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AGRO-CLIMATIC ZONES OF THE PARISH OF ST. MARY, JAMAICA

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MINISTRY OF AGRICULTURE
RURAL PHYSICAL PLANNING DIVISION
JAMAICA SOIL SURVEY PROJECT

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SUMMARY

Precipitation data recorded at 18 locations in the parish of Saint Mary, Jamaica, are statistically analyzed to characterize the variability of monthly and annual rainfall totals in space and time.

Median annual rainfall ranges from about 1500 mm in the coastal fringe near to the St. Ann border to over 3500 mm in the mountain range which borders on the parish of Portland. The Hills and Foothills, the major physiographic unit in St. Mary, receive median annual rainfall of 1800 to 2700 mm, the highest amounts occurring mainly along the southern border of the parish. Mean potential evapo-transpiration decreases from about 1600 mm/year in the coastal strip to about 1200 mm/year in the mountain range.

Along the major part of the coast line the main 75-percent dependable growing period (DGP) extends from October to February. In the central part of St. Mary, which mainly comprises hills and foothills, the main DGP extends from September to February. Often times there is also a short DGP from April to June in this section of the parish. In the south-eastern (Castleton area) and south-western (Guy's Hill area) section of St. Mary the main DGP extends from August to March and the short DGP from April to July. There are two periods of low rainfall in July and March in the mountainous south-eastern extremity of the parish.

Mean daily air temperature ranges from about 26 to 19 degrees Celsius due to the marked range in elevation, which is from 0 to about 1200 m above mean sea level.

The observed pattern of monthly rainfall, potential evapo-transpiration and air temperature is depicted on an agro-climatic zones map at a scale of 1:250,000 which can be used for crop zoning.

Key words: agro-climatic zones, 75%-dependable growing period, Saint Mary, Jamaica

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1. INTRODUCTION

The climatic, topographical, soil and socio-economic conditions in a country determine to a great extent which crop assortment can be grown on a commercial basis. A good understanding of the relationships between the above factors forms the basis for sound agro-economic planning.

Jamaica disposes of good climatic data (JMS 1973). Yet this information has not always been used optimally to address important agricultural problems (e.g. IICA 1982). Staff members of the Rural Physical Planning Division (RPPD) therefore developed software allowing for agro-climatic zoning (SSU 1988c).

The agro-climatic conditions in the parish of Saint Mary are analyzed in this paper with a view to mapping zones of similar potential for crop production. Similar studies were prepared for the parishes of St. Catherine (SSU 1987), Clarendon (SSU 1988b) and Manchester (SSU 1989c). Upon completion of additional studies for the remaining parishes an agro-climatic zones map at a scale of 1:250,000 will be prepared for the island. This map can serve as the basis for regional crop zoning excercises using the Jamaica Geographical Information System (JAMGIS).

The soils of the parish of St. Mary were first studied by Vernon (1962). The present study was prepared within the wider operational framework of the compilation of a revised soil data base for parts of the parish by RPPD staff.

In Chapter 2 it is explained how the climatic data sets have been analyzed using the computerized Jamaica Physical Land Evaluation System. The third chapter defines the concepts of rainy season and dependable growing period. Results of the statistical analyses of monthly and annual rainfall totals are discussed in Chapter 4. Finally, the parish of St. Mary is divided into agro-climatic zones on the basis of the observed rainfall, potential evapo-transpiration and air temperature pattern (Chapter 5).

2. MATERIALS AND METHODS

2.1 Precipitation

According to the Jamaican Meteorological Service there are over 400 rainfall recording stations in the island of which at least 130 have continuous and good quality data for over 30 years (JMS 1973). The Rural Physical Planning Division obtained photocopies of 23 manuscript records of monthly precipitation recorded in St. Mary between 1951 and 1980. These records include good data sets with at least 20 years of continuous observations for 17 stations, viz.: Agualta Vale, Annotto Bay, Brainerd, Carron Hall, Castleton, Dover, Enfield, Fort Stewart, Gray's Inn, Guy's Hill, Hampstead, Iter Boreale, Lucky Hill, Orange River, Port Maria, Richmond Prison Farm and Wey Hill. Monthly rainfall data for Oracabessa cover the period 1931-1977 (JMS 1987 and 1988). The location of the above rainfall recording stations is shown in Figure 1.

Unfortunately, the 1951-1980 data base set does not include any stations in the mountains bordering the parish of Portland and the coastal strip near the St. Ann border. Rainfall statistics for selected stations in St. Ann (Ocho Rios and Moneague), St. Catherine (Glengoffe and Riversdale), St. Andrew (Stony Hill) and Portland (Buff Bay, Cedar Valley and Balcarres) have been used when compiling the agro-climatic zones map in Chapter 5.

Prior to entering monthly rainfall data into the computer the author checked the records for possible inconsistencies. Statistical analyses of rainfall series are carried out with the computerized Jamaica Physical Land Evaluation System (Batjes and Bouwman 1989). The procedure includes an algorithm for normalizing, i.e. smoothening originally skewed rainfall data series so as to permit the use of statistical tests based on the assumption of normality (SSU 1988c and 1989b).

2.2 Monthly potential evapo-transpiration

IICA (1983) developed linear regression functions which relate monthly potential evapo-transpiration, calculated according to Priestley-Taylor's formula (PET), with elevation above mean sea level. From the author's knowledge this is the only widely applicable method for calculating PET on an islandwide basis to date. Use of a different calculation procedure such as Penman and Hargreaves would have given somewhat different values for PET.

2.3 Air temperature

Monthly fluctuations in daily air temperature are calculated using linear regression functions of air temperature against elevation above mean sea level (see Appendix I). Mean air temperature decreases by about 0.5 degrees Celsius per 100 meter rise in elevation (SSU 1988a).

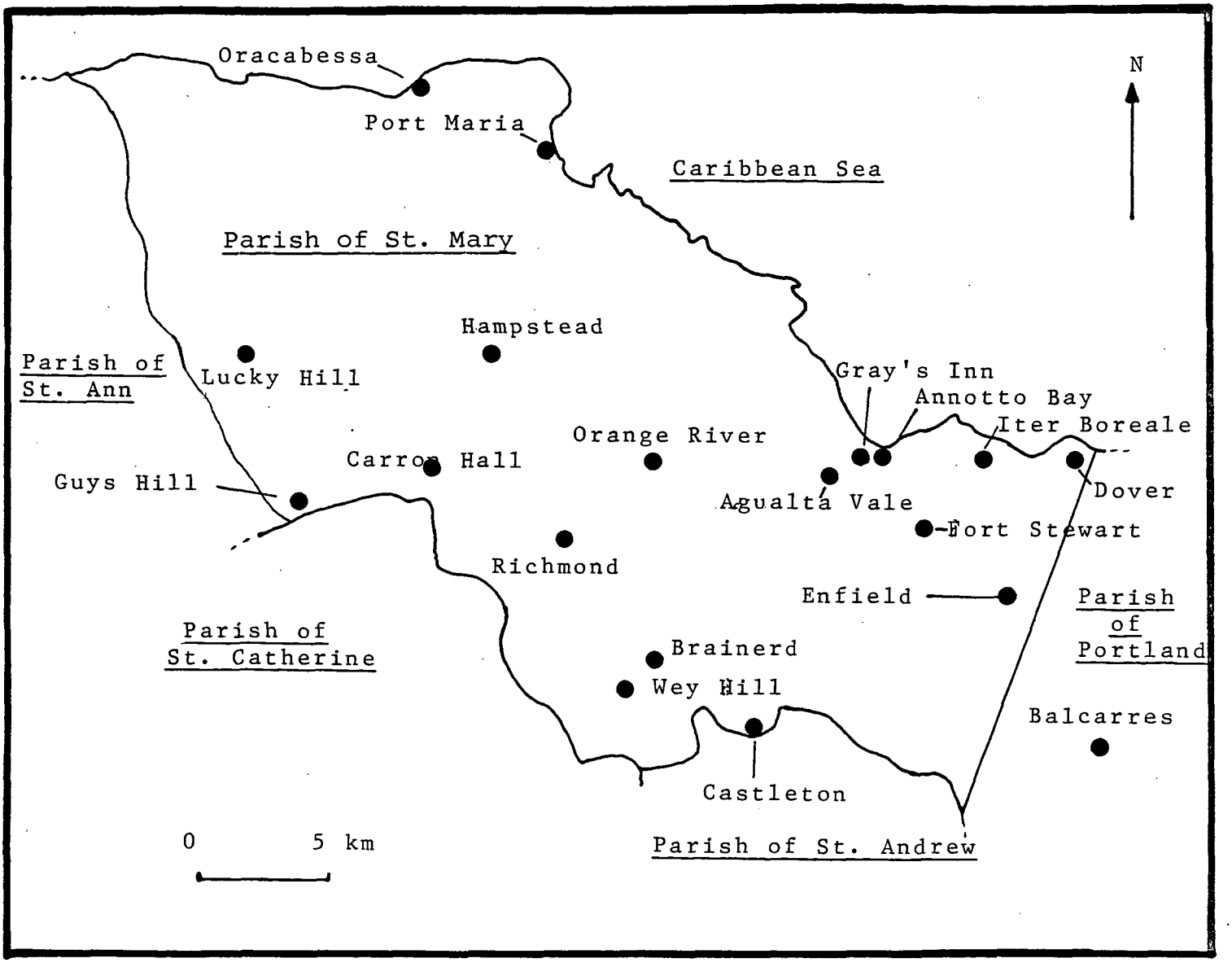


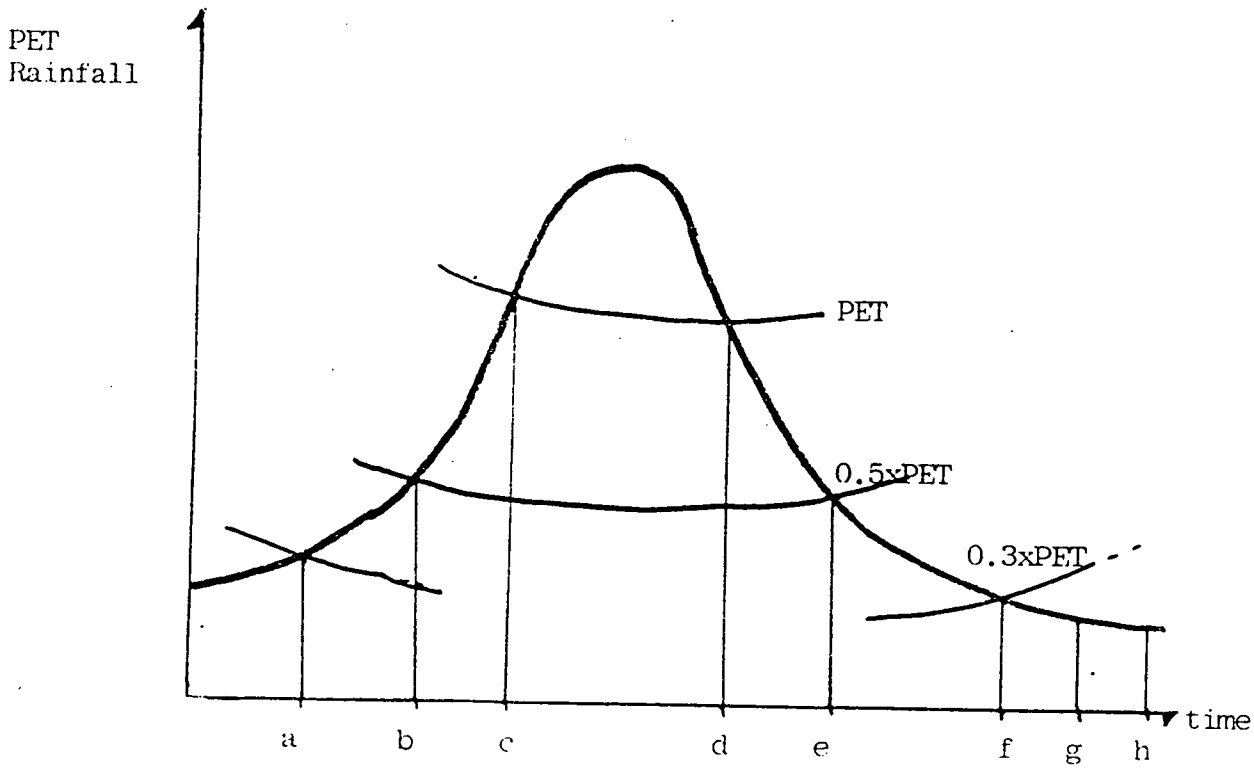
Figure 1. Location of selected rainfall stations in the parish of St. Mary, Jamaica.

3. RAINY SEASON AND GROWING PERIOD

Crop water requirements are related to an empirical crop coefficient, which varies with the crop's growing stage, relative humidity and wind speed, and potential evapo-transpiration (see FAO 1979).

Rainfed crops usually suffer severely from drought when monthly precipitation is less than 0.3xPET (e.g. Cochrane 1975). The minimum seasonal water requirement needed to ensure satisfactory, but not optimal production of upland crops under rainfed conditions is frequently set at 0.5xPET in agro-climatic studies (e.g. FAO 1981, IICA 1983, SSU 1988b). Water requirements of mature upland crops are fully covered when precipitation exceeds PET.

Taking the above into consideration a rainfall curve can be partitioned into phases that are of significance to the agronomist. This aspect is illustrated in Figure 2 using a hypothetical rainfall curve.



LEGEND:

af : rainy season
ab : field preparation
bc : sowing/planting (pre-humid phase)
cd : humid phase
de : post-humid phase
bg : growing period (low AWC)
bh : growing period (high AWC)

Figure 2. Schematic representation of the onset and length of the rainy season and growing period.

The rainy season is demarcated as the period in which precipitation surpasses 0.3xPET. After its onset rainfall gradually increases from 0.3 to 0.5xPET so that the surface soil will be sufficiently moistened to enable field preparation. Rainfall at this stage is generally low and erratically distributed. As a result it will be risky to plant crops even though their water requirements mostly range from 0.3 to 0.5xPET in the early stages of development (see FAO 1979).

Most crops can be safely planted during the pre-humid phase in which rainfall increases from 0.5xPET to 1xPET. Planting should be done in such a way that the period of maximum crop water use coincides with the period of maximum water availability, which corresponds with the humid period. Rainfall at that time exceeds PET so that there will be a rainfall surplus. Part of this excess will be lost from the soil-crop system as run-off and/or deep percolation and the remainder stored as soil moisture reserve. The "crop available fraction" of these reserves can be utilized by crops during dry spells which may occur during the post humid phase, the period in which precipitation decreases from 1.0 to 0.5xPET. Rainfall conditions during the post humid phase are suited for crop ripening (e.g. grains and pulses) and harvesting.

Crop growth is reduced when the water supply, the sum of rainfall and crop available soil moisture, drops below the equivalent of 0.5xPET. The period in which water supply exceeds 0.5xPET is considered to correspond with the growing period.

In a given "rainfall" zone the length of the growing period will vary with the topography, soil characteristics and management conditions. These variables determine to a great extent which percentage of the precipitation will be stored in the soil or lost as run off (see intervals "bg" and "bh" in Figure 2).

The above defined "pedo-climatic" growing-period is not the same as the growing season of a crop. The growing season corresponds with the time span needed by a particular crop to reach maturity under non-limiting conditions of climate, soils and management. Agro-climatic crop zoning studies thus can be based on the comparison of the crop's growing season requirements with the characteristics of the growing periods encountered in a given location.

The distribution of precipitation in space and time is highly variable throughout Jamaica. This implies that the concept of growing period, as defined earlier, can only be applied meaningfully if it is linked to a predefined probability of occurrence. It also means that mean or average rainfall is not a reliable index for either usefulness or risk in agro-economic analyses (see SSU 1986).

Internationally, the 75 percent level of exceedance of critical (minimum) amounts of precipitation is widely used in agro-climatic risk forecasting because it relates well to a acceptable risk for the small farmer (e.g. Cochrane 1975, FAO 1981, ICC

1986, IICA 1983). Consequently, soil survey staff (SSU 1988b) defined the dependable growing period (DGP) as the number of months (consecutive) in which:

a) Monthly precipitation exceeds 0.5xPET in 75 percent of the years.

b) Estimated soil moisture reserves allow for satisfactory crop growth and harvesting.

In view of the resolution level (monthly data), the maximum effective length of the period of soil water use towards the end of the growing period is arbitrarily set at 1 month when:

b1) 0.3xPET <= R75 < 0.5xPET in month i, and

b2) 0.5xPET <= R75 in the preceding month (i-1).

It is further assumed that the soils are deep and freely drained. The estimated period of soil water use is indicated with a "u" in Table 2.

c) A growing period is considered to be interrupted when a "u" is encountered.

d) Other climatic factors are not limiting for the specified crop (e.g. air temperature and photo-periodicity).

This general approach is only justified in regional studies of moisture availability at a scale of 1:250,000. More detailed studies should be based on soil-water budgetting models. Ideally, such models should consider 5-day or 10 day climatic data so that changes in seasonal water supply can be studied in relation to critical crop development stages (see SSU 1989a).

Islandwide studies of the above kind are not yet feasible in Jamaica because records of daily climatic data are mainly stored in manuscript form at the Meteorological Office. As such, they are not readily available for computerized processing (see also IICA 1982).

4. RESULTS AND DISCUSSION

4.1 Annual rainfall pattern

This section includes a description of the general rainfall pattern in the parish based on median rainfall (see R50 in Table 1). Appendix 1 provides additional information pertaining to the interannual variability of monthly rainfall totals at each location. The seasonal pattern or rainfall in St. Mary is strongly related to factors such as proximity to the Caribbean Sea, topography (i.e. rain shadow of mountains) and the effects of meteorological phenomena such as the inversion of the trade winds as well as micro-climatic effects and plurannual trends (see JMS 1973).

Table 1: Range in annual rainfall totals observed at 18 stations in St. Mary (mm/year) grouped in order of increasing R75/PET ratios.

Station	Min.	R90	R50	R10	Max.	R/PET	CV
Oracabessa	935	878	1691	2547	3139	0.80	36
Port Maria	838	1060	1607	2155	2488	0.83	24
Agualta Vale	1097	1024	1711	2397	2978	0.86	29
Iter Boreale	1176	1227	1674	2242	3097	0.90	23
Annotto Bay	996	1164	1774	2483	3230	0.91	28
Richmond P.F.	1151	1270	1812	2354	2420	1.00	21
Fort Stewart	1350	1345	1946	2745	3591	1.03	26
Orange River	1094	1241	1838	2436	2684	1.03	23
Hampstead	974	1221	1952	2682	3076	1.04	27
Gray's Inn	1444	1406	1977	2720	3593	1.05	25
Dover	1060	1351	2022	2767	3729	1.05	25
Lucky Hill	1291	1319	1960	2601	2749	1.10	23
Brainerd	1038	1348	1937	2526	2699	1.10	22
Carron Hall	1137	1358	1960	2563	2595	1.18	21
Wey Hill	924	1315	2254	3192	3410	1.20	29
Castleton	1548	1655	2456	3452	5186	1.33	30
Enfield	811	1523	2670	3817	4585	1.33	30
Guys Hill	1194	1449	2332	3214	4073	1.35	27

* R/PET is the abbreviation for R75/PET; see Appendix I for explanation of symbols; CV is coefficient of variation (%).

The variability of annual precipitation in space is high in the parish of St. Mary. Median rainfall gradually increases from 1500 to 1800 mm/year in the direction St. Ann border to Annotto Bay along the coastal strip. Median rainfall surpasses 2000 mm/year at Dover near the Portland border.

The Hills and Foothills which encompass the major part of the parish (see Vernon 1960) have median rainfall between 1800 and 2300 mm/year. The lowest values for median rainfall are recorded

near Orange River and Richmond in the central part of the parish and the highest in the Guy's Hill and Wey Hill-Castleton area along the southern border of the parish.

The mountains to the south-east of Castleton and Enfield mostly have median rainfall of 2400 to 2700 mm/year. Higher values are recorded in small areas in the south-eastern extremity of the parish near the Portland border. Median rainfall at Balcarres in Portland is 3819 mm/year, the recorded extremes for the period under review being 1745 and 7345 mm/year respectively (see Appendix I).

The highly variable nature of annual rainfall in time at a particular location is clear from Table 1. At Enfield, for instance, precipitation ranged from 1523 to 3817 mm/year in 80 percent of the years while median rainfall (R50) amounted to 2670 mm/year. The extremes recorded for annual rainfall during the period of time under review (1951-1980) are 811 and 4585 mm/year respectively. Relatively dry and wet years alternate in an unpredictable sequence.

4.2 Dependable growing period

The rainfall pattern is bimodal thoughout St. Mary, with peaks mainly centered around May and November. There are clear regional differences in the distribution of monthly rainfall over the year. The general pattern is discussed below (Table 2).

The 75%-dependable growing period (DGP) starts in October in the coastal fringe. It extends to February near the St. Ann border and to March near the Portland border. In the major part of the considered zone a period of low rainfall (p) occurs from April to May, but at Iter Boreale there is a short DGP at that time of the year. The driest periods are centered around the months of April and June.

In the northern part of the Hills and Foothills the main DGP mostly extends from September to February. There is also a short DGP from April to June in that region. In the Guy's Hill and Castleton-Wey Hill area, however, the main DGP extends from August to March and the short DGP from April to July. Periods of low rainfall are likely to occur mainly around March and July.

In the south-eastern mountainous extremity of the parish the main DGP extends from August to March and the short DGP from April to June. There is an ill defined period of low rainfall around July and March in most years.

Table 2: Time of occurrence and duration of the 75% Dependable Growing Period(s) at 18 stations in St. Mary.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Oracabessa	M	u	-	-	p	-	p	p	M	M	H	H
Port Maria	M	u	-	p	p	-	p	p	p	M	H	H
Agualta Vale	M	M	u	p	p	-	-	p	M	M	H	H
Annotto Bay	M	M	u	p	p	-	-	p	p	M	H	H
Iter Boreale	H	M	u	M	u	-	-	p	p	M	H	H
Richmond P.F.	H	M	-	p	p	p	-	p	M	M	H	H
Fort Stewart	H	M	u	M	-	-	-	p	p	M	H	H
Orange River	H	M	u	M	M	u	-	M	M	M	H	H
Hampstead	H	M	M	M	M	u	-	p	p	M	H	H
Gray's Inn	H	M	u	p	p	-	-	-	p	M	H	H
Dover	H	M	u	p	p	p	p	p	p	M	H	H
Lucky Hill	H	M	u	M	M	u	-	p	M	H	H	H
Brainerd	M	u	-	M	M	M	u	M	M	H	H	H
Carron Hall	H	M	u	M	M	M	-	p	M	H	H	H
Wey Hill	M	u	p	M	H	M	u	M	H	H	H	H
Castleton	M	u	-	M	H	M	u	H	H	H	H	H
Enfield	H	M	M	M	u	p	-	p	M	H	H	H
Guys Hill	H	M	u	M	M	M	u	M	M	H	H	H

-: month in which R75<0.3xPET ("dry" in > 25% of the years)
p: month in which 0.3<=R75/PET<0.5 (field preparation possible)
M: month in which 0.5 <= R75/PET< 1.0 (sowing/planting or harvesting recommended)
H: month in which 1.0 <= R75/PET (period of water surplus)
u: utilization of "last" rains plus stored soil moisture

Appendix I includes analyses of rainfall in which monthly periods within a specific year are considered as independent events. Generally, the agronomist also requires an insight with regard to the rainfall total (cumulative) that can be expected during the dependable growing period and the probability of occurrence of having either a "dry" or a "very wet" month (Table 4 and 5).

Median rainfall for the main dependable growing period ranges from 875 mm (Port Maria, 5 months) to 2481 mm (Enfield, 9 months) at the stations under review. The R75/PET ratios for the main dependable growing period range from 1.20 to 1.79 (Table 3). These "rainfall" conditions generally permit production of a wide range of climatically adapted crops under rainfed conditions unless soil and management conditions are limiting (see e.g. Booker 1984).

Table 3: Range in rainfall totals recorded during the main 75%-dependable growing period at 18 locations in St. Mary.

Station	75%-DGP	N	PET	Min	R90	R75	R50	R25	R10	Max	R/PET
Oracabessa	Sept-Feb	20	677	657	618	799	1012	1245	1479	1901	1.17
Port Maria	Oct-Feb	26	553	367	509	678	875	1086	1294	1868	1.22
Agualta Vale	Sep-Mar	25	815	512	743	986	1261	1549	1826	2529	1.20
Iter Boreale	Oct-Mar	24	693	647	713	878	1090	1340	1611	2534	1.26
Annotto Bay	Oct-Mar	26	695	604	730	903	1124	1385	1670	2596	1.29
Richmond P.F	Sep-Feb	21	658	690	813	983	1167	1351	1521	1652	1.49
Fort Stewart	Oct-Mar	16	683	539	740	1047	1384	1730	2062	2731	1.53
Orange River	Aug-Mar	28	903	612	937	1157	1397	1637	1858	2063	1.28
Hampstead	Oct-June	24	1081	993	1134	1423	1735	2047	2335	2981	1.31
Gray's Inn	Oct-Mar	27	695	892	966	1126	1325	1551	1784	2734	1.62
Dover	Oct-Mar	24	692	760	849	1045	1257	1470	1666	1698	1.51
Lucky Hill	Sep-Mar	18	765	730	860	1085	1326	1567	1791	2229	1.41
Brainerd	Aug-Feb	25	733	637	871	1057	1258	1459	1646	1782	1.36
Carron Hall	Sep-Mar	20	723	806	874	1115	1374	1632	1873	2087	1.54
Wey Hill	Aug-Feb	15	773	671	905	1191	1496	1801	2087	2342	1.54
Castleton	Aug-Feb	17	793	912	1038	1357	1696	2034	2353	2903	1.71
Enfield	Sep-May	19	1102	1185	1503	1975	2481	2987	3549	3945	1.79
Guys Hill	Aug-Mar	24	849	814	1003	1285	1588	1892	2173	2444	1.51

* R/PET is the abbreviation for R75/PET

4.3 Probability of occurrence of "dry" months

A "dry" month is defined as receiving less than 0.3xPET mm. The actual probability of a having a "dry" month is shown in Table 4 which indicates that clear regional differences occur.

Table 4. Probability of receiving less than 0.3xPET mm of rainfall per month (dry month) at 18 locations in St. Mary.

Station	J	F	M	A	M	J	J	A	S	O	N	D
Oracabessa	7	10	30	26	19	34	12	23	9	4	5	2
Port Maria	8	14	26	29	30	26	15	15	15	2	1	4
Agualta Vale	2	5	25	22	22	37	46	32	14	4	2	2
Annotto Bay	8	5	25	26	25	35	36	25	9	8	0	4
Iter Boreale	2	5	36	12	19	32	17	22	24	8	1	5
Richmond P.F.	2	12	26	20	16	9	42	25	1	0	1	0
Fort Stewart	1	1	17	6	33	45	35	15	15	15	0	6
Orange River	4	4	34	11	7	14	38	7	4	1	1	1
Hampstead	2	2	16	16	9	34	39	9	13	2	0	2
Gray's Inn	1	2	25	19	23	39	32	26	8	4	1	1
Dover	1	8	21	20	24	24	16	24	16	5	1	1
Lucky Hill	1	8	19	8	4	20	48	16	8	2	1	1
Brainerd	1	18	28	12	4	11	21	5	5	1	1	5
Carron Hall	1	1	28	10	2	11	45	19	6	1	0	0
Wey Hill	1	24	32	10	1	9	8	2	4	1	1	10
Castleton	1	31	42	10	0	9	19	2	1	0	1	1
Enfield	1	2	10	6	15	19	30	26	0	1	6	5
Guys Hill	2	9	24	12	5	5	16	5	1	2	1	1

Note: probabilities calculated using non-transformed data series. [See also Table 2 in Appendix I].

4.4 Probability of occurrence of "very wet" months

So far water deficits have been named as the only possible source of yield reduction. An excess of precipitation, however, can also lead to decreased yields resulting e.g. from water logging, flooding, and poor conditions for pollination and ripening. Appendix I includes tables showing the probability of rainfall exceeding preselected monthly totals. These data can be interpreted for agronomic purposes on the basis of the following general statements.

According to ILACO (1981) nearly all annual crops require periods of reduced rainfall during sowing and harvesting and moderate rain (100-250 mm/month) during growth and flowering. ILACO further considers that more than 3 consecutive months with over 300 mm of precipitation is poorly suited for cropping, except for rice (with reduced yields), cassava and yams. For this reason, it is often recommended to sow rainfed upland crops at the end of such high rainfall periods (see H in Table 2) provided total rainfall and/or soil moisture reserves remain at a satisfactory level in the following months.

The probability of monthly rainfall exceeding 300 mm/month at the 18 locations under study are summarized in Table 5. Marked differences occur again between the coastal strip, the Hills and Foothills and the mountain range.

Table 5. Probability of surpassing 300 mm of rainfall per month at 18 locations in St. Mary.

Station	J	F	M	A	M	J	J	A	S	O	N	D
Oracabessa	12	3	9	3	10	3	3	0	3	10	37	13
Port Maria	6	3	0	7	17	3	0	0	0	10	28	29
Agualta Vale	3	6	6	6	13	0	0	0	3	6	35	51
Iter Boreale	7	3	0	7	10	0	3	3	6	10	29	37
Annotto Bay	10	3	6	13	17	3	0	0	3	10	34	46
Richmond P.F.	11	0	8	0	8	3	0	0	0	16	30	36
Fort Stewart	26	5	10	10	10	0	0	0	5	5	31	57
Orange River	13	3	10	6	3	0	0	0	3	17	31	37
Hampstead	22	0	3	18	18	0	0	3	7	15	36	50
Gray's Inn	20	6	10	10	13	0	0	0	3	13	31	64
Dover	17	14	14	3	14	3	0	0	0	15	38	53
Lucky Hill	15	0	0	12	12	8	0	8	8	23	39	25
Brainerd	3	0	0	7	21	10	0	3	10	24	32	32
Carron Hall	34	0	8	17	13	4	0	4	0	17	34	28
Wey Hill	8	4	0	22	25	8	4	17	16	45	38	30
Castleton	13	13	4	29	24	4	4	18	22	54	37	43
Enfield	45	20	17	18	17	0	0	4	4	27	61	80
Guys Hill	13	17	7	7	22	11	0	7	17	37	35	19

Note: probabilities calculated using non-transformed data series. [For additional information see Table 2 in Appendix I]

5. AGRO-CLIMATIC ZONES

5.1 Class defining criteria

The climate of St. Mary is marked by its seasonal and spatial variability and to a lesser degree by recurring plurannual trends and micro-climatic effects. Agro-climatic delineations based on rainfall, PET and air temperature consequently always are somewhat arbitrary, each zone showing a gradual change to the adjoining one. Figure 3 was prepared using the revised rating system (see SSU 1989c).

For practical reasons, the legend and map are presented on separate pages at the end of this chapter. Due to technical constraints it was not possible to superimpose the agro-climatic zones onto a subdued topographical base map. It is recommended that the user photocopies Figure 3 or draws a copy of it on transparent paper after which it can be overlaid on a base map at scale 1:250,000.

<u>The first entry</u>: moisture availability zones

The first entry which is based on the range in annual R75/PET ratios divides the parish into zones of similar moisture availability conditions. Considering the fact that only limited areas of natural vegetation remain in Jamaica, it is not feasible to correlate specific ranges in R75/PET ratios with occurring changes in natural vegetation cover. It is for this reason that the selection of boundaries for the moisture availability zones is mainly based on "crop-moisture" relationships discussed in FAO (1979) and ILACO (1981). Cochrane (1975) in a study of the lowlands of Colombia advocated the use of 0.66 as an approximate measure for moisture sufficiency levels. This type of regional refinments can only be made on the basis of agricultural research. It is for this reason that somewhat arbitrary values of R75/PET have been used when demarcating the respective moisture availability zones, viz.:

- the "intermediate" zone (I: 0.50<= R75/PET <1.00)
- the "wet" zone (W: 1.00<= R75/PET <1.50)
- the "very wet" zone (V: 1.50<= R75/PET)

The "intermediate" moisture availability zone has a marked period of water deficit at some time of the year but a wide range of climatically adapted crops will produce well under rainfed conditions. Particularly, in those locations where the annual R75/PET ratio exceeds 0.75.

There is a net moisture surplus in the "wet" zone in at least 75 percent of the years, but there are short periods of water deficits. The "wet" zone is demarcated by R75/PET ratios of 1.0 and 1.5. The latter value forms the lower boundary condition for demarcating the "very wet" zone. The "very wet" zome is an area

of continuous, high rainfall throughout the year. As such it is clearly different from the "wet" zone in terms of overall "crop suitability". The "very wet" zone is mainly suited for crops that do not require a clear dry period to ensure good growth and harvesting.

Second entry: dependable growing period

The R75/PET ratio provides a rough insight with regard to the overall moisture availability throughout the year. It cannot provide any information about the global distribution of rainfall over the year. This type of information, however, is of critical importance to the agronomist.

The distribution of the dependable growing period(s) over the year is described at the second level in the map unit code (see p.16). It should be noted that 1) the agronomic meaning of the roman numerals (e.g. I1a) varies with the nature of the moisture availability zone and 2) other descriptions may be needed for second level entries in the other parishes (see e.g. SSU 1989c).

Boundaries for the moisture availability zones are interpolated from "rainfall" statistics (Tables 1 and 2) and topographical features (Survey Department 1972). The boundaries are most accurate in those areas were the intensity of observations is highest (see Figure 1). Cross border correlation to the surrounding parishes is based on rainfall statictics for the stations listed in section 2.1.

Third entry:

Air temperature is the third main climatic factor, after rainfall and PET, that determines crop productivity. The thermal zone is visualized at the third level in the map unit code (e.g. I1a).

Temperature zones were plotted on the basis of the 1000 feet contour lines shown on the 1:250,000 topographical map of Jamaica (Survey Department 1972) using linear regression (SSU 1988a). These intervals correlate well with the temperature requirements of the major crops grown in Jamaica.

5.2 Possible applications

Figure 3 may serve as the basis for regional crop zoning studies in St. Mary. First, the agro-climatic requirements of the pertinent crop have to be determined. For instance through a search of literature (e.g. Booker 1984, ILACO 1981, Royes and Barnes 1988) or from local experience. Subsequently, these requirements are matched with the agro-climatic conditions with a view to demarcating zones of similar agro-climatic suitability

for the crop under consideration.

The data base developed within the framework of this study can be used at a later date to determine the agro-ecological suitability of the soils of St. Mary for selected land utilization types using the computerized Jamaica Physical Land Evaluation System.

Agro-climatic studies of the present type may form the basis for the mapping of agro-climatic zones for the island. This information can subsequently be used for agro-ecological zoning studies using the Jamaica Geographical Information System.

LEGEND TO THE AGRO-CLIMATIC ZONES MAP OF THE PARISH OF SAINT MARY
(scale 1:250,000)

I: Intermediate moisture availability zone

I2: 0.75<=R75/PET<1.00

I2a: intermediate with the main dependable growing period from October to February, the short rainy season from April to May, and the main dry period centered around June; Tmean about 24-26 degrees Celsius.

W: Wet moisture availability zone

W1: 1.00<=R75/PET<1.25

W1a: wet with the main dependable growing period from September to February and the short dependable growing period mainly from April to June; Tmean about 24-26 degrees Celsius.

W1b: as above, but Tmean about 22-24 degrees Celsius.

W1c: as above, but Tmean about 20-22 degrees Celsius.

W2: 1.25<=R75/PET<1.50

W2a: wet with the main dependable growing period from August to February and a short dependable growing period from April to July; Tmean about 24-26 degrees Celsius.

W2b: as above, but Tmean about 22-24 degrees Celsius.

W2c: as above, but Tmean about 20-22 degrees Celsius.

V: very wet moisture availability zone

V1: 1.50 <= R75/PET < 2.50

V1d: very wet with the main dependable growing period from August to March, the short period dependable growing period from April to June, and a period of lower rainfall centered around July; Tmean about 17-20 degrees Celsius.

Key to thermal codes (degrees C)

Code	a	b	c	d	e
Tmin.	19-22	17-19	16-17	13-16	9-13
Tmean	24-26	22-24	20-22	17-20	13-17
Tmax.	29-32	27-29	25-27	22-25	18-22
Alt.(x100m)	0-3	3-6	6-9	9-15	>15

* Alt. is the approximate range in elevation.

Range in median rainfall (R50) recorded at the rainfall recording stations under study (mm/year).

Zone	N	R50 +- SD	CV
I2	5	1691 +- 60	3.6%
W1	10	1966 +- 119	6.1%
W2	3	2486 +- 171	6.8%
V1	-	>3000	-

* SD is the standard deviation.
CV is the coefficient of variation.

Note: R75 is the 75% dependable rainfall. Potential evapo-transpiration (PET) is calculated according to Priestley and Taylor.

[--> Turn to next page for agro-climatic zones map]

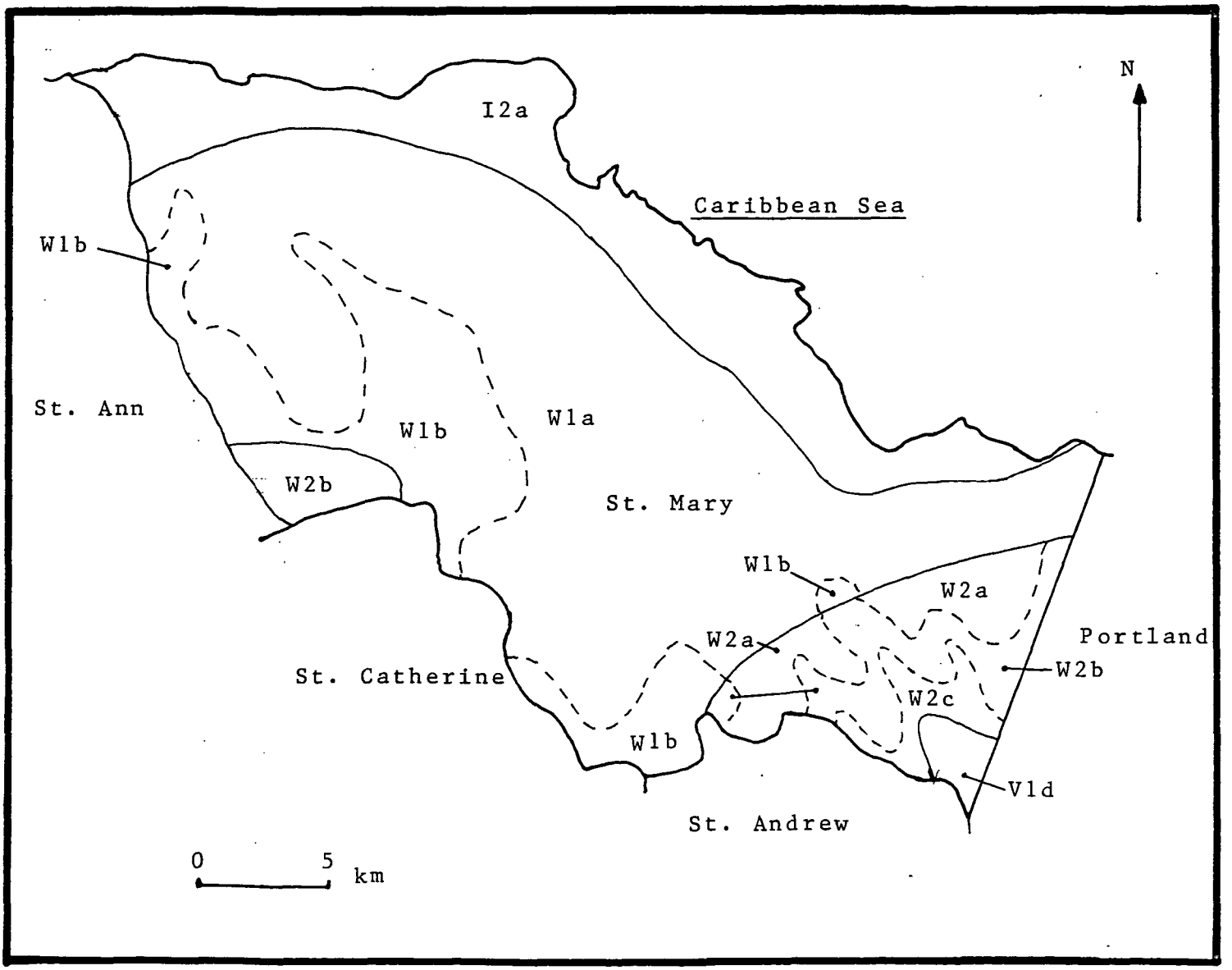


Figure 3: Agro-climatic zones map for the parish of St. Mary.
(See preceding page for legend)

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APPENDIX I

Agro-climatic profiles for 18 locations in the parish of St. Mary, Jamaica.

Rainfall recording stations are listed in alphabetical order in this appendix:

- Agualta Vale
- Annotto Bay
- Balcarres (Portland)
- Brainerd
- Carron Hall
- Castleton
- Dover
- Enfield
- Fort Stewart
- Gray's Inn
- Guy's Hill
- Hampstead
- Iter Boreale
- Lucky Hill
- Oracabessa
- Orange River
- Port Maria
- Richmond Prison Farm
- Wey Hill

Information on the following variables is presented for each station:

N: the sample size -number of records- for each month or year.

Mean: the arithmetic mean for month-i or the year.

CV: the coefficient of variation is a measure for the variability of total rainfall in the period under study in time.

Minim.: lowest total amount of monthly rainfall recorded during the period under review.

R90: the amount of rainfall that will be reached or exceeded in 90 percent of the years.

R75: as above, but this amount will be reached or exceeded in 75% of the years (synonym: dependable rainfall).

R50: as above, but this amount will be reached or exceeded in 50 percent of the years (median).

R25: as above, but this amount will be reached or exceeded in 25 percent of the years.

R10: as above, but this amount will be reached or exceeded in 10 percent of the years.

Maxim.: highest amount of total rainfall recorded during the period under review.

R90 to R10: corresponds with the range in precipitation observed during the specified time period in 80 percent of the years.

PET: Potential evapo-transpiration - Priestley and Taylor's - calculated with linear regression against elevation (IICA 1983).

DGP-75%: the dependable growing period at the 75 percent level of statistical confidence (see also Table 2, p.9).

Precipitation and PET are expressed in mm/month respectively mm/year [1 inch = 25.4 mm].

Tmin., Tmean and Tmax.: Air temperature is calculated with linear regression and expressed in degrees Celsius (SSU 1988b).
[deg F = 32 + 9/5xdeg C]

Agualta Vale

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Agualta Vale (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	30	29	30	29	29	30	29	29	30	29	28	27	25
Mean	161	142	105	124	144	85	60	74	113	166	262	292	1711
CV (%)	53	60	88	72	91	77	69	50	60	68	60	65	29
Minim.	46	28	10	17	28	9	0	19	17	21	33	38	1097
R90	44	25	15	10	27	2	4	23	32	50	56	44	1024
R75	100	81	43	60	58	38	31	48	64	89	149	155	1355
R50	161	142	89	121	113	83	60	74	107	147	257	286	1711
R25	222	203	152	185	196	129	89	101	156	223	371	423	2067
R10	278	259	224	246	304	174	116	126	204	310	478	554	2397
Maxim.	384	348	470	334	543	229	170	144	347	588	702	890	2978
PET	105	111	141	145	153	147	157	146	126	124	106	105	1566
R75/PET	0.95	0.73	0.30	0.41	0.37	0.26	0.19	0.32	0.51	0.71	1.40	1.48	0.86
DGP-75%	M	M	u	p	p	-	-	p	M	M	H	H	
Tmin	19.0	18.6	19.1	20.1	21.4	22.0	22.0	22.0	22.1	21.8	21.1	20.1	20.8
Tmean	23.8	23.8	24.1	25.0	25.9	26.5	26.8	27.1	26.7	26.5	25.8	24.8	25.6
Tmax	28.9	29.0	29.4	30.0	30.4	30.9	31.4	31.6	31.3	30.9	30.2	29.4	30.3

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Agualta Vale [in %; data base: 1951 - 1980 , elev.= 10 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	2	5	25	22	22	37	46	32	14	4	2	2
P(.3<=X<.5)	6	3	6	20	20	20	31	20	10	10	3	3
P(.5<=Xi<1)	26	44	53	27	24	23	20	48	40	31	10	18
P(1<=Xi)	66	48	16	31	34	20	3	0	36	55	85	77
P(2<=Xi)	40	24	6	6	13	0	0	0	3	10	53	62
P(R> 25mm)	100	100	76	89	100	80	79	82	93	96	100	100
P(R> 50mm)	93	93	76	75	75	63	55	68	83	93	96	96
P(R> 75mm)	76	75	66	58	62	43	24	48	70	86	96	81
P(R>100mm)	66	55	46	55	41	30	17	27	46	79	89	77
P(R>150mm)	46	34	16	27	34	20	3	0	23	48	64	74
P(R>200mm)	40	27	10	17	20	13	0	0	6	24	53	66
P(R>300mm)	3	6	6	6	13	0	0	0	3	6	35	51
P(R>400mm)	0	0	3	0	6	0	0	0	0	6	21	18
P(R>500mm)	0	0	0	0	3	0	0	0	0	3	7	11

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Annotto Bay

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Annotto Bay (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	29	28	29	29	29	29	28	29	28	29	29	28	28
Mean	167	145	109	138	141	98	71	81	113	165	270	298	1801
CV (%)	54	56	79	75	94	107	71	54	75	73	40	74	28
Minim.	27	31	9	11	31	4	4	11	18	13	112	29	996
R90	44	33	12	0	27	10	11	21	36	41	121	56	1164
R75	103	86	48	64	55	32	34	50	60	84	192	142	1443
R50	167	145	100	138	105	74	65	81	98	147	270	269	1774
R25	232	203	161	212	186	139	102	112	150	228	348	426	2132
R10	291	256	225	280	298	221	139	140	213	318	420	595	2483
Maxim.	379	301	380	374	472	532	244	168	481	642	558	1019	3230
PET	106	112	143	147	155	149	158	147	127	125	107	106	1581
R75/PET	0.97	0.77	0.33	0.43	0.35	0.21	0.21	0.33	0.47	0.66	1.79	1.34	0.91
DGP-75%	M	M	u	p	p	-	-	p	p	M	H	H	
Tmin	19.0	18.7	19.1	20.1	21.4	22.1	22.1	22.1	22.1	21.8	21.1	20.2	20.8
Tmean	23.9	23.8	24.1	25.0	25.9	26.5	26.8	27.1	26.7	26.5	25.9	24.9	25.6
Tmax	28.9	29.0	29.5	30.0	30.4	30.9	31.4	31.6	31.3	30.9	30.2	29.4	30.3

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Annotto Bay [in %; data base: 1951 - 1980 , elev.= 3 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	8	5	25	26	25	35	36	25	9	8	0	4
P(.3<=X<.5)	0	10	17	10	20	24	25	24	17	3	0	0
P(.5<=Xi<1)	27	32	27	27	31	24	32	41	42	31	0	14
P(1<=Xi)	65	53	31	37	24	17	7	10	32	58	100	82
P(2<=Xi)	37	25	6	13	17	3	0	0	3	10	68	57
P(R> 25mm)	100	100	82	93	100	82	82	93	96	96	100	100
P(R> 50mm)	93	89	72	75	75	62	64	68	85	93	100	96
P(R> 75mm)	82	75	51	65	58	41	42	51	71	86	100	89
P(R>100mm)	65	57	48	55	37	27	21	37	42	68	100	82
P(R>150mm)	51	39	31	34	24	17	7	6	14	41	86	71
P(R>200mm)	41	25	10	24	20	13	3	0	7	24	68	57
P(R>300mm)	10	3	6	13	17	3	0	0	3	10	34	46
P(R>400mm)	0	0	0	0	10	3	0	0	3	3	13	17
P(R>500mm)	0	0	0	0	0	3	0	0	0	3	3	14

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Balcarres (Port.)

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Balcarres (Port.) (in mm/month and degrees Celsius respectively) [data base: 1931 - 1968]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	37	38	36	35	37	37	38	35	35	37	36	37	29
Mean	336	251	187	288	360	120	112	158	193	401	734	656	3860
CV (%)	56	88	109	81	92	84	65	84	47	83	73	57	33
Minim.	73	26	19	0	47	0	18	17	50	25	53	43	1745
R90	92	44	26	0	77	0	26	31	69	97	124	150	2173
R75	203	103	64	121	155	49	60	69	128	184	358	393	2938
R50	331	205	137	278	289	120	105	131	193	330	680	656	3819
R25	464	351	254	446	487	190	157	219	258	540	1058	919	4743
R10	590	528	410	605	739	256	209	323	318	804	1446	1161	5625
Maxim.	912	1016	1084	815	1859	345	301	509	386	1477	2334	1858	7345
PET	101	106	134	138	146	142	151	141	122	120	102	101	1503
R75/PET	2.00	0.97	0.47	0.88	1.06	0.34	0.39	0.48	1.05	1.54	3.52	3.89	1.95
DGP-75%	H	M	u	M	H	u	p	p	H	H	H	H	
Tmin	18.0	17.6	18.0	19.0	20.3	21.0	20.9	21.0	21.0	20.7	20.1	19.1	19.8
Tmean	22.8	22.7	23.1	24.0	24.8	25.4	25.7	26.0	25.6	25.3	24.7	23.7	24.5
Tmax	27.7	27.8	28.3	29.0	29.3	29.8	30.3	30.5	30.2	29.7	29.0	28.2	29.2

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Balcarres (Port.) [in %; data base: 1931 - 1968 , elev.= 213 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	4	18	10	1	31	17	7	2	4	1	1
P(.3<=X<.5)	0	7	11	5	8	16	18	14	2	0	0	2
P(.5<=Xi<1)	2	21	27	14	16	21	44	48	25	2	2	0
P(1<=Xi)	97	68	44	71	75	32	21	31	71	94	97	97
P(2<=Xi)	62	50	19	40	40	10	0	17	31	59	88	91
P(R> 25mm)	100	100	97	91	100	86	94	94	100	97	100	100
P(R> 50mm)	100	89	80	88	97	62	78	88	100	97	100	97
P(R> 75mm)	97	86	72	82	91	54	65	77	91	97	97	97
P(R>100mm)	97	68	50	74	89	45	50	51	77	97	97	97
P(R>150mm)	86	63	41	68	75	29	21	31	65	89	94	94
P(R>200mm)	64	50	25	48	67	21	13	22	45	72	88	91
P(R>300mm)	48	26	19	34	40	10	2	17	17	48	83	78
P(R>400mm)	37	13	13	31	29	0	0	8	0	37	69	72
P(R>500mm)	18	13	5	22	18	0	0	2	0	21	55	70

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Brainerd

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Brainerd (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	27	29	27	28	28	30	30	29	30	29	28	28	24
Mean	148	88	89	155	230	181	101	154	195	230	229	233	1937
CV (%)	61	76	81	73	54	67	49	43	55	56	43	75	22
Minim.	50	15	0	11	0	0	15	41	27	76	84	12	1038
R90	40	12	2	17	71	38	33	62	70	81	92	51	1348
R75	84	41	36	73	140	94	65	106	119	140	157	112	1631
R50	140	81	83	147	223	169	101	154	184	217	229	205	1937
R25	205	129	136	229	313	257	136	202	260	308	300	327	2242
R10	271	178	190	309	400	346	169	246	338	402	365	463	2526
Maxim.	432	240	295	522	587	579	187	327	622	595	414	822	2699
PET	99	103	131	134	142	139	148	138	120	117	99	99	1470
R75/PET	0.84	0.39	0.27	0.54	0.98	0.67	0.44	0.76	0.99	1.19	1.58	1.13	1.10
DGP-75%	M	u	-	M	M	M	u	M	M	H	H	H	
Tmin	17.6	17.1	17.6	18.5	19.9	20.5	20.5	20.5	20.5	20.2	19.6	18.6	19.3
Tmean	22.3	22.2	22.6	23.5	24.3	24.9	25.2	25.5	25.1	24.8	24.1	23.2	24.0
Tmax	27.1	27.3	27.8	28.5	28.8	29.3	29.8	30.1	29.7	29.2	28.5	27.7	28.7

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Brainerd [in %; data base: 1951 - 1980 , elev.= 304 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	18	28	12	4	11	21	5	5	1	1	5
P(.3<=X<.5)	3	17	25	17	0	3	16	10	3	0	0	0
P(.5<=Xi<1)	37	34	22	21	14	30	43	27	16	20	7	17
P(1<=Xi)	59	31	25	50	82	56	20	58	76	79	92	78
P(2<=Xi)	33	10	3	14	21	10	0	3	23	41	50	42
P(R> 25mm)	100	82	77	92	96	96	96	100	100	100	100	96
P(R> 50mm)	96	65	70	78	96	90	80	93	93	100	100	96
P(R> 75mm)	74	41	44	71	96	86	63	86	93	100	100	92
P(R>100mm)	59	31	37	64	85	80	46	86	93	86	92	78
P(R>150mm)	40	20	18	42	75	56	20	41	66	72	75	57
P(R>200mm)	33	10	7	28	64	33	0	31	43	51	46	42
P(R>300mm)	3	0	0	7	21	10	0	3	10	24	32	32
P(R>400mm)	3	0	0	3	7	6	0	0	3	10	7	10
P(R>500mm)	0	0	0	3	7	6	0	0	3	6	0	7

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Carron Hall

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Carron Hall (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	23	23	23	23	23	22	23	23	23	23	23	21	20
Mean	237	134	119	146	190	141	61	108	124	214	292	239	1960
CV (%)	59	49	83	74	64	67	72	72	50	63	59	46	21
Minim.	64	35	11	0	44	22	10	0	0	48	103	96	1137
R90	82	42	3	0	38	23	7	16	38	65	107	95	1358
R75	140	86	48	68	102	72	29	51	79	119	173	159	1649
R50	220	134	111	146	182	135	58	100	124	196	267	235	1960
R25	318	181	183	224	270	204	90	157	168	291	386	315	2272
R10	424	226	255	296	357	273	121	216	210	395	521	394	2563
Maxim.	733	265	359	395	537	397	178	356	237	678	833	579	2595
PET	95	97	122	125	133	132	140	132	114	112	94	94	1390
R75/PET	1.47	0.88	0.39	0.54	0.76	0.54	0.20	0.38	0.68	1.06	1.84	1.69	1.18
DGP-75%	H	M	u	M	M	M	-	p	M	H	H	H	
Tmin	16.5	16.1	16.5	17.4	18.7	19.4	19.3	19.4	19.4	19.1	18.5	17.5	18.2
Tmean	21.2	21.0	21.5	22.4	23.2	23.7	24.1	24.4	24.0	23.6	22.9	21.9	22.8
Tmax	25.9	26.0	26.7	27.4	27.6	28.1	28.7	29.0	28.5	28.0	27.2	26.4	27.5

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Carron Hall [in %; data base: 1951 - 1980 , elev.= 518 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	1	28	10	2	11	45	19	6	1	0	0
P(.3<=X<.5)	0	8	8	13	17	13	17	13	4	4	0	0
P(.5<=Xi<1)	13	26	30	34	21	36	30	47	43	17	0	0
P(1<=Xi)	86	65	34	43	60	40	8	21	47	78	100	100
P(2<=Xi)	52	21	17	17	21	13	0	4	8	34	69	61
P(R> 25mm)	100	100	82	91	100	95	69	86	95	100	100	100
P(R> 50mm)	100	91	69	86	91	90	52	78	91	95	100	100
P(R> 75mm)	95	78	56	65	82	77	34	65	82	91	100	100
P(R>100mm)	86	65	47	43	73	50	17	56	52	86	100	95
P(R>150mm)	78	30	26	39	52	40	4	17	30	60	82	71
P(R>200mm)	47	21	21	30	39	27	0	13	17	47	56	61
P(R>300mm)	34	0	8	17	13	4	0	4	0	17	34	28
P(R>400mm)	4	0	0	0	8	0	0	0	0	8	21	4
P(R>500mm)	4	0	0	0	4	0	0	0	0	4	13	4

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Castleton

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Castleton (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	21	21	21	22	24	23	21	21	22	22	22	22	14
Mean	161	130	124	228	249	142	125	218	250	412	293	320	2514
CV (%)	72	93	116	61	56	49	101	50	39	68	59	51	34
Minim.	33	0	0	24	74	7	6	56	122	121	43	43	1584
R90	46	0	6	35	110	45	18	77	143	122	80	93	1535
R75	84	42	32	128	158	91	47	139	184	220	166	202	1925
R50	142	118	88	228	226	142	100	213	238	366	278	320	2420
R25	219	207	180	329	316	192	178	293	304	558	406	438	3011
R10	307	297	302	421	423	239	274	371	377	781	536	546	3671
Maxim.	600	402	664	601	711	274	633	521	600	1250	859	665	5186
PET	102	106	135	138	146	142	152	142	122	120	102	101	1509
R75/PET	0.82	0.39	0.23	0.92	1.07	0.64	0.31	0.98	1.50	1.82	1.62	1.99	1.27
DGP-75%	M	u	-	M	H	M	u	M	H	H	H	H	
Tmin	18.1	17.7	18.1	19.1	20.4	21.1	21.0	21.1	21.1	20.8	20.1	19.2	19.8
Tmean	22.9	22.8	23.1	24.0	24.9	25.5	25.8	26.1	25.7	25.4	24.7	23.8	24.5
Tmax	27.8	27.9	28.4	29.0	29.4	29.8	30.4	30.6	30.3	29.8	29.1	28.3	29.3

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Castleton [in %; data base: 1951 - 1980 , elev.= 198 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	35	40	10	1	10	20	2	1	0	1	1
P(.3<=X<.5)	14	0	4	9	0	4	9	4	0	0	9	4
P(.5<=Xi<1)	14	23	28	4	16	39	57	23	4	0	0	0
P(1<=Xi)	71	42	28	77	83	47	14	71	95	100	90	95
P(2<=Xi)	14	19	9	40	20	0	4	19	45	77	63	68
P(R> 25mm)	100	80	80	95	100	95	90	100	100	100	100	100
P(R> 50mm)	85	66	57	86	100	91	80	100	100	100	95	95
P(R> 75mm)	80	66	57	81	95	86	71	95	100	100	90	95
P(R>100mm)	71	47	47	77	95	65	47	90	100	100	90	95
P(R>150mm)	47	33	28	72	83	43	19	71	90	86	81	95
P(R>200mm)	14	19	19	50	54	26	9	52	72	77	63	68
P(R>300mm)	9	14	4	31	20	0	4	19	22	54	40	45
P(R>400mm)	4	4	4	4	12	0	4	9	4	36	18	27
P(R>500mm)	4	0	4	4	8	0	4	4	4	27	4	22

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Dover

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Dover (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	28	28	27	27	27	27	26	26	27	26	26	26	24
Mean	196	155	140	127	160	113	108	79	97	185	296	332	2041
CV (%)	50	59	78	69	93	74	58	56	53	77	58	65	25
Minim.	66	5	9	4	10	0	0	3	19	31	90	69	1060
R90	62	29	2	12	15	16	21	18	25	44	71	98	1351
R75	126	89	62	63	57	53	63	47	60	89	173	182	1664
R50	196	155	136	124	131	105	108	79	97	159	291	302	2022
R25	266	221	215	188	234	165	153	111	134	255	414	451	2399
R10	330	281	291	249	356	228	194	140	168	369	531	617	2767
Maxim.	377	354	406	382	581	391	257	158	209	688	716	1143	3729
PET	105	111	142	146	153	148	157	146	126	124	107	105	1571
R75/PET	1.19	0.80	0.43	0.43	0.37	0.35	0.39	0.32	0.47	0.71	1.62	1.73	1.05
DGP-75%	H	M	u	p	p	p	p	p	p	M	H	H	
Tmin	18.9	18.5	19.0	20.0	21.3	21.9	21.9	21.9	22.0	21.6	21.0	20.0	20.7
Tmean	23.7	23.7	24.0	24.9	25.7	26.4	26.7	27.0	26.6	26.4	25.7	24.7	25.4
Tmax	28.7	28.9	29.3	29.9	30.2	30.8	31.3	31.5	31.2	30.8	30.0	29.3	30.2

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Dover [in %; data base: 1951 - 1980 , elev.= 31 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	8	21	20	24	24	16	24	16	5	1	1
P(.3<=X<.5)	0	0	14	18	14	18	15	23	18	7	0	0
P(.5<=Xi<1)	21	35	25	25	29	33	50	42	33	23	7	7
P(1<=Xi)	78	57	40	37	33	25	19	11	33	65	92	92
P(2<=Xi)	39	21	14	3	14	3	0	0	0	19	57	65
P(R> 25mm)	100	92	88	88	92	96	88	84	96	100	100	100
P(R> 50mm)	100	92	81	81	74	74	84	73	81	92	100	100
P(R> 75mm)	85	82	62	59	62	59	73	53	55	76	100	96
P(R>100mm)	78	71	48	55	55	44	53	34	48	69	96	92
P(R>150mm)	57	39	40	29	33	25	19	7	14	53	76	80
P(R>200mm)	39	28	22	22	22	18	11	0	3	23	57	65
P(R>300mm)	17	14	14	3	14	3	0	0	0	15	38	53
P(R>400mm)	0	0	3	0	7	0	0	0	0	7	26	30
P(R>500mm)	0	0	0	0	7	0	0	0	0	3	15	15

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Enfield

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Enfield (in mm/month and degrees Celsius respectively) [data base: 1952 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	22	24	23	22	23	23	24	24	25	22	21	20	18
Mean	307	208	179	164	197	104	87	115	165	255	411	480	2670
CV (%)	68	74	76	73	93	59	70	85	38	69	55	56	30
Minim.	45	43	17	18	0	0	0	8	38	43	0	19	811
R90	47	52	29	18	18	18	3	12	77	67	94	98	1523
R75	155	102	82	78	69	59	44	47	119	133	246	282	2075
R50	293	180	161	156	160	104	87	101	165	230	411	480	2670
R25	447	285	259	243	289	149	131	170	211	353	576	678	3264
R10	599	410	367	330	441	190	172	247	254	490	728	863	3817
Maxim.	798	683	484	478	828	226	216	446	329	817	843	1128	4585
PET	104	110	140	144	152	146	156	145	125	123	105	104	1554
R75/PET	1.48	0.93	0.58	0.54	0.45	0.40	0.27	0.32	0.95	1.08	2.33	2.71	1.33
DGP-75%	H	M	M	M	u	p	-	p	M	H	H	H	
Tmin	18.7	18.3	18.7	19.7	21.0	21.7	21.7	21.7	21.7	21.4	20.8	19.8	20.5
Tmean	23.5	23.4	23.8	24.7	25.5	26.1	26.4	26.7	26.3	26.1	25.4	24.4	25.2
Tmax	28.5	28.6	29.1	29.7	30.0	30.5	31.0	31.2	30.9	30.5	29.8	29.0	29.9

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Enfield [in %; data base: 1952 - 1980 , elev.= 76 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	2	10	6	15	19	30	26	0	1	6	5
P(.3<=X<.5)	4	8	13	22	8	17	25	12	4	4	0	5
P(.5<=Xi<1)	9	20	30	27	30	43	25	37	20	9	4	0
P(1<=Xi)	86	70	47	45	47	21	20	25	76	86	90	90
P(2<=Xi)	59	37	17	22	17	0	0	4	8	36	85	85
P(R> 25mm)	100	100	95	95	91	91	75	87	100	100	95	95
P(R> 50mm)	95	95	91	95	82	78	70	70	96	95	95	90
P(R> 75mm)	90	91	78	63	78	65	50	62	96	90	90	90
P(R>100mm)	86	70	65	59	65	56	41	45	80	86	90	90
P(R>150mm)	77	58	43	40	47	21	25	25	60	72	90	85
P(R>200mm)	63	37	30	27	34	8	4	16	28	45	85	85
P(R>300mm)	45	20	17	18	17	0	0	4	4	27	61	80
P(R>400mm)	27	8	17	4	13	0	0	4	0	18	38	65
P(R>500mm)	13	8	0	0	4	0	0	0	0	13	28	40

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Fort Stewart

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Fort Stewart (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	19	19	19	19	19	20	20	20	20	20	19	19	15
Mean	237	165	126	212	149	74	64	90	106	181	277	363	1997
CV (%)	40	53	71	84	122	85	64	66	85	102	45	62	26
Minim.	70	57	27	18	3	0	0	0	10	25	112	5	1350
R90	103	42	24	32	11	0	6	7	21	38	102	43	1345
R75	168	101	61	89	39	27	34	47	47	74	187	198	1614
R50	237	165	114	181	100	68	64	90	90	138	277	363	1946
R25	306	229	180	306	208	115	94	133	149	241	368	529	2331
R10	370	288	250	451	364	162	121	173	222	385	452	683	2745
Maxim.	410	376	348	691	824	248	163	227	436	927	489	832	3591
PET	104	110	140	144	151	146	156	145	125	123	105	104	1553
R75/PET	1.61	0.92	0.43	0.62	0.25	0.18	0.21	0.32	0.37	0.60	1.77	1.90	1.03
DGP-75%	H	M	u	M	-	-	-	p	p	M	H	H	
Tmin	18.7	18.3	18.7	19.7	21.0	21.7	21.7	21.7	21.7	21.4	20.8	19.8	20.4
Tmean	23.5	23.4	23.7	24.7	25.5	26.1	26.4	26.7	26.3	26.1	25.4	24.4	25.2
Tmax	28.5	28.6	29.1	29.7	30.0	30.5	31.0	31.2	30.9	30.5	29.8	29.0	29.9

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Fort Stewart [in %; data base: 1951 - 1980 , elev.= 79 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	1	17	6	33	45	35	15	15	15	0	6
P(.3<=X<.5)	0	0	15	10	10	10	35	30	15	0	0	0
P(.5<=Xi<1)	5	31	42	21	31	35	25	40	40	30	0	10
P(1<=Xi)	94	68	26	63	26	10	5	15	30	55	100	84
P(2<=Xi)	57	31	10	10	10	0	0	0	5	10	57	73
P(R> 25mm)	100	100	100	94	84	80	85	90	90	95	100	94
P(R> 50mm)	100	100	84	89	68	55	55	70	85	85	100	94
P(R> 75mm)	94	89	68	84	57	45	30	55	50	80	100	89
P(R>100mm)	94	68	57	68	52	30	15	30	35	70	100	84
P(R>150mm)	78	47	26	63	26	10	5	15	20	50	84	84
P(R>200mm)	57	31	15	42	26	5	0	5	10	30	68	73
P(R>300mm)	26	5	10	10	10	0	0	0	5	5	31	57
P(R>400mm)	5	0	0	10	5	0	0	0	5	5	31	42
P(R>500mm)	0	0	0	10	5	0	0	0	0	5	0	26

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Gray's Inn

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Gray's Inn (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	29	29	29	28	29	27	29	28	29	29	29	28	24
Mean	204	154	122	149	172	78	70	74	110	202	290	362	2025
CV (%)	52	61	84	75	101	78	65	66	67	82	47	51	25
Minim.	53	34	9	1	16	0	0	3	0	30	68	55	1444
R90	59	26	14	0	25	0	10	13	27	61	109	109	1406
R75	128	87	50	70	61	35	37	38	58	102	192	230	1662
R50	204	154	107	149	129	78	68	70	101	168	286	362	1977
R25	280	220	180	229	236	121	101	106	153	264	384	493	2339
R10	350	281	260	302	379	162	132	140	208	388	476	614	2720
Maxim.	453	398	422	453	850	230	180	202	398	927	626	832	3593
PET	106	112	143	147	154	149	158	147	127	125	107	106	1580
R75/PET	1.21	0.78	0.34	0.47	0.39	0.23	0.23	0.26	0.45	0.81	1.79	2.17	1.05
DGP-75%	H	M	u	p	p	-	-	-	p	M	H	H	
Tmin	19.0	18.7	19.1	20.1	21.4	22.1	22.0	22.1	22.1	21.8	21.1	20.2	20.8
Tmean	23.9	23.8	24.1	25.0	25.9	26.5	26.8	27.1	26.7	26.5	25.8	24.8	25.6
Tmax	28.9	29.0	29.5	30.0	30.4	30.9	31.4	31.6	31.3	30.9	30.2	29.4	30.3

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Gray's Inn [in %; data base: 1951 - 1980 , elev.= 7 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	2	25	19	23	39	32	26	8	4	1	1
P(.3<=X<.5)	0	6	10	10	6	14	34	35	17	3	0	0
P(.5<=Xi<1)	20	41	41	21	37	33	24	32	48	31	3	7
P(1<=Xi)	79	51	24	50	34	14	10	7	27	62	96	92
P(2<=Xi)	44	34	10	10	13	0	0	0	3	20	62	78
P(R> 25mm)	100	100	89	85	89	74	82	85	96	100	100	100
P(R> 50mm)	100	93	75	78	79	59	55	60	86	93	100	100
P(R> 75mm)	89	79	65	71	72	48	34	39	65	93	96	96
P(R>100mm)	82	55	48	60	62	33	17	21	44	82	96	92
P(R>150mm)	62	37	24	46	34	14	10	7	24	62	93	92
P(R>200mm)	48	34	17	25	31	3	0	3	6	34	72	82
P(R>300mm)	20	6	10	10	13	0	0	0	3	13	31	64
P(R>400mm)	6	0	3	3	6	0	0	0	0	6	27	25
P(R>500mm)	0	0	0	0	6	0	0	0	0	3	6	14

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Guys Hill

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Guys Hill (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	29	29	28	28	27	27	27	28	28	27	28	26	24
Mean	190	142	114	154	210	181	112	162	206	271	300	249	2332
CV (%)	54	85	83	67	59	60	60	55	77	51	53	39	27
Minim.	29	9	0	15	28	25	25	27	35	48	67	53	1194
R90	49	16	13	20	38	39	19	50	67	79	81	116	1449
R75	117	58	46	79	120	103	64	99	109	171	185	180	1874
R50	190	124	99	150	210	177	112	158	174	271	300	249	2332
R25	263	208	167	225	299	255	161	222	269	371	414	318	2790
R10	330	300	240	296	382	329	206	284	387	463	518	383	3214
Maxim.	423	467	411	470	508	456	274	414	883	699	725	522	4073
PET	94	97	121	123	132	131	139	131	114	111	93	93	1379
R75/PET	1.23	0.59	0.38	0.64	0.91	0.78	0.45	0.74	0.95	1.54	1.99	1.92	1.35
DGP-75%	H	M	u	M	M	M	u	M	M	H	H	H	
Tmin	16.3	15.9	16.3	17.3	18.6	19.2	19.2	19.2	19.2	19.0	18.3	17.3	18.0
Tmean	21.0	20.9	21.4	22.3	23.0	23.6	23.9	24.2	23.8	23.4	22.8	21.8	22.7
Tmax	25.7	25.8	26.5	27.2	27.5	27.9	28.5	28.9	28.4	27.8	27.0	26.2	27.4

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Guys Hill [in %; data base: 1951 - 1980 , elev.= 548 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	2	9	24	12	5	5	16	5	1	2	1	1
P(.3<=X<.5)	3	13	17	10	7	3	14	10	7	3	0	0
P(.5<=Xi<1)	13	37	17	28	22	33	37	28	14	18	7	3
P(1<=Xi)	82	41	42	50	66	59	33	57	78	77	92	96
P(2<=Xi)	37	24	7	17	29	22	0	14	25	66	71	76
P(R> 25mm)	100	96	89	92	100	100	100	100	100	100	100	100
P(R> 50mm)	96	79	71	85	92	96	85	96	92	96	100	100
P(R> 75mm)	93	58	57	71	88	85	70	82	92	96	96	96
P(R>100mm)	82	41	50	64	81	70	37	75	85	88	92	96
P(R>150mm)	58	34	25	46	62	55	33	50	60	77	78	84
P(R>200mm)	34	24	10	25	44	33	11	21	28	70	71	76
P(R>300mm)	13	17	7	7	22	11	0	7	17	37	35	19
P(R>400mm)	10	6	3	3	7	7	0	3	7	11	25	3
P(R>500mm)	0	0	0	0	3	0	0	0	3	3	10	3

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Hampstead

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Hampstead (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	27	27	27	27	27	27	27	27	26	26	25	26	25
Mean	204	129	119	162	184	99	65	100	123	202	293	308	1952
CV (%)	61	45	60	79	79	78	65	69	74	77	48	61	27
Minim.	39	50	0	8	17	6	3	23	18	47	90	50	974
R90	41	53	20	0	27	7	10	30	23	47	99	47	1221
R75	115	87	67	71	82	44	34	54	59	96	193	173	1573
R50	201	126	119	162	164	94	63	89	111	173	293	308	1952
R25	290	169	170	252	266	149	94	135	176	278	394	443	2330
R10	375	210	218	337	379	205	123	187	245	404	487	569	2682
Maxim.	547	290	309	446	548	285	167	354	325	584	589	793	3076
PET	101	106	134	137	145	142	151	141	122	119	101	101	1499
R75/PET	1.13	0.82	0.50	0.51	0.56	0.31	0.22	0.38	0.48	0.80	1.90	1.71	1.04
DGP-75%	H	M	M	M	M	u	-	p	p	M	H	H	
Tmin	17.9	17.6	18.0	18.9	20.3	20.9	20.9	20.9	20.9	20.6	20.0	19.0	19.7
Tmean	22.7	22.6	23.0	23.9	24.7	25.3	25.6	25.9	25.5	25.3	24.6	23.6	24.4
Tmax	27.6	27.7	28.3	28.9	29.2	29.7	30.3	30.5	30.1	29.7	28.9	28.1	29.1

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Hampstead [in %; data base: 1951 - 1980 , elev.= 225 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	2	2	16	16	9	34	39	9	13	2	0	2
P(.3<=X<.5)	3	3	7	22	18	11	29	33	11	7	0	7
P(.5<=Xi<1)	18	44	37	14	22	33	25	40	50	26	4	7
P(1<=Xi)	77	51	40	48	51	22	7	18	26	65	96	84
P(2<=Xi)	44	7	3	22	18	3	0	3	19	23	72	61
P(R> 25mm)	100	100	85	92	96	88	81	96	96	100	100	100
P(R> 50mm)	96	96	85	77	88	62	59	70	84	96	100	92
P(R> 75mm)	85	88	74	59	74	51	33	55	69	80	100	92
P(R>100mm)	77	62	59	51	70	40	14	44	42	69	96	84
P(R>150mm)	55	33	25	48	48	22	7	11	23	46	92	76
P(R>200mm)	44	14	11	37	29	18	0	7	19	34	72	61
P(R>300mm)	22	0	3	18	18	0	0	3	7	15	36	50
P(R>400mm)	11	0	0	3	11	0	0	0	0	15	28	26
P(R>500mm)	3	0	0	0	7	0	0	0	0	11	16	11

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Iter Boreale

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Iter Boreale (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	28	27	27	28	29	29	30	29	30	29	27	27	25
Mean	189	115	93	141	126	84	83	104	113	161	260	289	1708
CV (%)	45	62	72	62	82	77	79	73	81	69	52	69	23
Minim.	45	26	7	6	24	0	13	10	0	7	73	5	1176
R90	71	39	6	22	26	0	13	30	15	30	88	54	1227
R75	127	65	45	79	56	38	37	55	48	81	163	145	1428
R50	189	104	91	141	105	84	74	92	100	150	253	269	1674
R25	250	153	140	202	175	131	120	140	165	230	350	413	1952
R10	306	210	187	259	257	173	170	196	236	311	445	562	2242
Maxim.	350	314	295	333	448	238	324	438	395	551	577	1034	3097
PET	105	111	142	146	154	148	158	147	127	125	107	105	1577
R75/PET	1.20	0.58	0.31	0.53	0.36	0.25	0.23	0.37	0.37	0.64	1.52	1.37	0.90
DGP-75%	H	M	u	M	u	-	-	p	p	M	H	H	
Tmin	19.0	18.6	19.1	20.0	21.4	22.0	22.0	22.0	22.1	21.7	21.1	20.1	20.8
Tmean	23.8	23.8	24.1	25.0	25.8	26.4	26.7	27.1	26.7	26.4	25.8	24.8	25.5
Tmax	28.8	29.0	29.4	30.0	30.3	30.9	31.4	31.5	31.2	30.9	30.1	29.4	30.3

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Iter Boreale [in %; data base: 1951 - 1980 , elev.= 15 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	2	5	36	12	19	32	37	22	24	8	1	5
P(.3<=X<.5)	3	7	14	25	20	17	20	13	10	6	0	3
P(.5<=Xi<1)	17	59	25	17	37	27	33	48	30	24	7	11
P(1<=Xi)	78	29	25	46	24	24	10	17	36	62	92	81
P(2<=Xi)	42	14	3	7	10	0	3	3	6	17	51	62
P(R> 25mm)	100	100	85	96	93	79	80	96	93	93	100	96
P(R> 50mm)	96	92	62	82	79	55	60	79	70	89	100	92
P(R> 75mm)	89	74	51	64	65	51	46	62	60	79	96	92
P(R>100mm)	78	37	44	64	44	27	30	48	50	65	92	81
P(R>150mm)	60	22	18	46	24	20	10	17	30	44	77	77
P(R>200mm)	46	14	3	25	20	3	3	3	6	27	66	62
P(R>300mm)	7	3	0	7	10	0	3	3	6	10	29	37
P(R>400mm)	0	0	0	0	3	0	0	3	0	3	14	25
P(R>500mm)	0	0	0	0	0	0	0	0	0	3	11	7

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Lucky Hill

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Lucky Hill (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	26	25	23	25	25	25	25	25	25	26	23	24	20
Mean	175	109	110	154	171	122	64	121	149	220	294	250	1960
CV (%)	55	62	66	65	60	75	76	73	61	63	53	50	23
Minim.	59	18	9	7	41	11	3	14	0	46	68	76	1291
R90	41	20	22	16	30	16	8	13	29	47	77	104	1319
R75	106	60	57	82	98	56	29	57	83	121	181	161	1628
R50	175	107	103	154	171	113	59	115	146	212	294	236	1960
R25	244	157	156	225	244	179	94	178	212	312	407	325	2291
R10	309	204	211	292	311	249	131	242	275	411	511	420	2601
Maxim.	420	288	292	383	413	397	223	374	426	615	574	669	2749
PET	99	103	131	134	142	139	148	138	120	117	99	99	1469
R75/PET	1.06	0.58	0.43	0.61	0.68	0.40	0.19	0.41	0.69	1.02	1.82	1.62	1.10
DGP-75%	H	M	u	M	M	u	-	p	M	H	H	H	
Tmin	17.5	17.1	17.6	18.5	19.8	20.5	20.5	20.5	20.5	20.2	19.6	18.6	19.3
Tmean	22.3	22.2	22.6	23.5	24.3	24.9	25.2	25.5	25.1	24.8	24.1	23.1	24.0
Tmax	27.1	27.2	27.8	28.5	28.8	29.2	29.8	30.1	29.7	29.2	28.5	27.7	28.7

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Lucky Hill [in %; data base: 1951 - 1980 , elev.= 305 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	8	19	8	4	20	48	16	8	2	1	1
P(.3<=X<.5)	0	8	8	24	12	8	20	16	4	7	0	0
P(.5<=Xi<1)	26	40	47	16	36	40	28	36	28	15	8	4
P(1<=Xi)	73	44	26	52	48	32	4	32	60	76	91	95
P(2<=Xi)	34	12	8	20	16	8	0	8	12	38	69	58
P(R> 25mm)	100	92	91	96	100	92	76	88	92	100	100	100
P(R> 50mm)	100	84	82	84	88	76	52	76	88	92	100	100
P(R> 75mm)	84	64	65	68	84	64	32	68	84	84	91	100
P(R>100mm)	69	44	43	64	72	52	24	52	68	84	91	95
P(R>150mm)	53	24	17	48	48	32	4	32	48	57	78	79
P(R>200mm)	34	12	13	28	40	20	4	12	20	42	69	58
P(R>300mm)	15	0	0	12	12	8	0	8	8	23	39	25
P(R>400mm)	3	0	0	0	4	0	0	0	4	11	30	8
P(R>500mm)	0	0	0	0	0	0	0	0	0	3	13	4

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Oracabessa

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Oracabessa (in mm/month and degrees Celsius respectively) [data base: 1931 - 1977]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	31	33	31	29	28	28	29	28	29	30	29	29	23
Mean	161	121	100	92	160	94	112	106	113	184	244	224	1702
CV (%)	76	75	98	84	72	85	64	67	60	59	64	76	36
Minim.	18	23	0	0	15	3	17	25	5	28	14	33	935
R90	42	28	4	1	11	10	32	19	32	43	50	58	878
R75	80	59	32	35	77	37	62	56	65	107	132	111	1262
R50	139	107	83	86	156	82	104	102	107	181	234	194	1691
R25	219	168	152	143	240	138	154	153	156	258	346	306	2132
R10	313	237	229	200	319	200	206	203	205	331	456	437	2547
Maxim.	640	426	390	308	512	380	358	287	308	469	692	836	3139
PET	105	111	142	146	154	148	158	147	127	125	107	105	1577
R75/PET	0.75	0.53	0.22	0.24	0.49	0.25	0.39	0.37	0.51	0.85	1.22	1.05	0.80
DGP-75%	M	M	-	-	p	-	p	p	M	M	H	H	
Tmin	19.0	18.6	19.1	20.0	21.4	22.0	22.0	22.0	22.1	21.7	21.1	20.1	20.8
Tmean	23.8	23.8	24.1	25.0	25.8	26.4	26.7	27.1	26.7	26.4	25.8	24.8	25.5
Tmax	28.8	29.0	29.4	30.0	30.3	30.9	31.4	31.5	31.2	30.9	30.1	29.4	30.3

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Oracabessa [in %; data base: 1931 - 1977 , elev.= 15 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	7	10	30	26	19	34	12	23	9	4	5	2
P(.3<=X<.5)	0	15	29	27	14	17	37	21	6	6	3	6
P(.5<=Xi<1)	32	33	19	27	25	32	27	35	58	20	6	17
P(1<=Xi)	61	42	22	20	42	17	24	21	27	70	86	75
P(2<=Xi)	19	15	9	3	7	3	3	0	6	23	44	44
P(R> 25mm)	96	96	80	79	89	82	96	96	96	100	96	100
P(R> 50mm)	93	81	70	68	78	67	86	75	93	93	96	93
P(R> 75mm)	80	63	41	48	71	50	58	57	68	86	86	93
P(R>100mm)	64	45	32	34	64	39	44	42	37	83	86	75
P(R>150mm)	35	24	22	20	46	17	24	21	24	50	75	65
P(R>200mm)	22	18	9	10	32	7	10	14	10	33	51	44
P(R>300mm)	12	3	9	3	10	3	3	0	3	10	27	13
P(R>400mm)	3	3	0	0	3	0	0	0	0	6	13	10
P(R>500mm)	3	0	0	0	3	0	0	0	0	0	6	6

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Orange River

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Orange River (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	30	30	30	30	30	30	30	30	30	28	29	29	28
Mean	186	132	112	141	144	102	65	109	138	194	245	263	1838
CV (%)	52	63	96	70	70	65	61	46	61	68	61	50	23
Minim.	19	20	11	4	36	29	8	12	25	40	88	54	1094
R90	55	19	14	20	38	27	11	41	37	59	61	90	1241
R75	118	73	40	70	75	56	37	74	78	104	139	169	1526
R50	186	132	88	134	130	95	65	109	130	172	237	260	1838
R25	254	191	159	205	199	141	93	145	191	262	342	354	2151
R10	317	245	247	275	276	191	119	178	251	364	446	442	2436
Maxim.	392	323	478	413	499	278	157	228	415	646	597	700	2684
PET	99	104	131	134	142	139	148	139	120	117	99	99	1472
R75/PET	1.18	0.70	0.30	0.52	0.52	0.39	0.24	0.53	0.64	0.88	1.40	1.71	1.03
DGP-75%	H	M	u	M	M	u	-	M	M	M	H	H	
Tmin	17.6	17.2	17.6	18.6	19.9	20.5	20.5	20.5	20.6	20.3	19.6	18.6	19.3
Tmean	22.3	22.2	22.6	23.5	24.3	24.9	25.2	25.5	25.1	24.9	24.2	23.2	24.0
Tmax	27.2	27.3	27.9	28.5	28.8	29.3	29.9	30.1	29.7	29.2	28.5	27.7	28.7

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Orange River [in %; data base: 1951 - 1980 , elev.= 298 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	4	4	34	11	7	14	38	7	4	1	1	1
P(.3<=X<.5)	0	10	10	20	13	33	26	20	10	7	0	0
P(.5<=Xi<1)	23	33	30	23	40	30	30	43	33	21	10	10
P(1<=Xi)	73	53	26	46	40	23	6	30	53	71	89	89
P(2<=Xi)	40	20	10	10	10	3	0	0	13	25	41	68
P(R> 25mm)	96	96	86	96	100	100	86	96	100	100	100	100
P(R> 50mm)	96	86	60	86	83	80	60	90	90	96	100	100
P(R> 75mm)	83	66	53	60	73	50	36	70	73	92	100	96
P(R>100mm)	73	53	43	56	53	36	13	60	56	82	89	89
P(R>150mm)	56	33	23	36	40	20	6	20	36	50	58	75
P(R>200mm)	40	20	16	23	20	13	0	6	20	32	41	65
P(R>300mm)	13	3	10	6	3	0	0	0	3	17	31	37
P(R>400mm)	0	0	3	3	3	0	0	0	3	10	20	6
P(R>500mm)	0	0	0	0	0	0	0	0	0	3	6	3

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Port Maria

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Port Maria (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	29	30	29	28	29	28	29	29	29	29	28	27	24
Mean	132	108	79	108	139	93	94	93	103	152	241	246	1607
CV (%)	66	72	74	81	76	76	57	47	67	69	55	62	24
Minim.	29	24	0	0	15	3	28	18	5	42	75	27	838
R90	20	22	12	0	0	12	34	34	14	49	67	54	1060
R75	70	53	37	45	64	43	57	62	54	82	146	135	1323
R50	129	98	73	105	139	85	88	93	101	133	237	237	1607
R25	191	152	115	168	214	136	125	125	150	201	332	347	1891
R10	250	211	158	227	283	188	166	153	197	284	422	457	2155
Maxim.	364	307	267	337	327	306	264	200	299	489	581	739	2488
PET	106	112	143	147	155	149	158	147	127	125	107	106	1581
R75/PET	0.66	0.47	0.26	0.30	0.41	0.28	0.35	0.42	0.42	0.65	1.36	1.28	0.83
DGP-75%	M	u	-	p	p	-	p	p	p	M	H	H	
Tmin	19.0	18.7	19.1	20.1	21.4	22.1	22.1	22.1	22.1	21.8	21.1	20.2	20.8
Tmean	23.9	23.8	24.1	25.0	25.9	26.5	26.8	27.1	26.7	26.5	25.9	24.9	25.6
Tmax	28.9	29.0	29.5	30.0	30.4	30.9	31.4	31.6	31.3	30.9	30.2	29.4	30.3

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Port Maria [in %; data base: 1951 - 1980 , elev.= 3 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	8	14	26	29	30	26	15	15	15	2	1	4
P(.3<=X<.5)	10	16	34	14	6	28	31	17	20	13	0	0
P(.5<=Xi<1)	34	40	27	32	27	32	44	55	34	44	10	11
P(1<=Xi)	48	30	13	25	37	14	10	13	31	41	89	85
P(2<=Xi)	17	13	0	7	17	3	0	0	3	13	46	55
P(R> 25mm)	100	96	89	85	89	89	100	96	89	100	100	100
P(R> 50mm)	82	76	65	71	72	67	86	75	79	96	100	96
P(R> 75mm)	65	53	37	57	65	46	58	68	65	75	100	88
P(R>100mm)	51	33	20	42	51	39	34	34	41	65	89	85
P(R>150mm)	37	26	13	25	37	14	10	13	20	31	67	66
P(R>200mm)	17	16	3	14	27	10	10	3	10	24	50	59
P(R>300mm)	6	3	0	7	17	3	0	0	0	10	28	29
P(R>400mm)	0	0	0	0	0	0	0	0	0	6	14	14
P(R>500mm)	0	0	0	0	0	0	0	0	0	0	7	3

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Richmond P.F.

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Richmond P.F. (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	26	25	24	25	25	26	24	26	27	25	23	25	20
Mean	177	105	103	126	146	106	62	87	129	213	256	259	1812
CV (%)	48	64	96	74	88	69	65	63	43	69	65	52	21
Minim.	38	25	17	4	8	31	5	6	37	38	66	60	1151
R90	60	16	18	0	20	34	11	11	53	55	67	79	1270
R75	116	56	40	59	59	57	33	47	90	110	138	161	1532
R50	177	103	80	126	124	93	60	87	129	191	237	255	1812
R25	239	151	142	192	211	141	89	126	169	294	356	353	2093
R10	295	198	223	254	313	199	119	163	206	409	483	446	2354
Maxim.	384	283	449	280	547	331	189	209	260	675	745	657	2420
PET	102	108	137	140	148	144	153	143	123	121	103	102	1526
R75/PET	1.13	0.52	0.29	0.42	0.39	0.39	0.21	0.33	0.72	0.91	1.33	1.57	1.00
DGP-75%	H	M	-	p	p	p	-	p	M	M	H	H	
Tmin	18.3	17.9	18.4	19.3	20.6	21.3	21.3	21.3	21.3	21.0	20.4	19.4	20.1
Tmean	23.1	23.0	23.4	24.3	25.1	25.7	26.0	26.3	25.9	25.7	25.0	24.0	24.8
Tmax	28.0	28.1	28.7	29.3	29.6	30.1	30.6	30.8	30.5	30.1	29.3	28.6	29.5

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Richmond P.F. [in %; data base: 1951 - 1980 , elev.= 153 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	2	12	26	20	16	9	42	25	1	0	1	0
P(.3<=X<.5)	3	24	25	20	16	30	29	30	11	8	0	0
P(.5<=Xi<1)	15	20	37	20	28	46	25	26	37	20	13	12
P(1<=Xi)	80	44	12	40	40	15	4	19	51	72	86	88
P(2<=Xi)	30	4	8	0	8	3	0	0	7	32	47	68
P(R> 25mm)	100	100	83	88	92	100	79	88	100	100	100	100
P(R> 50mm)	96	76	70	68	80	76	54	69	92	96	100	100
P(R> 75mm)	84	56	45	60	68	57	29	46	77	88	95	96
P(R>100mm)	80	44	33	48	56	38	16	38	66	84	86	92
P(R>150mm)	65	24	12	36	40	15	4	19	29	56	65	76
P(R>200mm)	34	12	12	28	16	11	0	3	11	40	47	68
P(R>300mm)	11	0	8	0	8	3	0	0	0	16	30	36
P(R>400mm)	0	0	4	0	8	0	0	0	0	12	21	12
P(R>500mm)	0	0	0	0	8	0	0	0	0	8	8	4

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

Wey Hill

Table 1 : Extremes and variability of monthly and annual rainfall totals, mean potential evapo-transpiration, and mean air temperature for Wey Hill (in mm/month and degrees Celsius respectively) [data base: 1951 - 1980]

PERIOD	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	YEAR
N	23	22	23	22	24	23	25	23	25	24	21	23	17
Mean	145	97	105	211	250	146	127	199	206	302	255	225	2254
CV (%)	65	95	70	71	51	59	66	56	39	49	40	67	29
Minim.	50	0	0	11	53	6	13	56	21	39	62	21	924
R90	41	9	3	15	92	27	27	67	93	97	111	27	1315
R75	78	34	52	102	158	84	67	119	148	195	180	115	1770
R50	132	79	105	206	241	146	119	187	206	302	255	220	2254
R25	199	142	158	316	333	207	180	268	265	408	329	330	2737
R10	273	216	207	421	425	265	242	352	319	506	398	436	3192
Maxim.	415	405	250	542	630	321	359	490	359	732	432	654	3410
PET	99	103	131	134	142	139	148	138	120	117	99	99	1469
R75/PET	0.78	0.33	0.40	0.75	1.11	0.60	0.45	0.85	1.23	1.66	1.81	1.16	1.20
DGP-75%	M	u	p	M	H	M	u	M	H	H	H	H	
Tmin	17.5	17.1	17.6	18.5	19.8	20.5	20.5	20.5	20.5	20.2	19.6	18.6	19.3
Tmean	22.3	22.2	22.6	23.5	24.3	24.9	25.2	25.5	25.1	24.8	24.1	23.1	24.0
Tmax	27.1	27.2	27.8	28.5	28.8	29.2	29.8	30.1	29.7	29.2	28.5	27.7	28.7

Note: R75 is mm of rainfall surpassed in 75% of the years in specified period
DGP-75% is the dependable growing period in 75% of the years
PET and T are calculated using linear regression.

Table 2 : Probability of surpassing preselected monthly rainfall totals at Wey Hill [in %; data base: 1951 - 1980 , elev.= 305 m]

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
P(Xi<0.3)	1	24	32	10	1	9	8	2	4	1	1	10
P(.3<=X<.5)	0	18	8	0	4	13	28	8	0	4	0	0
P(.5<=Xi<1)	52	31	26	36	16	39	40	17	8	4	9	17
P(1<=Xi)	47	27	34	54	79	39	24	73	88	91	90	73
P(2<=Xi)	21	9	0	31	29	13	4	21	44	66	71	56
P(R> 25mm)	100	81	91	95	100	95	92	100	96	100	100	95
P(R> 50mm)	95	63	65	90	100	86	92	100	96	95	100	91
P(R> 75mm)	69	50	60	90	95	78	64	91	96	95	95	86
P(R>100mm)	47	36	56	72	95	73	60	86	88	95	90	69
P(R>150mm)	39	18	26	54	75	30	24	60	76	87	85	56
P(R>200mm)	17	9	17	45	62	21	16	30	48	75	71	56
P(R>300mm)	8	4	0	22	25	8	4	17	16	45	38	30
P(R>400mm)	4	4	0	13	8	0	0	13	0	20	9	17
P(R>500mm)	0	0	0	13	4	0	0	0	0	8	0	4

Note: frequency analysis of non-transformed data (for N see table 1)
Xi is the abbreviation for R/PET

List of publications issued by the Jamaica Soil Survey Project
(October 1989)

Soil Survey Reports

SR-1 (July 1986). Soil and land use survey of the Coastal Plain of St. Catherine, Jamaica (scale 1:50,000)
SR-2 (May 1987). Semi-detailed soil survey of the Linstead-Bog Walk area, St. Catherine, Jamaica (scale 1:25,000)
SR-3 (Feb. 1989). Semi-detailed soil survey of the Pedro area, St. Elizabeth, Jamaica (scale 1:25,000)
SR-4 (Aug. 1989). Semi-detailed soil survey of the Montpelier area, Western Jamaica (scale 1:25,000)

Technical Soils Bulletins

TB-1 (Nov. 1985). Legends for semi-detailed soil maps: the entries proposed for Jamaica (1st Approximation).
TB-2 (Dec. 1985). Assessment of the resistance of land to erosion for land evaluation.
TB-3 (Apr. 1986). Jamaica Physical Land Evaluation System (JAMPLES).
TB-4 (Aug. 1986). Methodology and BASIC programmes for the statistical analysis of rainfall probability.
TB-5 (Sep. 1986). Matching model (MATMOD), Jamaica Physical Land Evaluation System.
TB-6 (Sep. 1986). General temperature zones for land evaluation in Jamaica.
TB-7 (Apr. 1987). CROPRISK, a computerized procedure to assess the agro-ecological suitability of land for rainfed annual crops.
TB-8 (June 1987). JAMPLES Users Guide: A computerized land evaluation system for Jamaica.
TB-9 (Dec. 1986). A semi-detailed soil legend: a framework for Jamaica (2nd Approximation).
TB-10 (Nov. 1987). Revised rating system for land qualities used in the Jamaica Physical Land Evaluation System.
TB-11 (July 1988). Agro-climatic characterization of the parish of Clarendon, Jamaica.
TB-12 (July 1988). Soil Legend Framework for Jamaica (3rd Approximation).
TB-13 (Dec. 1988). Review of agro-climatic modules of JAMPLES.
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TB-15 (Feb. 1989). Matching of land use requirements with land qualities using the computerized land evaluation module.
TB-16 (July 1989). User's Guide to the Jamaica Physical Land Evaluation System (Version 3.0).

Miscellaneous Papers

MP-1 (May 1985). Generalized soil map of Jamaica: explanatory note to the first draft (scale: 1:250,000).
MP-2 (Oct. 1986). General land capability map of Jamaica (scale: 1:500,000).
MP-3 (Dec. 1986). Soil and water quality for ornamental horticulture.
MP-4 (Feb. 1987). An analysis of rainfall variability in St. Catherine for agricultural planning.
MP-5 (Feb. 1988). The application of transfer-functions in creating the climate data base of the Jamaica Geographical Information System (JAMGIS).
MP-6 (June 1988). Land evaluation of the Coastal Plains of St. Catherine, Jamaica, using the computerized JAMPLES system.
MP-7 (July 1988). Soil salinity Survey of the South Clarendon Plains.
MP-8 (Sep. 1989). Agro-climatic zones of the parish of Manchester, Jamaica.
MP-9 (Oct. 1989). Agro-climatic zones of the parish of St. Mary, Jamaica.