	19	19	39	64	81	118	914
Rn	6.4	4.3	6.9	13.0	8.2	2.1	3.7	3.4	3.8	5.0	6.3	7.4	70.5
Rmax	37	44	34	37	33	13	9	9	14	21	28	39	
EI_{30}	80	77	70	103	72	15	2	3	22	43	56	90	633

Table 20.9 Torondo Sisal Estate

Station no.	Location	Altitude (m asl)	District
943844	4.55S,38.06E	564	Korogwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	62	40	90	156	139	26	28	15	33	38	82	81	790
Rn	3.3	2.5	4.6	8.1	9.0	3.3	2.1	2.1	2.1	2.5	5.4	5.5	50.5
Rmax	28	21	41	50	34	11	14	8	16	16	34	35	
EI_{30}	54	34	81	127	97	11	21	5	26	29	65	64	614

Table 20.10 Gologolo Forest House

Station no.	Location	Altitude (m asl)	District
943847	4.42S,38.14E	1920	Lushoto

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	73	79	83	143	99	19	12	4	19	44	98	96	769
Rn	5.6	5.0	8.7	11.6	10.6	2.5	0.9	1.2	1.5	3.3	8.3	6.7	65.9
Rmax	28	30	37	33	26	10	7	2	10	26	29	29	
EI_{30}	52	62	52	87	49	8	8	0	13	37	62	68	498

Appendix 6. continued

Table 20.11 Tanga Municipal Council

Station no.	Location	Altitude (m asl)	District
953900	5.04S,39.06E	9	Tanga

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	38	22	73	175	296	97	74	53	98	85	103	89	1203
Rn	2.7	2.0	4.8	10.3	11.6	4.8	6.0	6.3	6.8	5.6	5.7	5.1	71.7
Rmax	19	15	38	50	85	30	30	16	54	40	36	44	
EI_{30}	30	17	63	133	255	78	53	23	86	71	83	79	971

Table 20.12 Amani

Station no.	Location	Altitude (m asl)	District
953803	5.06S,38.38E	911	Muheza

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	113	75	159	265	258	97	96	98	109	180	209	148	1807
Rn	9.7	5.7	12.5	20.6	19.4	11.8	11.7	12.2	11.1	11.0	12.9	12.2	150.8
Rmax	38	33	48	52	48	27	25	23	52	57	61	45	
EI_{30}	74	57	107	163	160	42	41	39	73	139	157	97	1149

Table 20.13 Korongwe Boma

Station no.	Location	Altitude (m asl)	District
953808	5.10S,38.28E	292	Korogwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	52	28	103	262	210	62	53	42	41	76	76	50	1055
Rn	3.2	1.9	6.1	14.5	13.6	5.7	5.8	5.0	3.6	3.9	3.7	3.4	70.4
Rmax	29	21	37	67	42	17	16	13	21	37	34	25	
EI_{30}	46	26	82	200	142	35	26	18	29	69	68	41	782

Table 20.14 Noorelya Sisal Estate

Station no.	Location	Altitude (m asl)	District
943857	4.56S,38.18E	442	Korogwe

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	60	42	63	135	172	29	13	17	12	46	76	75	740
Rn	3.6	3.2	6.2	10.1	11.4	3.1	1.9	1.5	0.8	2.9	5.3	6.4	56.4
Rmax	27	27	23	42	43	12	6	9	11	24	29	23	
EI_{30}	50	36	37	94	120	15	3	11	11	39	57	47	520

Table 20.15 Kigongoi Pr.School

Station no.	Location	Altitude (m asl)	District
943860	4.48S,38.45E	NA	Muheza

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	40	14	98	165	164	21	62	97	104	65	85	54	969
Rn	2.6	1.6	5.0	9.6	10.6	4.2	6.4	6.4	5.4	6.7	6.7	3.9	69.1
Rmax	14	10	31	40	46	7	20	30	37	16	25	20	
EI_{30}	29	8	79	121	119	0	33	71	86	32	55	39	672

Appendix 6. continued

Table 20.16 Bumbuli

Station no.	Location	Altitude (m asl)	District
943864	4.52S,38.28E	1433	Lushoto

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	72	46	104	193	228	73	56	62	62	112	63	73	1144
Rn	5.2	4.2	7.9	13.1	14.4	6.6	7.2	5.8	5.5	4.9	6.1	5.2	86.1
Rmax	31	16	34	48	53	32	23	21	34	46	34	35	
EI_{30}	55	27	72	134	161	50	26	37	47	102	45	59	815

Table 20.17 Negero Pr.School

Station no.	Location	Altitude (m asl)	District
953712	5.47S,37.48E	NA	Handeni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	64	48	135	298	63	39	19	20	17	122	58	184	1067
Rn	5.0	3.0	6.4	15.3	6.3	4.0	2.7	2.4	3.1	6.2	6.4	9.6	70.4
Rmax	14	21	50	45	18	13	7	11	9	34	21	37	
EI_{30}	38	38	117	212	33	20	5	10	3	96	31	135	738

Table 20.18 Magila TTC

Station no.	Location	Altitude (m asl)	District
953834	5.10S,38.46E	214	Muheza

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	91	51	107	191	199	87	75	68	83	122	143	104	1321
Rn	5.5	3.7	9.7	16.0	17.9	10.1	9.9	9.3	8.5	9.0	10.1	7.9	117.6
Rmax	42	22	34	39	38	24	19	23	29	44	44	45	
EI_{30}	78	38	66	112	109	40	27	27	48	89	102	79	815

Table 20.19 Songe Pr.School

Station no.	Location	Altitude (m asl)	District
953709	5.35S,37.17E	1150	Handeni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	84	67	76	154	89	23	8	6	8	32	67	109	723
Rn	6.5	5.5	5.8	11.0	11.0	3.2	0.9	1.9	1.7	3.8	6.3	8.2	65.8
Rmax	21	24	23	34	22	8	4	2	4	9	27	25	
EI_{30}	53	45	51	101	36	7	2	0	0	13	43	69	420

Table 20.20 Kwamsisi

Station no.	Location	Altitude (m asl)	District
953831	5.52S,38.37E	152	Handeni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	74	46	97	192	128	29	26	18	43	75	77	115	920
Rn	4.5	2.4	4.4	11.1	8.2	3.1	3.0	2.2	3.2	3.6	4.2	6.0	55.9
Rmax	32	27	40	39	42	15	11	10	26	37	37	48	
EI_{30}	61	44	87	137	97	17	13	9	36	70	69	100	740

Appendix 6. continued

Table 20.21 Handeni Boma

Station no.	Location	Altitude (m asl)	District
953807	5.26S,38.02E	677	Handeni

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	72	86	114	210	121	19	19	13	22	61	89	95	921
Rn	5.2	4.5	6.7	12.9	9.2	3.9	3.0	2.2	3.2	4.0	4.4	4.3	63.5
Rmax	31	36	38	55	38	16	13	7	11	21	51	43	
El_{30}	55	74	89	154	83	5	8	2	8	45	87	88	698

21.0 ZANZIBAR

Table 21.1 Pangeni

Station no.	Location	Altitude (m asl)	District
963939	6.01S,39.17E,	76	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	59	63	216	335	312	108	80	60	74	75	100	69	1551
Rn	4.3	3.6	11.6	19.9	16.4	8.1	7.2	7.3	7.7	5.9	7.5	6.2	105.7
Rmax	23	26	52	47	39	28	28	17	23	27	20	19	
El_{30}	43	52	164	224	215	71	51	25	40	52	61	40	1038

Table 21.2 Kisongoni

Station no.	Location	Altitude (m asl)	District
953917	5.59S,39.19E	49	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	47	49	161	330	258	75	64	49	65	83	115	111	1407
Rn	3.0	2.8	7.7	13.9	12.3	5.4	6.2	5.5	5.0	4.4	6.5	5.3	78.0
Rmax	23	24	50	59	53	18	18	18	27	26	33	40	
El_{30}	39	42	133	256	197	48	35	25	48	65	88	95	1071

Table 21.3 Kizimbani

Station no.	Location	Altitude (m asl)	District
963911	6.05S,39.16E	67	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	72	79	223	393	320	119	102	52	109	136	177	157	1939
Rn	4.0	4.9	12.8	21.4	16.3	8.0	8.0	5.7	10.1	8.5	10.4	7.8	117.9
Rmax	43	43	57	55	55	37	33	18	34	44	44	49	
El_{30}	69	71	167	272	233	87	69	27	66	104	130	129	1424

Table 21.4 Mwera

Station no.	Location	Altitude (m asl)	District
963921	6.09S,39.16E	24	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	36	84	159	302	229	98	73	52	68	91	174	80	1446
Rn	3.4	5.7	12.6	17.8	17.8	6.0	5.7	5.3	5.8	6.0	9.7	6.3	102.1
Rmax	18	34	44	49	42	39	30	18	23	31	37	32	
El_{30}	24	65	104	206	138	79	53	29	44	68	126	58	994

Appendix 6. continued

Table 21.5 Hanyagwa Mchana

Station no.	Location	Altitude (m asl)	District
963923	6.10S,39.23E	12	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	75	57	212	384	306	117	120	63	74	60	97	111	1676
Rn	4.1	4.3	10.5	18.5	15.3	8.2	9.7	7.4	6.3	5.7	7.2	6.8	104.0
Rmax	25	29	48	55	55	31	29	19	31	24	27	30	
EI_{30}	59	45	163	278	226	80	74	29	52	38	65	81	1190

Table 21.6 Mvongoni

Station no.	Location	Altitude (m asl)	District
963924	6.17S,39.26E	15	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	77	75	145	374	288	92	53	28	32	54	62	103	1383
Rn	4.9	4.8	11.4	18.8	17.0	8.9	9.0	5.3	4.1	4.2	7.2	7.3	102.9
Rmax	23	29	41	57	60	25	16	12	20	28	22	38	
EI_{30}	56	59	96	270	206	51	10	4	18	42	31	77	920

Table 21.7 Makunduchi

Station no.	Location	Altitude (m asl)	District
963914	6.25S,39.33E	24	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	56	71	138	347	278	98	63	23	33	23	70	74	1274
Rn	4.4	3.6	8.0	17.1	15.0	6.7	7.7	3.6	3.2	2.3	5.5	5.1	82.2
Rmax	24	31	41	54	58	39	19	11	19	14	24	25	
EI_{30}	41	62	106	252	205	76	27	7	23	15	47	54	915

Table 21.8 Bustani ya wananchi

Station no.	Location	Altitude (m asl)	District
963912	6.10S,39.11E	5	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	52	43	129	288	217	76	55	36	64	76	148	92	1276
Rn	3.6	3.8	9.7	18.1	14.6	5.9	5.9	6.5	6.7	7.7	11.1	7.2	100.8
Rmax	29	26	39	44	43	26	25	16	24	25	35	50	
EI_{30}	44	33	88	189	144	52	33	8	36	43	96	76	842

Table 21.9 Mahonda MET

Station no.	Location	Altitude (m asl)	District
953929	5.59S,39.14E	NA	Zanzibar

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Rt	114	33	131	303	300	75	51	73	66	96	215	141	1598
Rn	5.8	3.5	12.5	19.5	17.5	8.6	8.4	11.0	6.8	11.0	14.9	11.0	130.5
Rmax	48	13	42	61	62	26	19	19	19	34	48	40	
EI_{30}	100	18	79	207	215	38	14	20	34	50	144	93	1012