AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523

BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY
0072

1. SUBJECT CLASSIFICATION

A. PRIMARY
Agriculture — AF10-0000-G514

B. SECONDARY
Meteorology and climatology--Brazil

2. TITLE AND SUBTITLE
Water deficiences and needs for irrigation,Sao Francisco River Basin,Brazil

3. AUTHOR(S)
Hargreaves,G.H.

4. DOCUMENT DATE	5. NUMBER OF PAGES	6. ARC NUMBER
1972	78p.	ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS
Utah State

8. SUPPLEMENTARY NOTES *(Sponsoring Organization, Publishers, Availability)*

9. ABSTRACT

10. CONTROL NUMBER
PN-RAA-021

11. PRICE OF DOCUMENT

12. DESCRIPTORS
Brazil
Farm crops
Precipitation
Sao Francisco
Irrigation

13. PROJECT NUMBER

14. CONTRACT NUMBER
CSD-2167 Res.

15. TYPE OF DOCUMENT

AID 590-1 (4-74)

PRELIMINARY DRAFT FOR OFFICIAL USE

WATER DEFICIENCIES AND NEEDS FOR IRRIGATION SAO FRANCISCO RIVER BASIN, BRAZIL

By

Utah State University - Agency for

International Development

Project WG-69

Contract AID/csd-2167

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Logan, Utah

September 1972

WATER DEFICIENCIES AND NEEDS FOR IRRIGATION

SAO FRANCISCO RIVER BASIN, BRAZIL

Introduction

The Sao Francisco River Basin comprising about 700,000 square kilometers is one of the large and important river basins of Brazil (Figure 1). The Sao Francisco river is an important course of hydroelectric power with a current installed generating capacity of about 200,000 kilowatts.

Good quali

area exceeding 1,000,000 hectares. Unfortunately, however, the areas of good soils are located upstream from future and developed power sites. The consumptive use of irrigation waters results in direct reduction of power potentials. Therefore, careful analysis is required in order to reduce excessive irrigation to a minimum.

Brazil is experiencing a rapid expansion of both population and of developed economic resources resulting in ever-increasing demands for new opportunities and new production in agriculture.

Most of the northeast of Brazil is characterized by a shortage of good agricultural lands and by an arid climate with frequent reoccurrence of drouth. The Sao Francisco river basin provides one of the major potential agricultural resources of the northeast and could, if developed, provide opportunities for large numbers of people living in the fringes

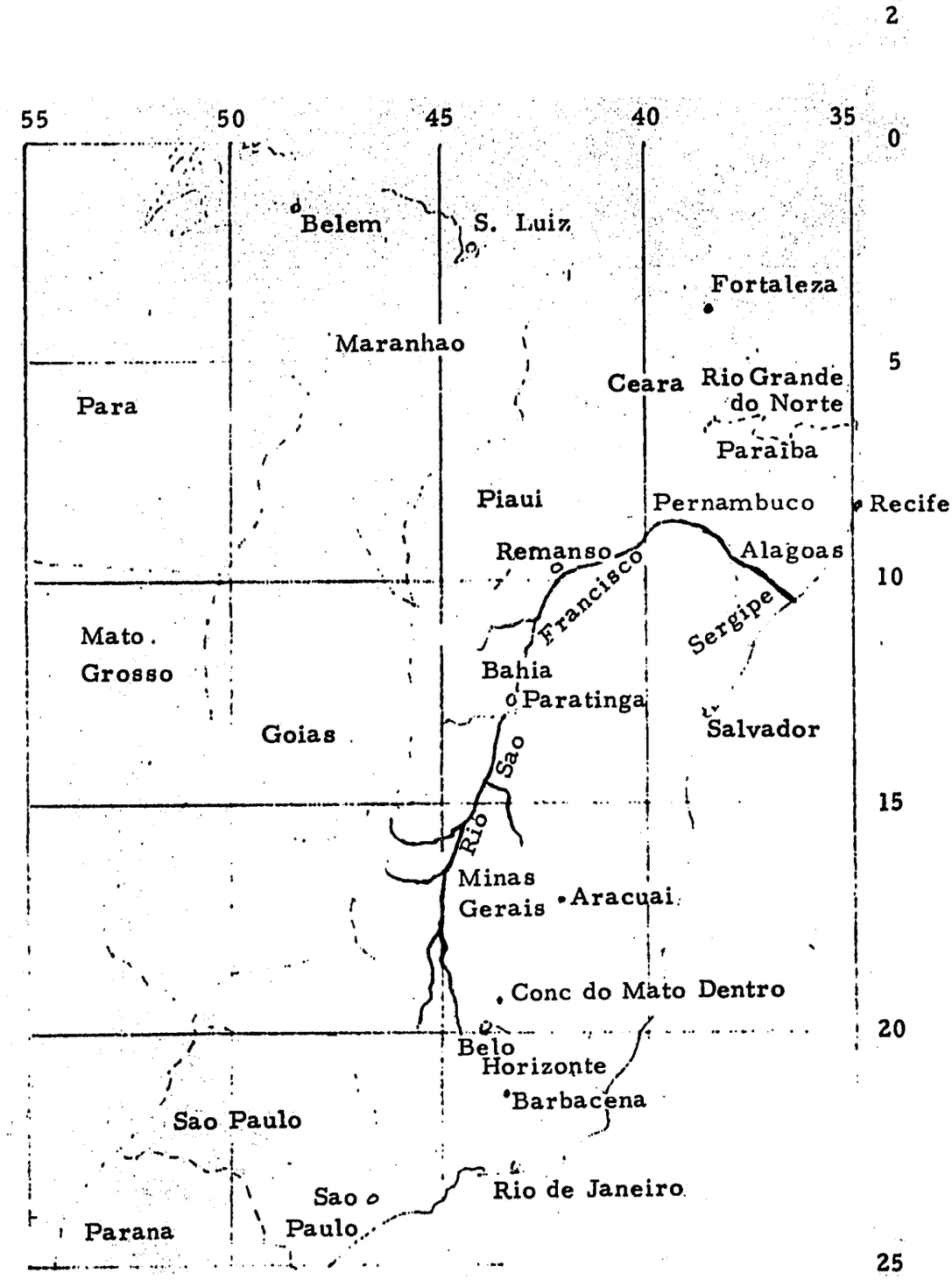

Figure 1. Sao Francisco River Basin, Brazil

of the economy of the northeast and in many cases existing under conditions that make little or no economic contribution to the development of the country. A satisfactory rate of irrigation development in the Sao Francisco Basin could become a major source of new opportunity in agriculture.

Purpose of the Study

This study is intended to serve as a preliminary analysis of the Brazilian climatological data and to provide useful determinations of the adequacy and/or deficiency of the precipitation for agricultural crops in the Sao Francisco Basin and adjacent areas. It is made from faily complete climatic data from fifty-six stations in and near the Sao Francisco basin including one in Maranhao, one in Piaui, five in Paraiba, four in Pernambuco, one in Alagaas, three in Sergipe, twelve in Bahia, and twenty-nine in Minas Gerais. The data used were published by the Ministerio de Agricultura, Escritorio de Meteorologia entitled, "Normais Climatologicas," and covers the period 1931-60. Class A pan evaporation data are available for three of the fifty-six stations and for twenty-three other locations. The evaporation data are unpublished but were made available by Hidroservice, Engenharia de Projetos Ltda., Sao Paulo, Brazil.

Limitations of the Data

These data are not as complete as would be desirable. The study involves the estimation of potential evapotranspiration and the probable

dependable precipitation at the seventy-five percent level, or three years out of four. Previous studies have shown that the best estimates of evaporation and potential evapotranspiration can be made when complete climatic data are available including temperature (mean, maximum and minimum), relative humidity, sunshine (hours of percentage possible), and mean wind velocity at a specified height above ground. Unfortunately, no wind velocity data are available and must therefore be assumed or taken as a mean value. The relative humidity data are referenced to Greenwich time and may not be completely comparable when consideration is given to the variations in the local times of the measurements reported. Since relative humidity values fluctuate through a wide range daily, the hours of measurements are of some importance. The available data may be evaluated and possibly refined by making a study of charts from hygrothermograph records to obtain the probable variations in the reported values due to differences in local time.

Although not specifically stated, the evaporation data published by the Ministerio de Agricultura are assumed to be Piche. Although many attempts have been made to correlate Piche evaporation with Class A pan evaporation data, no completely satisfactory relationships have been developed. Piche evaporation is influenced to a much greater degree by changes in wind velocity than in Class An pan evaporation. Without the Class A pan evaporation data furnished by Hidroservice, it would be difficult to modify equations previously developed to best fit the country data,

especially where it has been obtained in a somewhat different manner or at different times during the day.

Definition of Terms

Actual Evapotranspiration, ETA, is the actual use of water by agricultural crops including direct evaporation from moist soils and wet vegetation. It depends on the climate, the crop, the soil moisture supply, and the timing and methods of irrigation. The climatic factors are considered in the estimation of potential evapotranspiration. Crop factors include percentage of ground cover, height and total leaf surface. Evapotranspiration is limited by soil moisture availability within the root zone and by practices that reduce evaporation.

Potential Evapotranspiration, ETP, is the amount of water transpired from an actively growing short, green plant cover (usually grass) with a full crop cover and a continuously adequate moisture supply. It is considered to be dependent upon the climate and can be estimated from climatic parameters, the most important of which are available incoming radiation, temperature, relative humidity, and wind velocity. The incoming radiation is related to the extraterrestrial radiation that reaches the outer atmosphere, and the factors that influence its transmission through the atmosphere such as thickness of the atmosphere as determined by elevation and the percentage of possible sunshine or cloudiness. The energy available for evapotranspiration depends principally upon incoming radiation and energy transported through air mass transfer.

Potential evapotranspiration depends largely upon available energy and upon conditions that influence vapor transfer. The climatic parameters are not independent of each other but are interrelated in a complex manner.

Dependable Precipitation, PD, is the precipitation that has a specified probability of occurrence based on an analysis of long-time precipitation records. For irrigation development, a seventy-five percent probability level, or the rainfall that may be expected to occur three years out of four years, has been selected as a reasonable value for most conditions. For some crops or special conditions, a different probability level may be more appropriate.

For this study the dependable precipitation on a seventy-five percent level has been estimated from its approximate relationship to the mean monthly precipitation from the equation

$$PD = -5 + .16PM + .0022\ PM^2 \quad \text{and} \tag{1}$$

$$PD = -85 + PM \text{ for } PM \text{ greater than } 191 \text{ mm} \tag{1a}$$

in which

PM = the mean monthly precipitation in mm.

Equation 1 was developed by plotting the seventy-five percent probability of precipitation from a gamma analysis as a function of mean precipitation. It is a best fit relationship for the precipitation data for fifteen locations used in this study having long records. The precipitation

data are available from "Dados Pluviometricos Mensais in Natura, Minter SUDENE, Departamento de Recursos Maturais, Divisao de Hidrologia, Vol. I, II, III.

The results from the gamma distribution probability analysis are given in Appendix A.

Moisture Availability Index, MAI, is the ratio of dependable precipitation to the estimated potential evapotranspiration and can be defined as

$$MAI = PD/ETP \tag{2}$$

It is an index of the adequacy of precipitation for meeting the moisture requirements for most agricultural crops. The following classification of precipitation deficiencies is proposed:

MAI	Adequacy
0 - .33	Very deficient
.34 - .67	Moderately deficient
.68 - 1.00	Somewhat deficient
1.01 - 1.33	Adequate
1.34 and above	Excessive

Moisture Deficit, ETDF, is taken as the difference between the potential evapotranspiration and the dependable precipitation. This difference can be estimated from the climatic parameters. It is an index of the irrigation requirement but must be considered along with other factors such as effective precipitation and available soil moisture storage capacity

The equation for the moisture deficit or potential evapotranspiration deficit can be written:

$$ETDF = ETP - PD \tag{3}$$

Effective Precipitation, PEF, is the precipitation that enters the soil and is retained within the root zone of the crop grown. It is dependent upon the rainfall intensity and infiltration capacity of the soil, on the type of vegetative cover, upon rooting depth of the crop or vegetation and soil moisture retaining properties of the soil, primarily its texture. Under some conditions nearly all of the precipitation is effective, and under other conditions much of the precipitation may run off the surface or pass through the root zone and not be effective. Differences in management of adjacent fields including soil condition and crop cover sometimes produce very large variations in the effectiveness of precipitation.

Available Soil Moisture Storage Capacity is considered to be the difference between the upper level of moisture that is retained by a well-drained soil, or field capacity, and the lower level at which plants wilt, or wilting percentage. Both of these indices can be estimated from physical tests on soils: the field capacity by the moisture equivalent determined by a centrifuge test, or the .5 atmosphere percentage test, and the wilting percentage by the plant technique, or the 15 atmosphere percentage test. The available moisture storage capacity may also be

determined directly by field sampling and gravometric moisture determinations after an adequate irrigation as moisture is depleted until symptoms of wilting occur.

Climate, Evapotranspiration and Moisture Relationships

Potential evapotranspiration is determined by climate. The more important measured climatic factors are temperature and relative humidity. Wind speed is of lessor importance but still significant. Unfortunately, wind data are not available. For this study wind velocities have been estimated from precipitation data.

The equation used for estimating potential evapotranspiration can ben written

$$ETP = .35 \times RMM \times CT \times CH \times CE \tag{4}$$

in which

RMM = monthly extraterrestrial radiation expressed as equivalent evaporation by dividing the radiation (cal/cm^2/day) by the heat of vaporization at the mean monthly temperature, TM, and converting to appropriate units, mm per month (Table 1)

$$CT = .40 + .024 \times TM \tag{4a}$$

(TM = mean monthly temperature in ^{o}C)

$$CH = .05 + 1.42 \times (1.00 - HM)^{1/2} \tag{4b}$$

(HM = mean monthly relative humidity as a mean of three readings at 1200, 1800 and 2400 hours mean Greenwich time expressed decimally; CH has a maximum value of 1.00)

TABLE 1. EXTRATERRESTRIAL RADIATION IN MM PER MONTH AT 25. DEGREES CENTIGRADE

SOUTH

LAT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
						MONTH						
1.	474.	440.	490.	458.	447.	416.	437.	463.	470.	490.	463.	469.
2.	479.	442.	490.	456.	442.	411.	432.	459.	469.	492.	467.	475.
3.	484.	445.	491.	453.	438.	406.	427.	456.	468.	494.	471.	480.
4.	488.	447.	491.	451.	433.	401.	422.	452.	467.	496.	475.	485.
5.	493.	450.	491.	448.	429.	395.	417.	449.	466.	497.	479.	490.
6.	497.	452.	490.	445.	424.	390.	412.	445.	465.	499.	483.	494.
7.	501.	454.	490.	442.	419.	384.	406.	441.	463.	500.	486.	499.
8.	505.	456.	490.	439.	414.	379.	401.	437.	462.	501.	489.	503.
9.	509.	458.	489.	436.	409.	373.	395.	433.	460.	502.	493.	508.
10.	512.	459.	488.	433.	403.	367.	389.	428.	458.	503.	496.	512.
11.	516.	461.	487.	429.	398.	361.	384.	424.	456.	504.	499.	516.
12.	519.	462.	486.	426.	393.	355.	378.	420.	454.	504.	502.	520.
13.	523.	463.	485.	422.	387.	349.	372.	415.	452.	505.	504.	524.
14.	526.	465.	484.	418.	381.	343.	366.	410.	449.	505.	507.	528.
15.	529.	466.	482.	414.	376.	337.	360.	405.	447.	505.	509.	531.
16.	532.	466.	480.	410.	370.	330.	353.	400.	444.	505.	511.	535.
17.	535.	467.	479.	406.	364.	324.	347.	395.	441.	505.	513.	538.
18.	537.	468.	477.	402.	358.	318.	340.	390.	438.	504.	515.	541.
19.	540.	468.	474.	397.	352.	311.	334.	385.	435.	504.	517.	544.
20.	542.	469.	472.	393.	345.	304.	327.	379.	432.	503.	519.	547.
21.	544.	469.	470.	388.	339.	298.	321.	374.	429.	503.	521.	550.
22.	546.	469.	467.	383.	333.	291.	314.	368.	425.	502.	522.	553.
23.	548.	469.	465.	379.	326.	284.	307.	362.	422.	501.	523.	555.
24.	550.	469.	462.	374.	320.	277.	300.	356.	418.	499.	524.	558.
25.	552.	468.	459.	368.	313.	270.	293.	350.	414.	498.	526.	560.

TABLE 1. EXTRATERRESTRIAL RADIATION IN MM PER MONTH AT 20. DEGREES CENTIGRADE

SOUTH LAT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
							MONTH					
1.	472.	438.	488.	456.	444.	414.	435.	460.	468.	488.	461.	467.
2.	477.	440.	488.	454.	440.	409.	430.	457.	467.	490.	465.	472.
3.	481.	443.	488.	451.	436.	404.	425.	454.	466.	492.	469.	477.
4.	486.	445.	488.	449.	431.	399.	420.	450.	465.	493.	473.	482.
5.	490.	448.	488.	446.	427.	393.	415.	447.	464.	495.	477.	487.
6.	494.	450.	488.	443.	422.	388.	410.	443.	463.	496.	480.	492.
7.	499.	452.	488.	440.	417.	383.	404.	439.	461.	498.	484.	497.
8.	503.	454.	487.	437.	412.	377.	399.	435.	460.	499.	487.	501.
9.	506.	455.	487.	434.	407.	371.	393.	431.	458.	500.	490.	505.
10.	510.	457.	486.	431.	401.	365.	388.	426.	456.	501.	493.	510.
11.	514.	459.	485.	427.	396.	360.	382.	422.	454.	501.	496.	514.
12.	517.	460.	484.	424.	391.	354.	376.	418.	452.	502.	499.	518.
13.	520.	461.	483.	420.	385.	347.	370.	413.	450.	502.	502.	522.
14.	523.	462.	481.	416.	380.	341.	364.	408.	447.	503.	504.	525.
15.	526.	463.	480.	412.	374.	335.	358.	403.	445.	503.	507.	529.
16.	529.	464.	478.	408.	368.	329.	352.	398.	442.	503.	509.	532.
17.	532.	465.	476.	404.	362.	322.	345.	393.	439.	502.	511.	536.
18.	535.	466.	474.	400.	356.	316.	339.	388.	436.	502.	513.	539.
19.	537.	466.	472.	396.	350.	310.	332.	383.	433.	502.	515.	542.
20.	539.	466.	470.	391.	344.	303.	326.	377.	430.	501.	517.	545.
21.	542.	467.	468.	386.	337.	296.	319.	372.	427.	500.	518.	547.
22.	544.	467.	465.	382.	331.	290.	312.	366.	423.	499.	520.	550.
23.	546.	467.	462.	377.	325.	283.	306.	360.	420.	498.	521.	553.
24.	547.	466.	460.	372.	318.	276.	299.	355.	416.	497.	522.	555.
25.	549.	466.	457.	367.	311.	269.	292.	349.	412.	496.	523.	557.

TABLE 1. EXTRATERRESTRIAL RADIATION IN MK PER MONTH AT 15. DEGREES CENTIGRADE

SOUTH

LAT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	MONTH											
1.	470.	435.	485.	454.	442.	412.	433.	458.	465.	485.	459.	465.
2.	475.	438.	486.	452.	438.	407.	428.	455.	465.	487.	463.	470.
3.	479.	441.	485.	449.	434.	402.	423.	452.	464.	489.	467.	475.
4.	484.	443.	486.	447.	429.	397.	418.	448.	463.	491.	471.	480.
5.	488.	445.	486.	444.	425.	392.	413.	445.	462.	493.	475.	485.
6.	492.	448.	486.	441.	420.	386.	408.	441.	460.	494.	478.	490.
7.	496.	450.	485.	438.	415.	381.	403.	437.	459.	495.	482.	494.
8.	500.	452.	485.	435.	410.	375.	397.	433.	457.	496.	485.	499.
9.	504.	453.	484.	432.	405.	369.	392.	429.	456.	497.	488.	503.
10.	508.	455.	484.	429.	400.	364.	386.	424.	454.	498.	491.	507.
11.	511.	456.	483.	425.	394.	358.	380.	420.	452.	499.	494.	511.
12.	515.	458.	482.	422.	389.	352.	374.	416.	450.	500.	497.	515.
13.	518.	459.	480.	418.	383.	346.	368.	411.	448.	500.	499.	519.
14.	521.	460.	479.	414.	378.	340.	362.	406.	445.	500.	502.	523.
15.	524.	461.	478.	411.	372.	334.	356.	401.	443.	500.	504.	526.
16.	527.	462.	476.	407.	366.	327.	350.	396.	440.	500.	507.	530.
17.	530.	463.	474.	402.	360.	321.	344.	391.	437.	500.	509.	533.
18.	532.	463.	472.	398.	354.	315.	337.	386.	434.	500.	511.	536.
19.	535.	464.	470.	394.	348.	308.	331.	381.	431.	499.	512.	539.
20.	537.	464.	468.	389.	342.	302.	324.	376.	428.	499.	514.	542.
21.	539.	464.	465.	385.	336.	295.	318.	370.	425.	498.	516.	545.
22.	541.	464.	463.	380.	329.	288.	311.	364.	421.	497.	517.	548.
23.	543.	464.	460.	375.	323.	282.	304.	359.	418.	496.	518.	550.
24.	545.	464.	457.	370.	317.	275.	297.	353.	414.	495.	520.	552.
25.	546.	464.	455.	365.	310.	268.	291.	347.	410.	493.	521.	555.

$$CW = .80 + .028 \times W6 \quad (4c)$$

(W6 = mean monthly wind speed at an anemometer height of 6 mm in km/hr)

$$CE = 1.00 + .00004 \times EL \quad (4d)$$

(EL = elevation in meters)

The use of Greenwich time may create a problem with respect to the use of the relative humidity data. A reading at 1200 hours Greenwich time varies from 0843 to 0941 hours local sun time. At this time of day the humidity graph is changing rapidly, resulting in significant differences. Probably by using data from 24-hour hydrothermographs, relationships can be worked out for corrections for longitude (local sun time) and for possible differences in the significance of measured values.

Although wind data are not available, rainy months are usually less windy than dry periods. Exposure conditions and relief have very significant effects upon wind speeds. For this reason, wind velocity does not correlate highly with other measured climatic parameters. It is believed, however, that use of estimated wind improves the computation of potential evapotranspiration. Wind speeds at an anemometer height of six meters are therefore assumed as follows:

Monthly Precipitation	Wind at 6 mm in km/hr
Less than 50 mm	10.0
50 mm to 100 mm	7.1
Greater than 100 mm	5.0

Pan Evaporation and Potential Evapotranspiration

The relationship between Class A pan evaporation and potential evapotranspiration is not constant. Advection or high advective conditions cause a much larger increase in pan evaporation than in evapotranspiration. A Class A pan located in irrigated surrounds is considered as standardized. A pan located in a nearby dry area or non-irrigated area may, during periods of fairly low humidity, evaporate up to one-third or more water than a pan located in an irrigated area.

Average Class A pan evaporation data for twenty-six locations are given in Table 2. These data may be used as an index of potential evapotranspiration. However, considerable judgment is required in order to give adequate consideration to differing advective conditions. During hot, dry, windy weather the ratio of potential evapotranspiration to measured pan evaporation (ETP/EVPM) will be much lower than is the case during rainy periods when the surrounds approach irrigated area conditions. Also, proximity to the ocean sometimes results in advective cooling and producing higher ratios of ETP/EVPM.

Based upon these considerations, the following relationships between ETP and EVPM are proposed:

Typical Area	Season	Potential Evapotranspiration
Zona da Mata, near ocean	Rainy	ETP = .85 x EVPM
Zona da Mata, general	Rainy	ETP = .80 x EVPM
Zona da Mata, near ocean	Dry	ETP = .75 x EVPM
Zona da Mata, general	Dry	ETP = .70 x EVPM
Certao and Interior Valley	Rainy	ETP = .80 x EVPM
Certao and Interior Valley	Intermediate	ETP = .75 x EVPM
Certao and Interior Valley	Dry	ETP = .65 x EVPM

Table 2. Class A Pan Evaporation - Northeast Brazil in mm (mean values)

Location	South Lat	West Long	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Parnaiba	02° 55'	41° 47'	262	221	185	181	185	194	219	217	286	304	293	284	2831
Zedoca (Moncao)	03° 14'	45° 37'	148	121	128	126	128	149	153	186	206	217	190	181	1933
Piripiri	04° 17'	41° 47'	203	153	170	150	149	156	199	233	253	282	229	214	2391
Caxias	04° 52'	43° 21'	164	150	162	159	159	166	194	218	241	231	219	192	2225
Terezina	05° 05'	42° 49'	184	148	157	129	162	169	210	246	278	278	240	212	2413
Sao Felix	05° 56'	42° 07'	181	157	178	164	179	189	201	273	298	279	243	209	2551
Florania	06° 07'	36° 49'	285	210	230	178	177	168	206	292	289	349	312	327	2023
Lima Campos	06° 25'	38° 58'	241	188	183	156	169	173	224	274	283	304	281	273	2749
Acude Itans	06° 29'	37° 04'	355	244	257	214	202	190	252	336	357	365	385	388	3545
Boa Esperanca Acude	06° 46'	43° 38'	213	162	199	247	160	182	225	266	271	178	209	168	2478
Floriano	06° 46'	43° 01'	162	119	157	137	191	182	239	292	293	281	194	188	2435
Picos	07° 05'	41° 28'	205	161	156	159	193	222	256	301	308	322	262	228	2773
Curemas	07° 01'	37° 58'	298	214	230	190	187	174	231	301	327	342	357	314	3165
Juazeiro do Norte	07° 12'	39° 19'	218	171	184	161	174	168	208	259	289	306	278	256	2672
Triunfo	07° 50'	38° 07'	200	165	178	143	131	117	132	170	189	208	226	237	2096
Sao Joao do Piaui	08° 22'	42° 15'	192	191	189	204	242	248	206	246	274	277	217	218	2704
Cabrobo	08° 30'	39° 19'	242	212	201	158	154	148	173	224	269	283	279	273	2616
Petrolandia	09° 04'	38° 18'	243	202	216	164	134	130	135	180	209	271	259	242	2384
Juazeiro	09° 25'	40° 30'	256	208	243	206	218	203	227	264	275	308	282	259	2949
Remanso	09° 41'	42° 04'	224	194	217	202	240	234	254	283	313	348	281	248	3038
Porto Real do Colegio	10° 11'	36° 50'	228	188	196	133	112	88	104	112	143	190	214	227	1935
Penedo	10° 17'	36° 35'	190	158	159	115	125	102	128	114	122	168	179	181	1741
Monteiro	10° 49'	39° 34'	249	237	196	149	135	123	143	181	216	263	269	277	2438
Monte Branco	13° 51'	40° 26'	244	228	211	190	181	129	135	185	233	274	288	258	2556
Jequie	13° 52'	40° 05'	243	206	199	163	118	104	109	135	179	233	232	212	2133
Tres Marias	18° 12'	45° 16'	187	166	199	174	146	138	158	190	230	213	220	199	2220

Source: Hidroservice; data collected by Sudene and Hidroservice.

Potential Evapotranspiration from Climatic Data

Equation 4 was evaluated using the relationships between ETP and EVPM given above. Subject to the limitations in the climatic data, it is believed that this equation provides a satisfactory estimation of potential evapotranspiration. Potential evapotranspiration as estimated from equation 4 is presented for the fifty-six locations in Table 3.

Table 3 also presents the available climatic data and estimation of dependable precipitation, PD; evapotranspiration deficit, ETDF; and the moisture availability index, MAI. Column headings for Table 3 are as follows:

Column Number	Symbol	Description
1	MO	Month of the year.
2	TM	Mean monthly temperature in ^{o}C.
3	HM	Mean monthly relative humidity expressed decimally.
4	TD	Mean monthly temperature difference in ^{o}C (mean maximum temperature minus mean minimum temperature).
5	PREC	Mean monthly precipitation in mm.
6	INS	Insulation - monthly sunshine hours.
7	RMM	Monthly extraterrestrial radiation for the latitude and mean temperature expressed as equivalent mm of evaporation.
8	CT	A monthly temperature coefficient (equation 4a).
9	CH	A monthly humidity coefficient (equation 4b).
10	CW	A monthly wind coefficient based on estimated wind (equation 4c).
11	ETP	Estimated potential evapotranspiration (equation 4).
12	PD	Estimated dependable precipitation (equation 1).
13	ETDF	Evapotranspiration deficit (equation 3)
14	MAI	Moisture availability index (equation 2).

Table 3. Moisture Availability Analysis Including Climatic Data

82.476 CAXIAS MARANHAO . LAT 4 52 LONG 43 21 : ELEV 77

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.8	.77	10.3	169.	190.	493.	1.04	.73	.94	124.	85.	39.	.68
2	26.2	.83	9.7	243.	157.	450.	1.03	.64	.94	98.	158.	-59.	1.60
3	26.1	.84	9.5	288.	165.	491.	1.03	.62	.94	103.	203.	-100.	1.97
4	26.2	.84	9.5	283.	184.	449.	1.03	.62	.94	94.	198.	-103.	2.10
5	26.3	.81	9.8	72.	244.	430.	1.03	.67	1.00	105.	18.	87.	.17
6	25.9	.75	11.2	19.	263.	396.	1.02	.76	1.08	117.	0.	117.	.00
7	25.7	.69	13.0	8.	291.	418.	1.02	.84	1.08	135.	0.	135.	.00
8	26.7	.63	14.3	3.	309.	450.	1.04	.92	1.08	163.	0.	163.	.00
9	28.1	.60	14.0	13.	275.	468.	1.07	.95	1.08	181.	0.	181.	.00
10	28.7	.60	13.3	29.	266.	499.	1.09	.95	1.08	195.	2.	194.	.01
11	28.4	.65	12.1	65.	233.	480.	1.08	.89	1.00	162.	15.	147.	.09
12	27.6	.71	11.2	95.	213.	490.	1.06	.82	1.00	149.	30.	119.	.20
AVE	26.9	.73	11.5	107.	232.	459.	1.05	.78	1.01	136.	59.	77.	.57

82.578 TEREZINA PIAUI LAT 5 5 LONG 42 49 ELEV 79

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	27.2	.77	10.3	175.	195.	494.	1.05	.73	.94	126.	90.	36.	.72
2	26.5	.83	9.5	235.	165.	450.	1.04	.64	.94	99.	150.	-52.	1.53
3	26.2	.85	9.1	311.	167.	491.	1.03	.60	.94	99.	226.	-126.	2.27
4	26.3	.83	9.2	254.	191.	449.	1.03	.64	.94	98.	169.	-70.	1.71
5	26.6	.81	9.7	91.	252.	429.	1.04	.67	1.00	104.	28.	76.	.27
6	26.4	.74	11.3	15.	279.	395.	1.03	.78	1.08	121.	0.	121.	.00
7	26.5	.65	13.5	8.	307.	417.	1.04	.89	1.08	145.	0.	145.	.00
8	27.6	.57	15.0	6.	322.	449.	1.06	.98	1.08	177.	0.	177.	.00
9	29.1	.55	14.7	9.	292.	468.	1.10	1.00	1.08	195.	0.	195.	.00
10	29.5	.57	13.7	28.	280.	499.	1.11	.98	1.08	206.	1.	205.	.01
11	29.2	.61	12.6	60.	250.	481.	1.10	.93	1.00	173.	13.	161.	.07
12	28.2	.68	11.3	105.	219.	491.	1.08	.85	.94	148.	36.	112.	.25
AVE	27.4	.71	11.7	108.	243.	461.	1.06	.81	1.01	141.	59.	82.	.57

Table 3. (Continued)

82.696 AREIA PARAIBA LAT 6 58 LONG 35 41 ELEV 624

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	22.8	.81	10.0	55.	0.	500.	.95	.66	1.00	112.	10.	102.	.09
2	23.0	.83	9.7	94.	0.	453.	.95	.64	1.00	100.	29.	70.	.30
3	22.8	.85	8.9	159.	0.	489.	.95	.60	.94	94.	76.	18.	.81
4	22.3	.88	8.0	157.	0.	442.	.94	.55	.94	77.	75.	2.	.98
5	21.5	.90	7.2	205.	0.	418.	.92	.49	.94	63.	120.	-57.	1.89
6	20.2	.91	6.6	237.	0.	383.	.88	.46	.94	53.	152.	-99.	2.87
7	19.6	.90	7.0	185.	0.	404.	.87	.49	.94	58.	100.	-42.	1.72
8	19.6	.88	7.7	147.	0.	439.	.87	.53	.94	68.	62.	6.	.91
9	20.5	.85	8.7	54.	0.	461.	.89	.61	1.00	89.	10.	79.	.11
10	21.6	.81	9.8	25.	0.	498.	.92	.66	1.08	117.	0.	117.	.00
11	22.2	.81	10.3	28.	0.	485.	.93	.68	1.08	118.	1.	117.	.01
12	22.6	.81	10.3	38.	0.	498.	.94	.67	1.08	122.	4.	117.	.03
AVE	21.6	.85	8.7	115.	0.	456.	.92	.59	.99	89.	53.	36.	.81

82.795 CAMPINA GRANDE PARAIBA LAT 7 13 LONG 35 53 ELEV 527

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	24.3	.70	10.5	27.	0.	501.	.98	.82	1.08	157.	1.	156.	.01
2	24.4	.72	10.1	43.	0.	454.	.99	.80	1.08	139.	6.	133.	.04
3	24.4	.76	9.5	74.	0.	490.	.99	.75	1.00	130.	19.	111.	.15
4	23.8	.79	8.7	94.	0.	442.	.97	.70	1.00	107.	29.	78.	.27
5	22.6	.84	7.4	117.	0.	417.	.94	.62	.94	82.	44.	38.	.54
6	21.4	.85	6.8	118.	0.	382.	.91	.59	.94	69.	45.	24.	.65
7	20.6	.85	7.4	84.	0.	403.	.89	.60	1.00	78.	24.	54.	.31
8	20.7	.81	8.3	58.	0.	438.	.90	.67	1.00	94.	12.	82.	.13
9	21.9	.75	9.5	24.	0.	462.	.93	.76	1.08	125.	0.	125.	.00
10	22.9	.71	10.6	13.	0.	499.	.95	.82	1.08	150.	0.	150.	.00
11	23.7	.70	10.8	16.	0.	485.	.97	.83	1.08	151.	0.	151.	.00
12	24.0	.70	10.6	19.	0.	499.	.98	.82	1.08	155.	0.	155.	.00
AVE	22.9	.75	9.2	57.	1.	456.	.95	.73	1.03	120.	15.	105.	.17

Table 3. (Continued)

82.697 GUARABIRA PARAIBA LAT 6 51 LONG 35 29 ELEV 101

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.9	.75	11.7	42.	0.	501.	1.05	.76	1.08	150.	5.	145.	.04
2	27.0	.76	11.5	63.	0.	454.	1.05	.75	1.00	125.	14.	112.	.11
3	27.0	.77	10.8	98.	0.	491.	1.05	.73	1.00	133.	32.	101.	.24
4	26.3	.79	9.9	123.	0.	444.	1.03	.69	.94	105.	48.	57.	.46
5	25.4	.82	9.0	151.	0.	420.	1.01	.65	.94	92.	69.	22.	.76
6	24.2	.84	8.5	203.	0.	385.	.98	.62	.94	77.	118.	-41.	1.53
7	23.6	.84	8.8	88.	0.	407.	.97	.62	1.00	85.	26.	59.	.31
8	23.5	.83	9.6	56.	0.	441.	.96	.64	1.00	96.	11.	85.	.11
9	24.6	.79	11.0	22.	0.	463.	.99	.70	1.08	122.	0.	122.	.00
10	25.6	.76	12.2	12.	0.	500.	1.01	.75	1.08	145.	0.	145.	.00
11	26.3	.75	12.3	20.	0.	486.	1.03	.76	1.08	144.	0.	144.	.00
12	26.7	.75	11.9	46.	0.	499.	1.04	.76	1.08	150.	7.	143.	.05
AVE	25.6	.79	10.6	77.	0.	458.	1.01	.70	1.02	119.	28.	91.	.30

82.798 JOAO PESSOA PARAIBA LAT 7 6 LONG 34 52 ELEV 28

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.6	.76	7.4	62.	257.	502.	1.04	.74	1.00	135.	13.	122.	.10
2	26.8	.77	7.4	79.	235.	455.	1.04	.73	1.00	121.	22.	99.	.18
3	26.8	.78	7.6	173.	231.	491.	1.04	.71	.94	120.	88.	32.	.74
4	26.3	.81	7.6	227.	214.	443.	1.03	.67	.94	101.	142.	-41.	1.40
5	25.3	.84	7.3	301.	208.	418.	1.01	.62	.94	86.	216.	-130.	2.51
6	24.3	.84	7.1	348.	192.	384.	.98	.61	.94	76.	263.	-187.	3.47
7	23.7	.84	7.2	190.	207.	405.	.97	.62	.94	80.	105.	-25.	1.31
8	23.7	.82	7.5	132.	231.	440.	.97	.66	.94	92.	54.	38.	.59
9	24.7	.79	7.4	61.	237.	463.	.99	.71	1.00	114.	13.	101.	.11
10	25.6	.77	7.3	23.	282.	500.	1.01	.74	1.08	142.	0.	142.	.00
11	26.1	.76	6.9	31.	280.	487.	1.03	.74	1.08	140.	2.	138.	.01
12	26.4	.76	7.1	41.	282.	500.	1.03	.74	1.08	145.	5.	140.	.04
AVE	25.5	.80	7.3	139.	239.	457.	1.01	.69	.99	113.	77.	36.	.87

Table 3. (Continued)

82.779 UMBUZEIRO PARAIBA LAT 7 42 LONG 35 42 ELEV 497

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	23.9	.74	10.3	25.	0.	503.	.97	.78	1.08	147.	1.	146.	.00
2	24.0	.75	10.0	43.	0.	455.	.98	.76	1.08	129.	6.	123.	.05
3	23.9	.77	9.4	77.	0.	489.	.97	.73	1.00	124.	20.	104.	.16
4	23.2	.81	8.4	106.	0.	440.	.96	.66	.94	94.	37.	57.	.39
5	22.1	.86	7.3	137.	0.	414.	.93	.58	.94	75.	58.	16.	.78
6	20.9	.87	6.8	151.	0.	379.	.90	.56	.94	64.	69.	-5.	1.07
7	20.2	.87	7.3	119.	0.	401.	.88	.57	.94	68.	45.	23.	.67
8	20.2	.84	8.0	82.	0.	436.	.88	.62	1.00	85.	23.	62.	.27
9	21.2	.80	8.8	32.	0.	461.	.91	.68	1.08	110.	2.	108.	.02
10	22.4	.75	9.9	19.	0.	500.	.94	.76	1.08	136.	0.	136.	.00
11	23.2	.73	10.6	17.	0.	488.	.96	.78	1.08	141.	0.	141.	.00
12	23.5	.74	10.4	21.	0.	501.	.96	.78	1.08	145.	0.	145.	.00
AVE	22.4	.79	8.9	69.	0.	456.	.94	.69	1.02	110.	22.	88.	.29

82.893 GAPANHUNS PBCO LAT 8 53 LONG 36 31 ELEV 927

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	21.9	.75	11.6	39.	0.	507.	.93	.76	1.08	139.	5.	135.	.03
2	21.9	.76	11.2	55.	0.	456.	.93	.74	1.00	113.	10.	103.	.09
3	21.9	.77	10.8	111.	0.	488.	.93	.73	.94	112.	40.	72.	.36
4	21.2	.81	9.6	134.	0.	435.	.91	.67	.94	90.	56.	34.	.62
5	19.8	.87	7.9	224.	0.	407.	.88	.56	.94	68.	139.	-72.	2.05
6	18.8	.90	7.1	231.	0.	371.	.85	.51	.94	55.	146.	-91.	2.67
7	17.8	.91	7.1	213.	0.	393.	.83	.48	.94	54.	128.	-74.	2.38
8	17.9	.89	7.7	155.	0.	430.	.83	.52	.94	54.	73.	-9.	1.15
9	19.2	.83	8.8	66.	0.	458.	.86	.63	1.00	90.	15.	75.	.17
10	20.6	.78	10.4	30.	0.	500.	.89	.71	1.08	125.	2.	123.	.01
11	21.5	.76	11.4	36.	0.	491.	.92	.75	1.08	132.	4.	128.	.03
12	22.0	.75	11.7	39.	0.	505.	.93	.76	1.08	141.	5.	136.	.03
AVE	20.4	.82	9.6	111.	0.	454.	.89	.65	1.00	99.	52.	47.	.80

Table 3. (Continued)

82.799 BOIANA PBCO LAT 7 33 LONG 34 59 ELEV 11

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.0	.75	11.1	97.	0.	504.	1.02	.76	1.00	137.	26.	111.	.19
2	26.0	.75	10.7	151.	0.	455.	1.02	.76	.94	117.	69.	47.	.59
3	25.9	.76	10.3	232.	0.	490.	1.02	.75	.94	124.	147.	-23.	1.19
4	25.4	.77	9.7	326.	0.	441.	1.01	.73	.94	107.	241.	-134.	2.25
5	24.8	.79	9.3	361.	0.	416.	1.00	.70	.94	95.	276.	-181.	2.90
6	23.8	.82	9.5	388.	0.	381.	.97	.66	.94	80.	303.	-223.	3.79
7	23.3	.83	9.9	259.	0.	403.	.96	.63	.94	80.	174.	-94.	2.17
8	23.3	.83	10.3	175.	0.	438.	.96	.64	.94	88.	91.	-3.	1.03
9	24.5	.80	10.4	92.	0.	462.	.99	.68	1.00	108.	29.	80.	.26
10	25.2	.78	10.9	51.	0.	501.	1.00	.72	1.00	127.	9.	118.	.07
11	25.7	.75	11.2	52.	0.	488.	1.02	.74	1.00	129.	9.	120.	.07
12	25.9	.76	11.2	76.	0.	502.	1.02	.75	1.00	135.	20.	115.	.15
AVE	25.0	.78	10.4	188.	0.	457.	1.00	.71	.96	111.	116.	-6.	1.22

82.781 NAZARE DA MATA PBCO LAT 7 44 LONG 35 15 ELEV 87

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.4	.74	11.4	38.	258.	505.	1.03	.77	1.08	153.	4.	149.	.03
2	26.5	.76	10.6	64.	216.	455.	1.04	.74	1.00	123.	14.	109.	.11
3	26.2	.79	9.9	109.	224.	490.	1.03	.70	.94	117.	39.	79.	.33
4	25.6	.82	9.0	151.	207.	441.	1.01	.65	.94	96.	69.	27.	.72
5	24.7	.85	8.3	197.	190.	415.	.99	.60	.94	82.	112.	-29.	1.36
6	23.5	.86	8.0	197.	173.	380.	.96	.58	.94	70.	112.	-43.	1.61
7	22.9	.85	8.4	128.	189.	402.	.95	.60	.94	75.	52.	23.	.69
8	22.9	.83	9.0	77.	204.	437.	.95	.63	1.00	92.	20.	71.	.22
9	23.7	.80	10.2	39.	232.	462.	.97	.68	1.08	115.	5.	110.	.04
10	24.8	.77	11.3	21.	268.	501.	1.00	.74	1.08	140.	0.	140.	.00
11	25.6	.74	11.8	27.	262.	489.	1.01	.77	1.08	145.	1.	144.	.01
12	26.1	.74	11.6	33.	273.	503.	1.03	.77	1.08	151.	3.	148.	.02
AVE	24.9	.80	10.0	90.	225.	457.	1.00	.69	1.01	113.	36.	77.	.43

Table 3. (Continued)

82.898 RECIFE IOLINDA PBCO LAT 8 1 LONG 34 51 ELEV 56

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	27.0	.76	5.7	40.	281.	506.	1.05	.74	1.08	149.	5.	144.	.03
2	27.1	.77	5.7	89.	240.	457.	1.05	.73	1.03	122.	27.	95.	.22
3	27.0	.79	5.9	197.	236.	491.	1.05	.70	.94	119.	112.	7.	.94
4	26.6	.81	6.2	248.	213.	440.	1.04	.67	.94	101.	163.	-62.	1.61
5	25.6	.83	6.1	335.	201.	414.	1.01	.64	.94	89.	250.	-161.	2.81
6	24.7	.83	5.8	318.	186.	378.	.99	.64	.94	79.	233.	-154.	2.94
7	24.2	.82	5.8	224.	198.	400.	.98	.66	.94	85.	139.	-53.	1.62
8	24.2	.80	5.9	146.	214.	437.	.98	.68	.94	96.	66.	30.	.69
9	25.0	.78	5.5	62.	244.	462.	1.00	.71	1.00	115.	14.	101.	.12
10	25.9	.76	5.5	37.	280.	502.	1.02	.74	1.08	144.	4.	140.	.03
11	26.4	.76	5.5	25.	285.	490.	1.03	.74	1.08	142.	0.	142.	.00
12	26.7	.76	5.6	40.	294.	504.	1.04	.74	1.08	147.	5.	143.	.03
AVE	25.9	.79	5.8	147.	239.	457.	1.02	.70	1.00	116.	85.	31.	.92

82.994 MACEIO ALA LAT 9 40 LONG 35 42 ELEV 46

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.5	.76	6.7	58.	281.	512.	1.04	.74	1.00	138.	12.	126.	.09
2	26.7	.77	6.9	63.	244.	459.	1.04	.73	1.00	123.	14.	109.	.11
3	26.6	.79	6.6	135.	240.	489.	1.04	.70	.94	117.	57.	61.	.48
4	26.1	.81	6.1	225.	216.	435.	1.03	.67	.94	99.	140.	-41.	1.42
5	25.3	.83	5.5	345.	194.	405.	1.01	.64	.94	86.	260.	-174.	3.03
6	24.3	.82	5.5	264.	186.	369.	.98	.66	.94	79.	179.	-100.	2.28
7	23.7	.81	5.6	216.	199.	391.	.97	.67	.94	84.	131.	-47.	1.55
8	23.7	.78	5.6	134.	213.	429.	.97	.71	.94	98.	56.	42.	.57
9	24.5	.77	6.0	96.	229.	459.	.99	.73	1.00	115.	25.	90.	.22
10	25.3	.76	6.2	59.	268.	503.	1.01	.74	1.00	131.	12.	119.	.09
11	25.9	.76	6.8	31.	282.	495.	1.02	.75	1.08	144.	2.	142.	.01
12	26.3	.76	6.8	38.	292.	511.	1.03	.74	1.08	148.	4.	144.	.03
AVE	25.4	.79	6.2	138.	237.	455.	1.01	.71	.98	113.	74.	39.	.82

Table 3. (Continued)

83.096 ARACAJU SER LAT 10 55 LONG 37 5 ELEV 6

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.5	.77	6.2	43.	253.	516.	1.04	.73	1.08	148.	6.	142.	.04
2	26.8	.77	6.4	45.	226.	461.	1.04	.73	1.08	134.	7.	127.	.05
3	26.9	.78	6.3	107.	224.	488.	1.05	.72	.94	121.	37.	84.	.31
4	26.4	.79	6.2	162.	214.	431.	1.03	.70	.94	103.	78.	24.	.76
5	25.4	.81	6.0	263.	190.	399.	1.01	.67	.94	89.	178.	-89.	2.01
6	24.5	.80	5.9	177.	186.	362.	.99	.69	.94	81.	92.	-11.	1.14
7	23.8	.80	6.0	161.	179.	384.	.97	.69	.94	84.	78.	6.	.93
8	23.7	.78	6.0	104.	201.	424.	.97	.72	.94	97.	35.	62.	.35
9	24.5	.77	5.9	54.	214.	456.	.99	.73	1.00	115.	10.	105.	.09
10	25.4	.77	6.1	50.	242.	504.	1.01	.73	1.00	130.	8.	121.	.07
11	25.8	.78	6.3	49.	246.	499.	1.02	.72	1.08	138.	8.	129.	.06
12	26.2	.78	6.4	38.	268.	516.	1.03	.71	1.08	143.	4.	139.	.03
AVE	25.5	.78	6.1	104.	220.	453.	1.01	.71	1.00	115.	45.	70.	.49

83.195 ITABAIANINHA SER LAT 11 17 LONG 37 49 ELEV 225

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.1	.77	11.1	41.	0.	517.	1.00	.73	1.08	145.	5.	140.	.04
2	25.4	.77	11.1	41.	0.	461.	1.01	.73	1.08	130.	5.	125.	.04
3	25.2	.79	10.7	91.	0.	487.	1.00	.71	1.00	122.	28.	94.	.23
4	24.5	.82	9.5	112.	0.	428.	.99	.65	.94	91.	41.	50.	.45
5	23.1	.86	8.2	160.	0.	396.	.95	.59	.94	73.	77.	-4.	1.05
6	22.0	.87	8.4	106.	0.	359.	.93	.57	.94	63.	37.	26.	.59
7	21.2	.88	8.3	131.	0.	381.	.91	.55	.94	63.	54.	10.	.85
8	21.2	.86	8.9	86.	0.	421.	.91	.59	1.00	80.	25.	55.	.31
9	22.1	.83	9.9	55.	0.	454.	.93	.64	1.00	95.	11.	85.	.11
10	23.4	.81	10.6	53.	0.	503.	.96	.67	1.00	114.	10.	104.	.09
11	24.4	.79	10.9	72.	0.	499.	.99	.70	1.00	122.	18.	104.	.15
12	25.0	.78	10.7	51.	0.	517.	1.00	.71	1.00	130.	9.	122.	.07
AVE	23.5	.82	9.9	93.	0.	452.	.97	.65	.99	102.	27.	76.	.33

Table 3. (Continued)

83.097 PROPRIA SER LAT 10 12 LONG 36 52 ELEV 34

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	27.2	.70	10.5	30.	0.	514.	1.05	.83	1.08	169.	2.	167.	.01
2	27.9	.70	10.6	24.	0.	461.	1.07	.83	1.08	155.	0.	155.	.00
3	27.8	.71	10.0	47.	0.	489.	1.07	.81	1.08	161.	7.	153.	.05
4	26.8	.76	9.4	90.	0.	433.	1.04	.74	1.00	117.	27.	90.	.23
5	25.2	.82	7.9	158.	0.	402.	1.00	.65	.94	87.	75.	11.	.87
6	23.8	.84	7.6	123.	0.	365.	.97	.62	.94	72.	48.	24.	.66
7	23.0	.84	7.5	111.	0.	388.	.95	.61	.94	74.	40.	34.	.54
8	22.9	.83	8.1	80.	0.	427.	.95	.64	1.00	91.	22.	69.	.24
9	24.3	.78	9.2	40.	0.	457.	.98	.71	1.08	121.	5.	116.	.04
10	25.8	.74	10.3	25.	0.	504.	1.02	.77	1.08	150.	0.	150.	.00
11	26.8	.71	10.7	36.	0.	497.	1.04	.82	1.08	161.	4.	157.	.02
12	27.4	.70	10.6	22.	0.	514.	1.06	.82	1.08	170.	0.	170.	.00
AVE	25.7	.76	9.4	66.	0.	454.	1.02	.74	1.03	127.	19.	108.	.22

83.179 BARRA BAHIA LAT 11 5 LONG 43 10 ELEV 408

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.7	.65	12.5	89.	270.	517.	1.04	.89	1.00	179.	27.	143.	.16
2	26.8	.67	11.9	93.	251.	462.	1.04	.87	1.00	149.	29.	120.	.19
3	26.6	.68	11.9	119.	256.	488.	1.04	.85	.94	144.	45.	99.	.31
4	26.4	.66	12.5	62.	278.	430.	1.03	.88	1.00	138.	13.	125.	.10
5	25.5	.60	14.2	16.	299.	398.	1.01	.94	1.08	145.	0.	146.	.00
6	24.5	.55	16.0	0.	304.	361.	.99	1.00	1.08	137.	0.	137.	.00
7	24.1	.53	16.5	0.	319.	383.	.98	1.00	1.08	144.	0.	144.	.00
8	25.0	.48	16.8	0.	329.	424.	1.00	1.00	1.08	163.	0.	163.	.00
9	27.2	.46	15.6	8.	288.	457.	1.05	1.00	1.08	185.	0.	185.	.00
10	28.6	.48	13.9	32.	285.	505.	1.09	1.00	1.08	211.	2.	209.	.01
11	27.5	.60	12.2	118.	245.	500.	1.06	.95	.94	169.	44.	124.	.26
12	26.4	.68	11.5	147.	242.	517.	1.03	.86	.94	153.	66.	88.	.43
AVE	26.3	.59	13.8	57.	281.	453.	1.03	.94	1.02	159.	19.	140.	.12

Table 3. (Continued)

83.339 CAETITE BAHIA LAT 14 4 LONG 42 29 ELEV 872

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	22.0	.77	10.9	134.	208.	525.	.93	.74	.94	122.	56.	66.	.46
2	22.3	.76	11.2	92.	206.	463.	.94	.75	1.00	117.	29.	89.	.24
3	22.4	.77	10.8	127.	208.	482.	.94	.73	.94	112.	51.	62.	.45
4	21.6	.77	10.7	63.	205.	417.	.92	.73	1.00	101.	14.	87.	.14
5	20.4	.75	11.1	19.	222.	379.	.89	.76	1.08	100.	0.	100.	.00
6	19.2	.73	11.5	11.	221.	341.	.86	.78	1.08	90.	0.	90.	.00
7	18.7	.71	12.1	12.	234.	363.	.85	.81	1.08	98.	0.	98.	.00
8	19.5	.66	13.2	10.	262.	408.	.87	.88	1.08	122.	0.	122.	.00
9	21.6	.62	13.7	13.	244.	448.	.92	.92	1.08	149.	0.	149.	.00
10	22.8	.65	13.0	59.	225.	504.	.95	.90	1.00	155.	12.	143.	.08
11	22.2	.74	10.9	185.	164.	506.	.93	.77	.94	123.	100.	23.	.81
12	22.1	.78	10.4	164.	177.	527.	.93	.72	.94	120.	80.	40.	.67
AVE	21.2	.73	11.6	74.	215.	447.	.91	.79	1.01	117.	28.	89.	.24

83.498 CARAVELAS BAHIA LAT 17 44 LONG 39 15 ELEV 4

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.5	.81	8.5	125.	0.	537.	1.01	.67	.94	119.	49.	70.	.41
2	25.7	.81	9.1	97.	0.	468.	1.02	.67	1.00	112.	31.	80.	.28
3	25.4	.83	8.4	193.	0.	477.	1.01	.64	.94	101.	98.	3.	.97
4	24.5	.84	7.8	218.	0.	403.	.99	.62	.94	82.	133.	-51.	1.63
5	22.9	.84	8.0	141.	0.	359.	.95	.61	.94	69.	62.	7.	.90
6	21.7	.85	8.3	113.	0.	318.	.92	.59	.94	57.	41.	16.	.72
7	20.8	.84	8.5	119.	0.	341.	.90	.61	.94	62.	45.	16.	.73
8	21.2	.82	8.9	81.	0.	390.	.91	.65	1.00	80.	22.	58.	.28
9	22.2	.81	8.6	98.	0.	438.	.93	.67	1.00	95.	32.	64.	.33
10	23.5	.81	7.8	144.	0.	504.	.96	.68	.94	108.	64.	44.	.59
11	24.2	.83	7.2	239.	0.	515.	.98	.64	.94	107.	154.	-47.	1.44
12	23.0	.82	7.6	170.	0.	539.	.95	.65	.94	109.	86.	24.	.78
AVE	23.4	.83	8.2	144.	0.	441.	.96	.64	.95	92.	68.	24.	.76

Table 3. (Continued)

83.076 IBIPETUBA BAHIA LAT 11 1 LONG 44 31 : ELEV 434

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	24.6	.78	13.2	125.	0.	516.	.99	.72	.94	122.	49.	73.	.40
2	24.6	.79	12.8	145.	0.	461.	.99	.70	.94	107.	64.	43.	.60
3	24.6	.80	12.2	136.	0.	487.	.99	.68	.94	110.	58.	53.	.52
4	24.5	.78	13.5	73.	0.	429.	.99	.71	1.00	108.	19.	89.	.17
5	23.4	.74	15.0	11.	0.	397.	.96	.77	1.08	114.	0.	114.	.00
6	21.9	.69	19.0	1.	0.	360.	.93	.84	1.08	108.	0.	108.	.00
7	21.5	.65	20.1	1.	0.	382.	.92	.89	1.08	121.	0.	121.	.00
8	22.3	.60	21.2	1.	0.	423.	.94	.95	1.08	145.	0.	145.	.00
9	24.9	.58	20.1	7.	0.	456.	1.00	.97	1.08	170.	0.	170.	.00
10	26.3	.61	17.2	53.	0.	504.	1.03	.93	1.00	172.	10.	163.	.06
11	25.5	.72	13.8	158.	0.	499.	1.01	.80	.94	135.	75.	61.	.55
12	24.8	.78	12.8	198.	0.	516.	1.00	.71	.94	123.	113.	9.	.92
AVE	24.1	.71	16.0	76.	0.	453.	.98	.81	1.01	128.	32.	96.	.27

83.348 ILHEUS BAHIA LAT 14 47 LONG 39 3 ELEV 44

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.9	.83	7.8	149.	251.	529.	1.02	.64	.94	114.	68.	46.	.60
2	26.1	.83	7.9	152.	224.	466.	1.03	.64	.94	101.	79.	22.	.78
3	25.9	.84	7.7	254.	218.	483.	1.02	.61	.94	99.	169.	-70.	1.70
4	25.2	.86	7.4	270.	201.	416.	1.00	.58	.94	80.	185.	-105.	2.31
5	23.8	.86	7.5	170.	210.	376.	.97	.58	.94	70.	86.	-16.	1.23
6	22.7	.87	7.6	195.	191.	337.	.94	.56	.94	59.	110.	-52.	1.88
7	22.0	.86	7.5	191.	138.	360.	.93	.58	.94	64.	106.	-43.	1.67
8	22.4	.84	8.0	130.	220.	405.	.94	.62	.94	78.	53.	25.	.68
9	23.4	.83	7.7	97.	210.	447.	.96	.64	1.00	95.	31.	65.	.33
10	24.4	.83	7.2	124.	223.	505.	.99	.64	.94	105.	49.	57.	.46
11	24.9	.85	7.1	188.	194.	509.	1.00	.60	.94	101.	103.	-2.	1.02
12	25.5	.84	7.2	152.	227.	531.	1.01	.62	.94	109.	70.	40.	.64
AVE	24.3	.84	7.5	174.	214.	447.	.99	.51	.93	90.	92.	-3.	1.11

Table 3. (Continued)

83.186 JACOBINA BAHIA LAT 11 11 LONG 40 31 ; ELEV 470

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.3	.68	11.0	80.	0.	517.	1.01	.86	1.00	159.	22.	137.	.14
2	25.7	.67	11.3	74.	0.	461.	1.02	.86	1.00	144.	19.	125.	.13
3	25.3	.69	10.6	129.	0.	487.	1.01	.84	.94	137.	52.	85.	.38
4	24.3	.73	9.5	97.	0.	429.	.98	.79	1.00	118.	31.	86.	.27
5	22.7	.77	8.5	73.	0.	396.	.94	.73	1.00	98.	19.	79.	.19
6	21.6	.77	8.6	61.	0.	359.	.92	.73	1.00	86.	13.	73.	.15
7	20.8	.78	8.4	75.	0.	381.	.90	.72	1.00	88.	19.	68.	.22
8	21.2	.74	9.6	54.	0.	422.	.91	.78	1.00	105.	10.	96.	.09
9	23.0	.69	11.0	34.	0.	455.	.95	.85	1.08	141.	3.	138.	.02
10	24.6	.65	12.1	30.	0.	504.	.99	.90	1.08	172.	2.	170.	.01
11	25.1	.67	11.8	111.	0.	499.	1.00	.87	.94	145.	40.	106.	.27
12	25.1	.67	11.6	104.	0.	517.	1.00	.86	.94	150.	35.	114.	.24
AVE	23.7	.71	10.3	77.	0.	452.	.97	.81	1.00	129.	22.	107.	.18

83.090 MONTE SANTO BAHIA LAT 10 27 LONG 39 18 ELEV 495

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.4	.64	12.8	55.	0.	514.	1.01	.90	1.00	167.	10.	157.	.06
2	25.5	.64	13.3	43.	0.	460.	1.01	.91	1.08	163.	6.	157.	.04
3	25.1	.66	12.4	70.	0.	488.	1.00	.87	1.00	152.	17.	135.	.11
4	24.1	.71	11.3	72.	0.	431.	.98	.81	1.00	122.	18.	104.	.15
5	22.4	.78	10.0	64.	0.	400.	.94	.72	1.00	95.	14.	81.	.15
6	21.1	.78	9.8	48.	0.	363.	.91	.71	1.08	90.	8.	83.	.08
7	20.2	.80	9.8	54.	0.	385.	.88	.69	1.00	83.	10.	73.	.12
8	20.5	.76	11.0	35.	0.	425.	.89	.75	1.08	110.	3.	106.	.03
9	22.3	.70	12.8	16.	0.	456.	.94	.83	1.08	137.	0.	137.	.00
10	24.0	.64	13.7	16.	0.	503.	.98	.91	1.08	171.	0.	171.	.00
11	24.9	.64	14.0	70.	0.	497.	1.00	.90	1.00	159.	17.	142.	.11
12	25.3	.64	13.6	71.	0.	514.	1.01	.90	1.00	166.	18.	148.	.11
AVE	23.4	.70	12.0	51.	0.	453.	.96	.82	1.03	135.	10.	125.	.08

Table 3. (Continued)

83.229 ONDINA BAHIA LAT 13 0 LONG 38 31 ELEV 45

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.2	.80	6.7	76.	273.	523.	1.03	.69	1.00	130.	20.	110.	.15
2	26.6	.79	6.6	85.	242.	464.	1.04	.70	1.00	118.	24.	94.	.21
3	26.6	.80	6.5	153.	243.	486.	1.04	.69	.94	114.	71.	43.	.62
4	26.0	.82	5.7	291.	208.	423.	1.02	.65	.94	93.	206.	-113.	2.22
5	24.9	.83	5.2	293.	186.	387.	1.00	.63	.94	80.	208.	-128.	2.59
6	24.1	.82	5.3	187.	197.	349.	.98	.65	.94	74.	102.	-28.	1.38
7	23.3	.81	5.2	209.	197.	371.	.96	.66	.94	78.	124.	-46.	1.60
8	23.3	.80	5.6	97.	224.	414.	.96	.69	1.00	96.	31.	64.	.33
9	23.9	.80	5.9	83.	220.	451.	.97	.68	1.00	105.	24.	81.	.22
10	24.8	.81	6.0	91.	246.	505.	1.00	.67	1.00	118.	28.	90.	.23
11	25.2	.83	6.0	135.	222.	504.	1.00	.64	.94	107.	57.	51.	.53
12	25.7	.83	6.2	104.	242.	524.	1.02	.64	.94	113.	35.	78.	.31
AVE	25.0	.81	5.9	150.	225.	450.	1.00	.67	.96	102.	78.	25.	.87

83.238 PARATINGA BAHIA LAT 12 41 LONG 43 11 ELEV 422

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.8	.72	12.1	107.	238.	522.	1.02	.80	.94	142.	37.	105.	.26
2	25.7	.72	12.0	129.	243.	463.	1.02	.80	.94	125.	52.	73.	.42
3	25.8	.73	11.7	115.	219.	486.	1.02	.79	.94	130.	42.	88.	.32
4	25.9	.70	12.8	40.	260.	424.	1.02	.83	1.08	138.	5.	133.	.04
5	25.1	.63	14.2	11.	281.	389.	1.00	.91	1.08	136.	0.	136.	.00
6	24.4	.58	15.6	0.	277.	351.	.99	.97	1.08	129.	0.	129.	.00
7	24.3	.57	15.6	1.	279.	373.	.98	.98	1.08	139.	0.	139.	.00
8	25.6	.53	15.3	0.	305.	417.	1.01	1.00	1.08	162.	0.	162.	.00
9	27.5	.52	14.7	8.	252.	454.	1.06	1.00	1.08	185.	0.	185.	.00
10	28.3	.57	13.8	42.	247.	506.	1.08	.98	1.08	205.	6.	201.	.03
11	26.4	.68	11.8	149.	203.	504.	1.07	.85	.94	148.	68.	80.	.46
12	25.6	.74	11.8	153.	224.	523.	1.01	.78	.94	138.	71.	68.	.51
AVE	25.9	.64	13.4	63.	252.	451.	1.02	.89	1.02	148.	23.	125.	.17

Table 3. (Continued)

82.979 PEMANSO BAHIA LAT 9 41 LONG 42 4 ELEV 411

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	27.5	.51	14.7	92.	0.	512.	1.06	1.00	1.00	193.	28.	165.	.15
2	27.5	.52	14.6	65.	0.	460.	1.06	1.00	1.00	173.	15.	159.	.08
3	27.1	.51	14.2	108.	0.	489.	1.05	1.00	.94	172.	38.	134.	.22
4	27.3	.51	14.7	35.	0.	435.	1.06	1.00	1.08	176.	3.	173.	.02
5	27.8	.50	15.1	10.	0.	406.	1.05	1.00	1.08	163.	0.	163.	.00
6	26.0	.50	15.6	1.	0.	369.	1.02	1.00	1.08	145.	0.	145.	.00
7	25.6	.50	15.8	1.	0.	392.	1.01	1.00	1.08	153.	0.	153.	.00
8	26.0	.43	16.1	0.	0.	430.	1.02	1.00	1.08	169.	0.	169.	.00
9	27.2	.46	15.3	4.	0.	460.	1.05	1.00	1.08	186.	0.	186.	.00
10	28.3	.45	15.3	10.	0.	504.	1.08	1.00	1.08	209.	0.	209.	.00
11	28.0	.47	14.6	78.	0.	496.	1.07	1.00	1.00	189.	21.	168.	.11
12	27.5	.48	14.5	93.	0.	512.	1.06	1.00	1.00	193.	29.	164.	.15
AVE	27.1	.49	15.1	41.	0.	455.	1.05	1.00	1.04	177.	11.	166.	.06

83.223 SAO FCO DO CONDE BAHIA LAT 12 37 LONG 38 40 ELEV 80

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.7	.82	9.1	77.	0.	522.	1.02	.65	1.00	121.	20.	101.	.17
2	26.0	.82	9.2	74.	0.	463.	1.02	.65	1.00	108.	19.	89.	.18
3	25.8	.84	8.5	139.	0.	486.	1.02	.61	.94	100.	59.	41.	.59
4	25.0	.87	7.4	228.	0.	424.	1.00	.57	.94	79.	143.	-63.	1.80
5	23.8	.89	6.6	299.	0.	389.	.97	.53	.94	66.	214.	-148.	3.24
6	23.0	.88	6.5	163.	0.	351.	.95	.53	.94	59.	79.	-21.	1.35
7	22.2	.89	6.6	216.	0.	373.	.93	.52	.94	60.	131.	-71.	2.19
8	22.3	.87	7.3	113.	0.	416.	.94	.55	.94	71.	41.	30.	.58
9	23.2	.86	7.9	89.	0.	452.	.96	.58	1.00	88.	27.	61.	.30
10	24.2	.84	8.4	89.	0.	504.	.98	.62	1.00	107.	27.	80.	.25
11	24.9	.83	8.7	135.	0.	503.	1.00	.63	.94	104.	57.	48.	.54
12	25.5	.83	9.2	92.	0.	523.	1.01	.64	1.00	120.	29.	91.	.24
AVE	24.3	.85	8.0	143.	0.	450.	.98	.59	.95	90.	70.	20.	.95

Table 3. (Continued)

83.248 SALVADOR BAHIA LAT 12 57 LONG 38 30 ELEV 8

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	26.0	.79	6.3	74.	257.	523.	1.02	.71	1.00	132.	19.	113.	.14
2	26.3	.78	6.0	78.	228.	464.	1.03	.71	1.00	119.	21.	98.	.18
3	26.3	.80	5.7	163.	221.	486.	1.03	.69	.94	114.	80.	34.	.70
4	25.8	.82	5.3	289.	198.	423.	1.02	.65	.94	93.	204.	-112.	2.20
5	24.8	.82	4.9	298.	180.	387.	1.00	.65	.94	82.	213.	-131.	2.60
6	23.8	.81	5.0	193.	191.	349.	.97	.67	.94	75.	108.	-33.	1.45
7	23.0	.80	4.9	206.	187.	371.	.95	.68	.94	80.	121.	-41.	1.52
8	22.9	.79	5.0	111.	211.	414.	.95	.70	.94	91.	40.	51.	.44
9	23.6	.80	5.5	85.	208.	451.	.97	.69	1.00	105.	25.	81.	.23
10	24.5	.80	5.6	95.	231.	504.	.99	.69	1.00	120.	30.	91.	.25
11	25.2	.80	5.7	141.	216.	504.	1.00	.68	.94	113.	61.	52.	.54
12	25.6	.80	6.2	98.	241.	524.	1.01	.69	1.00	128.	32.	96.	.25
AVE	24.8	.80	5.5	153.	214.	450.	1.00	.68	.96	104.	80.	25.	.87

83.442 APACUAI M.G. LAT 16 51 LONG 41 59 ELEV 264

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.6	.75	13.7	146.	0.	535.	1.01	.76	.94	137.	65.	72.	.48
2	26.1	.71	14.3	83.	0.	468.	1.03	.81	1.00	137.	23.	114.	.17
3	25.7	.73	13.5	92.	0.	479.	1.02	.79	1.00	136.	29.	107.	.21
4	24.3	.73	13.5	55.	0.	407.	.98	.78	1.00	111.	11.	100.	.10
5	22.6	.72	14.6	11.	0.	364.	.94	.81	1.08	106.	0.	106.	.00
6	21.1	.70	15.9	6.	0.	324.	.91	.83	1.08	93.	0.	93.	.00
7	20.9	.67	15.9	5.	0.	347.	.90	.86	1.08	103.	0.	103.	.00
8	22.2	.63	17.1	3.	0.	395.	.93	.92	1.08	129.	0.	129.	.00
9	24.3	.59	16.1	17.	0.	441.	.98	.96	1.08	158.	0.	158.	.00
10	25.9	.59	14.1	63.	0.	505.	1.02	.96	1.00	175.	14.	161.	.08
11	25.1	.72	12.2	159.	0.	513.	1.00	.80	.94	137.	76.	61.	.56
12	25.1	.77	11.9	169.	0.	536.	1.00	.74	.94	132.	104.	28.	.79
AVE	24.1	.69	14.4	69.	0.	443.	.98	.83	1.02	130.	27.	103.	.20

Table 3. (Continued)

83.689 BARBACENA M.G. LAT 21 15 LONG 43 46 ELEV 1126

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	19.9	.81	9.9	237.	173.	542.	.88	.67	.94	109.	152.	-42.	1.39
2	19.9	.81	10.1	212.	152.	467.	.88	.66	.94	93.	127.	-34.	1.36
3	19.1	.83	9.5	186.	170.	467.	.86	.64	.94	88.	101.	-13.	1.15
4	17.5	.83	9.6	64.	166.	385.	.82	.63	1.00	73.	14.	59.	.20
5	15.9	.82	10.7	31.	197.	334.	.79	.66	1.08	68.	2.	66.	.03
6	14.8	.81	11.8	21.	195.	293.	.76	.67	1.08	59.	0.	59.	.00
7	14.4	.79	11.8	13.	202.	316.	.75	.71	1.08	66.	0.	66.	.00
8	15.6	.74	12.9	19.	219.	369.	.77	.77	1.08	87.	0.	87.	.00
9	16.9	.75	11.8	58.	155.	425.	.81	.77	1.00	95.	12.	84.	.12
10	17.9	.79	10.4	134.	149.	499.	.83	.71	.94	100.	56.	44.	.56
11	18.4	.81	9.8	135.	150.	518.	.84	.67	.94	101.	100.	1.	.99
12	19.0	.84	9.0	289.	130.	548.	.86	.63	.94	101.	204.	-103.	2.02
AVE	17.4	.80	10.6	121.	172.	430.	.82	.69	1.00	87.	64.	23.	.65

83.587 BELO HORIZONTE M.G. LAT 19 56 LONG 43 56 ELEV 915

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	22.8	.75	9.4	268.	192.	541.	.95	.75	.94	131.	183.	-53.	1.40
2	22.9	.74	9.6	194.	174.	468.	.95	.77	.94	116.	109.	7.	.94
3	22.3	.76	9.3	165.	205.	471.	.94	.75	.94	113.	81.	31.	.72
4	21.1	.74	9.7	77.	219.	392.	.91	.77	1.00	99.	21.	78.	.21
5	19.1	.73	10.5	22.	240.	344.	.86	.79	1.08	91.	0.	91.	.00
6	18.0	.72	11.1	10.	249.	303.	.83	.81	1.08	80.	0.	80.	.00
7	17.7	.67	11.2	6.	257.	326.	.82	.86	1.08	91.	0.	91.	.00
8	19.0	.61	12.1	9.	263.	377.	.86	.93	1.08	118.	0.	118.	.00
9	20.8	.53	11.5	38.	139.	430.	.90	.91	1.08	138.	4.	134.	.03
10	21.5	.69	10.0	113.	182.	502.	.92	.84	.94	132.	41.	90.	.31
11	21.7	.74	9.1	215.	171.	517.	.92	.78	.94	126.	130.	-4.	1.03
12	21.6	.80	8.4	354.	142.	545.	.92	.69	.94	118.	269.	-152.	2.29
AVE	20.7	.72	10.2	123.	208.	435.	.90	.81	1.00	113.	70.	43.	.58

Table 3. (Continued)

83.589 CONCEICAO DO MATO DENTM.G. LAT 19 2 LONG 43 25 ELEV 675

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	22.9	.77	11.2	261.	182.	539.	.95	.73	.94	126.	176.	-50.	1.40
2	22.8	.78	11.4	211.	160.	467.	.95	.72	.94	108.	126.	-19.	1.17
3	22.3	.80	10.8	193.	161.	473.	.94	.69	.94	104.	108.	-4.	1.04
4	20.6	.81	11.1	104.	146.	396.	.89	.68	.94	81.	36.	45.	.44
5	18.4	.81	12.4	37.	171.	349.	.84	.68	1.08	77.	4.	73.	.05
6	16.8	.80	14.0	15.	170.	308.	.80	.69	1.08	66.	0.	66.	.00
7	16.4	.78	14.0	15.	175.	331.	.79	.72	1.08	74.	0.	74.	.00
8	17.3	.73	16.0	8.	208.	382.	.82	.79	1.08	96.	0.	96.	.00
9	19.6	.71	14.7	44.	149.	433.	.87	.82	1.08	120.	6.	113.	.05
10	21.0	.73	12.4	141.	124.	502.	.90	.78	.94	120.	62.	59.	.51
11	21.8	.77	10.6	297.	124.	516.	.92	.74	.94	119.	202.	-83.	1.70
12	22.2	.79	9.8	435.	124.	543.	.93	.69	.94	119.	350.	-231.	2.94
AVE	20.2	.77	12.4	146.	158.	437.	.88	.73	1.00	101.	89.	12.	.78

83.536 CURVELO M.G. LAT 18 46 LONG 44 26 ELEV 609

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	24.1	.79	11.7	235.	0.	539.	.98	.70	.94	124.	150.	-26.	1.21
2	24.1	.78	12.2	164.	0.	468.	.98	.71	.94	110.	80.	29.	.73
3	23.7	.81	11.9	163.	0.	474.	.97	.68	.94	105.	79.	25.	.76
4	22.2	.78	13.3	68.	0.	398.	.93	.72	1.00	95.	16.	79.	.17
5	20.1	.76	14.8	19.	0.	351.	.88	.74	1.08	89.	0.	89.	.00
6	18.5	.74	16.0	7.	0.	311.	.84	.78	1.08	79.	0.	79.	.00
7	18.3	.72	16.5	5.	0.	333.	.84	.81	1.08	87.	0.	87.	.00
8	19.8	.67	17.2	6.	0.	384.	.88	.87	1.08	113.	0.	113.	.00
9	22.0	.66	15.9	35.	0.	435.	.93	.88	1.08	138.	3.	134.	.02
10	23.4	.73	13.1	97.	0.	503.	.96	.78	1.00	136.	31.	105.	.23
11	23.5	.79	11.7	190.	0.	515.	.96	.70	.94	117.	105.	12.	.90
12	23.3	.82	10.7	217.	0.	543.	.96	.65	.94	115.	232.	-117.	2.02
AVE	21.9	.75	13.7	109.	0.	438.	.93	.75	1.01	109.	58.	51.	.50

Table 3. (Continued)

83.538 DIAMANTINA M.G. LAT 18 15 LONG 43 36 ELEV 1261

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	20.3	.77	8.5	251.	182.	535.	.89	.72	.94	119.	166.	-47.	1.40
2	20.5	.77	8.7	170.	178.	466.	.89	.73	.94	105.	85.	20.	.81
3	20.0	.79	8.5	173.	180.	474.	.88	.70	.94	101.	89.	12.	.88
4	18.7	.80	8.4	107.	171.	399.	.85	.69	.94	81.	37.	43.	.46
5	17.0	.77	9.3	35.	207.	353.	.81	.73	1.08	83.	3.	80.	.04
6	15.9	.75	9.4	12.	209.	313.	.78	.76	1.08	74.	0.	74.	.00
7	15.3	.73	9.7	9.	219.	336.	.77	.79	1.08	81.	0.	81.	.00
8	16.6	.67	10.8	12.	244.	386.	.80	.87	1.08	106.	0.	106.	.00
9	18.1	.68	10.7	42.	193.	435.	.83	.85	1.08	123.	6.	117.	.05
10	19.1	.73	9.4	112.	166.	502.	.86	.79	.94	117.	41.	76.	.35
11	19.3	.79	8.3	255.	134.	513.	.86	.70	.94	108.	180.	-73.	1.68
12	19.4	.83	7.8	363.	121.	539.	.87	.64	.94	103.	278.	-176.	2.72
AVE	18.3	.76	9.1	129.	184.	438.	.84	.75	1.00	100.	74.	26.	.70

83.574 FRUTAL M.G. LAT 20 2 LONG 48 56 ELEV 563

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	24.6	.80	10.5	268.	0.	542.	.99	.68	.94	123.	183.	-61.	1.50
2	24.6	.80	10.8	238.	0.	468.	.99	.68	.94	106.	153.	-47.	1.44
3	24.4	.80	11.3	199.	0.	472.	.99	.69	.94	108.	114.	-5.	1.05
4	22.9	.75	12.9	86.	0.	392.	.95	.76	1.00	101.	25.	76.	.25
5	20.8	.72	14.3	43.	0.	344.	.90	.80	1.08	96.	6.	90.	.06
6	19.4	.70	15.3	25.	0.	303.	.87	.83	1.08	84.	0.	84.	.01
7	19.6	.62	16.1	11.	0.	325.	.87	.92	1.08	101.	0.	101.	.00
8	21.9	.55	16.7	12.	0.	378.	.93	1.00	1.08	135.	0.	135.	.00
9	23.5	.59	14.8	56.	0.	431.	.96	.96	1.00	143.	11.	132.	.08
10	24.5	.67	13.1	132.	0.	503.	.99	.87	.94	146.	54.	91.	.37
11	24.6	.73	11.9	203.	0.	519.	.99	.78	.94	135.	118.	18.	.87
12	24.5	.79	10.7	254.	0.	547.	.99	.71	.94	130.	169.	-40.	1.31
AVE	22.9	.71	13.2	127.	0.	435.	.95	.81	1.00	117.	70.	48.	.58

Table 3. (Continued)

83.439 GRAO MOGOL M.G. LAT 16 30 LONG 42 47 ELEV 819

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	22.7	.76	12.3	161.	0.	532.	.94	.75	.94	128.	78.	50.	.61
2	23.1	.75	12.4	117.	0.	466.	.95	.76	.94	115.	44.	71.	.38
3	22.3	.78	11.5	151.	0.	478.	.94	.71	.94	108.	69.	38.	.64
4	21.2	.79	11.7	83.	0.	407.	.91	.70	1.00	93.	24.	69.	.25
5	19.5	.78	11.8	22.	0.	365.	.87	.71	1.08	88.	0.	88.	.00
6	19.4	.77	12.3	10.	0.	325.	.84	.74	1.08	79.	0.	79.	.00
7	18.0	.74	12.9	9.	0.	348.	.83	.77	1.08	87.	0.	87.	.00
8	18.9	.68	14.6	6.	0.	395.	.85	.85	1.08	112.	0.	112.	.00
9	21.1	.67	14.1	30.	0.	441.	.91	.86	1.08	135.	2.	133.	.01
10	22.2	.69	13.4	76.	0.	504.	.93	.84	1.00	143.	20.	123.	.14
11	21.9	.78	12.1	225.	0.	511.	.93	.72	.94	115.	140.	-25.	1.22
12	22.0	.80	11.2	276.	0.	535.	.93	.68	.94	115.	191.	-76.	1.66
AVE	20.9	.75	12.5	97.	0.	442.	.90	.76	1.01	110.	47.	62.	.41

83.590 ITABIRA M.G. LAT 19 37 LONG 43 13 ELEV 826

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	22.2	.78	11.0	233.	0.	540.	.93	.71	.94	122.	148.	-26.	1.22
2	22.3	.79	11.1	192.	0.	467.	.94	.71	.94	105.	107.	-2.	1.02
3	21.6	.80	10.7	174.	0.	472.	.92	.69	.94	101.	90.	11.	.89
4	20.0	.81	10.3	96.	0.	393.	.88	.68	1.00	84.	30.	54.	.36
5	18.0	.79	11.6	29.	0.	345.	.83	.70	1.08	78.	1.	77.	.02
6	16.4	.78	12.8	16.	0.	304.	.79	.72	1.08	68.	0.	68.	.00
7	15.7	.76	13.1	8.	0.	327.	.78	.74	1.08	73.	0.	73.	.00
8	17.0	.72	14.5	11.	0.	378.	.81	.80	1.08	95.	0.	95.	.00
9	18.7	.73	12.7	45.	0.	431.	.85	.79	1.08	113.	7.	107.	.06
10	20.3	.75	10.9	109.	0.	501.	.89	.75	.94	114.	39.	75.	.34
11	21.1	.73	9.9	223.	0.	516.	.91	.72	.94	114.	138.	-24.	1.21
12	21.2	.82	9.0	358.	0.	544.	.91	.65	.94	109.	273.	-164.	2.51
AVE	19.5	.79	11.5	125.	0.	435.	.87	.72	1.00	98.	69.	29.	.64

Table 3. (Continued)

83.735 ITAJUBA M.G. LAT 21 26 LONG 45 28 ELEV 840

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	22.2	.79	11.7	237.	0.	544.	.93	.70	.94	121.	152.	-31.	1.25
2	22.0	.80	11.7	228.	0.	468.	.93	.68	.94	101.	143.	-43.	1.42
3	21.5	.79	12.2	164.	0.	467.	.92	.70	.94	102.	80.	22.	.79
4	19.5	.78	13.1	65.	0.	385.	.87	.72	1.00	87.	15.	72.	.17
5	16.9	.78	14.5	41.	0.	334.	.81	.72	1.08	76.	5.	70.	.07
6	15.3	.76	15.4	30.	0.	292.	.77	.74	1.08	65.	2.	63.	.03
7	15.1	.72	16.2	22.	0.	315.	.76	.80	1.08	75.	0.	75.	.00
8	17.1	.67	17.0	27.	0.	368.	.81	.86	1.08	101.	1.	100.	.01
9	19.1	.67	15.2	67.	0.	425.	.86	.86	1.00	113.	16.	98.	.14
10	20.5	.71	13.3	118.	0.	500.	.89	.82	.94	124.	45.	80.	.36
11	21.2	.74	12.5	164.	0.	519.	.91	.77	.94	124.	81.	43.	.65
12	21.6	.78	11.5	252.	0.	549.	.92	.72	.94	123.	167.	-43.	1.35
AVE	19.3	.75	13.7	118.	0.	430.	.86	.76	1.00	101.	59.	42.	.52

83.386 JANUARIA M.G. LAT 15 30 LONG 44 21 ELEV 439

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.1	.79	10.7	147.	227.	530.	1.00	.71	.94	126.	66.	59.	.53
2	25.3	.77	11.1	105.	218.	466.	1.01	.74	.94	116.	36.	80.	.31
3	25.2	.78	10.8	103.	231.	481.	1.00	.71	.94	116.	35.	81.	.30
4	24.6	.76	11.2	52.	235.	413.	.99	.75	1.00	109.	9.	100.	.09
5	23.3	.72	13.0	11.	255.	372.	.96	.80	1.08	110.	0.	110.	.00
6	22.2	.69	14.4	1.	251.	333.	.93	.84	1.08	100.	0.	100.	.00
7	22.0	.64	14.5	1.	265.	355.	.93	.90	1.08	115.	0.	115.	.00
8	23.4	.57	15.5	1.	281.	402.	.96	.98	1.08	145.	0.	145.	.00
9	25.5	.57	15.2	16.	244.	446.	1.01	.98	1.08	171.	0.	171.	.00
10	26.4	.63	13.6	57.	215.	506.	1.03	.91	1.00	169.	11.	158.	.07
11	25.2	.76	11.2	165.	167.	510.	1.00	.75	.94	129.	81.	48.	.63
12	24.7	.81	10.2	217.	174.	533.	.99	.68	.94	120.	132.	-12.	1.10
AVE	24.4	.71	12.6	73.	230.	446.	.99	.81	1.01	127.	31.	96.	.25

Table 3. (Continued)

83.687 LAVRAS M.G. LAT 21 14 LONG 45 0 ELEV 842

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	21.9	.82	11.0	260.	167.	543.	.93	.65	.94	110.	175.	-65.	1.59
2	21.9	.83	11.4	194.	158.	467.	.93	.64	.94	94.	109.	-14.	1.15
3	21.3	.82	11.4	176.	188.	468.	.91	.65	.94	94.	92.	2.	.97
4	19.3	.80	12.5	58.	201.	385.	.86	.68	1.00	82.	12.	70.	.14
5	16.9	.80	13.7	35.	208.	335.	.81	.69	1.08	73.	3.	69.	.05
6	15.6	.79	14.5	20.	194.	294.	.77	.70	1.08	62.	0.	62.	.00
7	15.4	.74	15.0	9.	219.	316.	.77	.77	1.08	73.	0.	73.	.00
8	17.4	.68	16.3	18.	238.	370.	.82	.85	1.08	101.	0.	101.	.00
9	19.1	.70	14.5	58.	182.	425.	.86	.83	1.00	110.	12.	98.	.11
10	20.5	.74	12.9	129.	176.	500.	.89	.78	.94	118.	53.	65.	.45
11	20.9	.77	11.8	164.	162.	519.	.90	.73	.94	116.	80.	35.	.70
12	21.2	.83	10.3	288.	137.	549.	.91	.63	.94	107.	203.	-96.	1.90
AVE	19.3	.78	12.9	118.	186.	431.	.86	.72	1.00	95.	62.	33.	.59

83.693 LEOPOLDINA M.G. LAT 21 32 LONG 42 38 ELEV 268

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.4	.78	11.2	201.	165.	546.	1.01	.71	.94	130.	116.	14.	.89
2	25.7	.78	12.0	174.	166.	469.	1.02	.72	.94	114.	89.	24.	.79
3	24.8	.80	11.5	135.	173.	468.	1.00	.69	.94	107.	57.	50.	.53
4	22.9	.80	11.0	68.	151.	385.	.95	.68	1.00	88.	16.	72.	.18
5	20.8	.80	11.8	34.	182.	334.	.90	.68	1.08	78.	3.	75.	.04
6	19.6	.81	12.5	25.	179.	293.	.87	.67	1.08	65.	0.	65.	.01
7	19.1	.77	13.1	14.	193.	315.	.86	.73	1.08	76.	0.	76.	.00
8	20.2	.74	14.1	17.	198.	369.	.88	.78	1.08	97.	0.	97.	.00
9	21.6	.73	12.4	43.	127.	425.	.92	.78	1.08	117.	6.	111.	.05
10	22.7	.76	11.0	123.	118.	501.	.94	.75	.94	117.	48.	69.	.41
11	23.6	.77	10.9	159.	127.	521.	.97	.72	.94	121.	76.	45.	.63
12	24.3	.80	10.6	272.	124.	551.	.98	.68	.94	123.	187.	-65.	1.53
AVE	22.6	.78	11.8	106.	159.	431.	.94	.72	1.00	103.	50.	53.	.42

Table 3. (Continued)

83.524 MONTE ALEGRE DE MINAS M.G. LAT 18 52 LONG 48 52 ELEV 756

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	23.4	.81	11.3	237.	0.	539.	.96	.67	.94	118.	152.	-34.	1.29
2	23.3	.82	11.3	182.	0.	467.	.96	.66	.94	100.	97.	3.	.97
3	22.8	.81	11.8	185.	0.	474.	.95	.67	.94	102.	100.	2.	.98
4	21.5	.80	12.9	73.	0.	397.	.92	.69	1.00	90.	18.	72.	.20
5	19.4	.77	14.1	36.	0.	350.	.87	.73	1.08	86.	4.	82.	.04
6	17.7	.76	15.5	11.	0.	310.	.82	.75	1.08	75.	0.	75.	.00
7	17.7	.71	16.0	10.	0.	333.	.82	.81	1.08	87.	0.	87.	.00
8	20.1	.64	16.8	9.	0.	384.	.88	.90	1.08	119.	0.	119.	.00
9	22.5	.63	15.5	44.	0.	435.	.94	.92	1.08	146.	6.	140.	.04
10	23.4	.71	13.6	120.	0.	503.	.96	.81	.94	133.	50.	82.	.38
11	23.1	.73	12.0	167.	0.	516.	.95	.70	.94	117.	83.	34.	.71
12	23.1	.82	10.6	231.	0.	543.	.95	.65	.94	115.	146.	-32.	1.28
AVE	21.5	.76	13.4	109.	0.	438.	.92	.75	1.00	107.	55.	52.	.49

83.694 MURIAE M.G. LAT 21 8 LONG 42 22 ELEV 240

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	25.5	.80	12.4	230.	0.	545.	1.01	.69	.94	127.	145.	-18.	1.14
2	25.6	.80	12.8	184.	0.	469.	1.01	.69	.94	109.	99.	10.	.91
3	24.8	.81	12.2	135.	0.	469.	1.00	.67	.94	103.	57.	46.	.55
4	22.8	.83	12.1	79.	0.	387.	.95	.63	1.00	82.	21.	61.	.26
5	20.8	.83	13.4	37.	0.	337.	.90	.63	1.08	73.	4.	69.	.05
6	19.1	.83	14.6	31.	0.	295.	.86	.64	1.08	62.	2.	60.	.03
7	18.7	.81	14.8	19.	0.	318.	.85	.67	1.08	69.	0.	69.	.00
8	19.9	.77	16.0	13.	0.	371.	.88	.73	1.08	91.	0.	91.	.00
9	21.6	.77	14.0	54.	0.	427.	.92	.74	1.00	102.	10.	91.	.10
10	23.0	.77	12.0	122.	0.	502.	.95	.73	.94	115.	48.	68.	.41
11	23.7	.79	11.4	191.	0.	520.	.97	.70	.94	118.	106.	11.	.91
12	24.3	.82	10.5	285.	0.	550.	.98	.65	.94	117.	200.	-83.	1.71
AVE	22.5	.80	13.0	115.	0.	432.	.94	.68	1.00	97.	58.	40.	.51

Table 3. (Continued)

83.637 OLIVEIRA M.G. LAT 20 41 LONG 44 49 ELEV 962

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	21.7	.78	11.0	270.	0.	542.	.92	.72	.94	123.	185.	-62.	1.51
2	21.6	.78	11.0	217.	0.	467.	.92	.71	.94	104.	132.	-28.	1.27
3	21.0	.79	11.1	189.	0.	469.	.90	.70	.94	102.	104.	-2.	1.02
4	19.7	.76	11.6	72.	0.	388.	.87	.75	1.00	92.	18.	74.	.20
5	18.0	.72	12.9	23.	0.	339.	.83	.80	1.08	88.	0.	88.	.00
6	16.1	.71	12.8	18.	0.	297.	.79	.81	1.08	75.	0.	75.	.00
7	15.8	.67	13.3	13.	0.	320.	.78	.87	1.08	85.	0.	85.	.00
8	17.5	.60	14.7	15.	0.	373.	.82	.94	1.08	113.	0.	113.	.00
9	19.2	.65	13.3	60.	0.	427.	.86	.90	1.00	120.	13.	107.	.10
10	20.3	.71	12.0	135.	0.	501.	.89	.82	.94	124.	57.	68.	.46
11	20.4	.75	11.1	212.	0.	518.	.89	.76	.94	120.	127.	-7.	1.06
12	20.7	.80	10.2	328.	0.	547.	.90	.68	.94	114.	243.	-129.	2.13
AVE	19.3	.73	12.1	129.	0.	432.	.86	.79	1.00	105.	73.	32.	.65

83.479 PARACATU M.G. LAT 17 13 LONG 46 52 ELEV 698

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	23.6	.76	11.7	502.	181.	534.	.97	.75	.94	131.	417.	-286.	3.19
2	23.4	.77	11.7	439.	161.	467.	.96	.74	.94	112.	354.	-242.	3.16
3	23.3	.77	11.9	328.	188.	477.	.96	.74	.94	114.	243.	-129.	2.13
4	22.4	.74	13.8	171.	207.	405.	.94	.77	.94	99.	87.	12.	.88
5	20.1	.72	16.1	32.	249.	361.	.88	.80	1.08	99.	2.	97.	.03
6	18.7	.72	17.2	26.	246.	321.	.85	.81	1.08	85.	1.	85.	.01
7	18.8	.69	17.6	3.	261.	343.	.85	.84	1.08	95.	0.	95.	.00
8	20.8	.65	17.7	4.	246.	392.	.90	.89	1.08	122.	0.	122.	.00
9	23.2	.65	16.3	52.	165.	440.	.96	.89	1.00	135.	9.	126.	.07
10	24.2	.68	13.7	196.	159.	504.	.99	.85	.94	143.	111.	32.	.78
11	23.4	.75	11.9	438.	141.	513.	.96	.75	.94	126.	353.	-227.	2.81
12	22.9	.81	10.7	658.	122.	538.	.95	.67	.94	115.	573.	-458.	4.97
AVE	22.1	.72	14.2	238.	194.	441.	.93	.79	.99	115.	179.	-65.	1.50

Table 3. (Continued)

83.737 PASSA QUATRO M.G. LAT 22 23 LONG 44 58 ELEV 920

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	21.3	.79	10.8	257.	162.	545.	.91	.70	.94	118.	182.	-64.	1.54
2	21.2	.79	10.9	226.	142.	467.	.91	.71	.94	102.	141.	-38.	1.38
3	20.5	.80	11.3	166.	177.	464.	.89	.69	.94	97.	83.	15.	.85
4	18.3	.79	11.9	58.	194.	380.	.84	.71	1.00	82.	12.	71.	.14
5	15.7	.78	13.8	42.	196.	327.	.78	.72	1.08	71.	6.	66.	.08
6	14.0	.78	15.2	27.	197.	285.	.74	.72	1.08	59.	1.	58.	.01
7	13.4	.74	16.5	14.	220.	308.	.72	.77	1.08	67.	0.	67.	.00
8	15.0	.71	16.9	21.	224.	362.	.76	.81	1.08	87.	0.	87.	.00
9	17.4	.72	15.2	63.	173.	421.	.82	.82	1.00	102.	14.	88.	.13
10	19.0	.74	12.1	110.	171.	498.	.86	.77	.94	112.	39.	73.	.35
11	19.8	.76	11.3	174.	167.	520.	.88	.75	.94	116.	90.	27.	.77
12	20.3	.80	9.9	258.	140.	551.	.89	.69	.94	116.	183.	-68.	1.58
AVE	18.0	.76	13.0	120.	180.	427.	.83	.74	1.00	94.	62.	32.	.57

83.393 PEDRA AZUL M.G. LAT 16 0 LONG 41 17 ELEV 583

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	24.3	.72	10.6	125.	196.	532.	.98	.80	.94	141.	50.	91.	.36
2	24.6	.71	10.9	101.	181.	466.	.99	.81	.94	126.	34.	93.	.27
3	24.1	.73	10.3	107.	186.	480.	.98	.79	.94	125.	38.	88.	.30
4	22.9	.76	9.9	91.	151.	410.	.95	.75	1.00	104.	28.	76.	.27
5	20.8	.78	11.1	28.	151.	368.	.90	.72	1.08	92.	1.	91.	.01
6	19.4	.78	12.1	20.	152.	329.	.87	.72	1.08	79.	0.	79.	.00
7	18.7	.78	11.9	23.	150.	351.	.85	.71	1.08	82.	0.	82.	.00
8	19.8	.76	11.9	11.	189.	398.	.88	.75	1.08	101.	0.	101.	.00
9	21.6	.73	11.7	22.	179.	443.	.92	.78	1.08	123.	0.	123.	.00
10	23.3	.71	10.9	84.	159.	504.	.95	.81	1.00	140.	24.	117.	.17
11	23.2	.73	10.0	216.	134.	511.	.96	.78	.94	129.	131.	-3.	1.02
12	23.6	.74	9.3	242.	146.	534.	.97	.78	.94	135.	157.	-22.	1.16
AVE	22.2	.74	10.9	89.	164.	444.	.93	.77	1.01	115.	39.	76.	.30

Table 3. (Continued)

83.483 PIRAPORA M.G. LAT 17 21 LONG 44 57 ELEV 412

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	24.7	.78	10.6	220.	195.	535.	.99	.71	.94	126.	135.	-9.	1.07
2	24.9	.78	11.1	143.	198.	467.	1.00	.71	.94	111.	63.	48.	.56
3	24.7	.78	11.4	127.	214.	478.	.99	.72	.94	114.	51.	63.	.45
4	23.5	.77	12.9	63.	232.	404.	.96	.73	1.00	101.	14.	88.	.13
5	21.3	.74	15.2	11.	269.	360.	.91	.77	1.08	97.	0.	97.	.00
6	19.9	.72	17.0	3.	261.	320.	.88	.80	1.08	87.	0.	87.	.00
7	19.7	.69	17.2	3.	274.	343.	.87	.84	1.08	97.	0.	97.	.00
8	21.5	.61	17.8	1.	290.	392.	.92	.94	1.08	130.	0.	130.	.00
9	24.1	.58	16.1	19.	221.	440.	.98	.97	1.08	161.	0.	161.	.00
10	25.3	.64	12.9	75.	197.	505.	1.01	.90	1.00	163.	19.	144.	.12
11	24.9	.74	11.1	202.	181.	514.	1.00	.77	.94	132.	117.	15.	.89
12	24.4	.79	10.2	278.	154.	539.	.99	.70	.94	124.	193.	-69.	1.56
AVE	23.2	.72	13.6	95.	224.	442.	.96	.80	1.01	120.	49.	71.	.40

83.585 PITANGUI M.G. LAT 19 41 LONG 44 46 ELEV 704

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	23.3	.78	12.0	250.	0.	540.	.96	.71	.94	124.	165.	-41.	1.33
2	23.3	.79	12.2	193.	0.	468.	.96	.69	.94	105.	108.	-2.	1.02
3	22.8	.81	12.2	192.	0.	472.	.95	.67	.94	102.	97.	5.	.95
4	21.0	.81	13.4	75.	0.	393.	.90	.67	1.00	85.	19.	66.	.23
5	18.9	.79	15.1	33.	0.	345.	.85	.70	1.08	80.	3.	77.	.03
6	17.7	.76	16.0	10.	0.	304.	.82	.74	1.08	72.	0.	72.	.00
7	17.7	.73	16.3	6.	0.	327.	.82	.79	1.08	82.	0.	82.	.00
8	19.4	.68	17.4	8.	0.	379.	.87	.85	1.08	109.	0.	109.	.00
9	21.4	.68	15.7	44.	0.	432.	.91	.85	1.08	130.	6.	124.	.05
10	22.9	.73	13.6	96.	0.	503.	.95	.78	1.00	134.	31.	104.	.23
11	22.9	.77	12.3	191.	0.	517.	.95	.73	.94	122.	96.	26.	.79
12	22.7	.81	10.7	310.	0.	545.	.94	.66	.94	115.	225.	-109.	1.95
AVE	21.2	.76	13.9	116.	0.	435.	.91	.74	1.01	105.	63.	43.	.55

Table 3. (Continued)

83.681 POCOS DE CALDAS M.G. LAT 21 47 LONG 46 34 ELEV 1189

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	20.3	.83	9.3	317.	145.	543.	.89	.64	.94	106.	232.	-126.	2.20
2	20.4	.82	9.7	248.	139.	467.	.89	.65	.94	93.	163.	-70.	1.76
3	19.8	.82	10.2	218.	184.	466.	.88	.65	.94	91.	133.	-42.	1.47
4	17.8	.80	11.5	82.	205.	382.	.83	.68	1.00	79.	23.	55.	.29
5	15.1	.79	13.3	54.	213.	331.	.76	.69	1.00	64.	10.	54.	.16
6	13.6	.78	13.9	30.	214.	289.	.73	.72	1.08	60.	2.	58.	.03
7	13.6	.76	14.2	26.	221.	312.	.73	.75	1.08	67.	1.	67.	.01
8	15.6	.70	14.9	24.	241.	366.	.77	.83	1.08	93.	0.	93.	.00
9	17.5	.71	13.4	69.	191.	423.	.82	.81	1.00	103.	16.	87.	.16
10	19.0	.75	11.6	142.	188.	499.	.86	.76	.94	111.	62.	49.	.56
11	19.4	.79	10.6	201.	171.	519.	.87	.70	.94	108.	116.	-8.	1.07
12	19.8	.82	9.6	284.	157.	549.	.88	.66	.94	109.	199.	-90.	1.82
AVE	17.7	.78	11.9	141.	189.	429.	.82	.71	.99	90.	80.	11.	.79

83.690 SANTOS DUMONT M.G. LAT 21 27 LONG 43 33 ELEV 908

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	21.3	.83	9.5	273.	165.	543.	.91	.64	.94	108.	188.	-80.	1.74
2	21.3	.83	9.6	244.	147.	467.	.91	.63	.94	92.	159.	-67.	1.73
3	20.7	.85	9.3	223.	164.	467.	.90	.61	.94	86.	138.	-51.	1.60
4	18.7	.85	9.1	92.	153.	384.	.85	.59	1.00	70.	29.	42.	.41
5	16.8	.84	10.5	32.	176.	334.	.80	.61	1.08	64.	2.	62.	.04
6	15.7	.83	11.5	24.	176.	292.	.78	.63	1.08	56.	0.	56.	.00
7	15.2	.81	11.2	18.	186.	315.	.76	.66	1.08	62.	0.	62.	.00
8	16.2	.77	12.7	16.	206.	368.	.79	.73	1.08	83.	0.	83.	.00
9	17.5	.79	10.7	59.	141.	424.	.82	.71	1.00	89.	12.	77.	.13
10	18.7	.81	9.4	142.	127.	490.	.85	.66	.94	96.	62.	34.	.65
11	19.3	.84	8.9	203.	117.	518.	.86	.63	.94	96.	118.	-23.	1.24
12	20.0	.85	8.4	335.	111.	549.	.88	.59	.94	97.	250.	-153.	2.57
AVE	18.4	.83	10.1	138.	156.	431.	.84	.64	1.00	83.	80.	4.	.84

Table 3. (Continued)

83.385 SAO FRANCISCO M.G. LAT 15 57 LONG 44 52 ELEV 440

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	24.1	.81	13.6	208.	0.	531.	.98	.66	.94	115.	123.	-8.	1.07
2	24.4	.81	14.7	137.	0.	466.	.99	.67	.94	103.	58.	45.	.56
3	24.1	.82	13.9	159.	0.	480.	.98	.65	.94	102.	76.	26.	.74
4	23.3	.80	15.5	67.	0.	410.	.96	.69	1.00	97.	15.	81.	.16
5	21.6	.77	17.6	14.	0.	369.	.92	.74	1.08	96.	0.	96.	.00
6	19.8	.74	19.2	3.	0.	329.	.88	.78	1.08	86.	0.	86.	.00
7	20.0	.69	19.8	2.	0.	352.	.88	.84	1.08	100.	0.	100.	.00
8	21.7	.62	20.4	1.	0.	399.	.92	.92	1.08	131.	0.	131.	.00
9	24.2	.60	18.8	27.	0.	444.	.98	.95	1.08	159.	1.	158.	.01
10	25.7	.64	16.3	65.	0.	505.	1.02	.90	1.00	165.	15.	150.	.09
11	24.6	.76	13.5	195.	0.	511.	.99	.74	.94	125.	110.	16.	.88
12	24.2	.82	12.6	278.	0.	534.	.98	.65	.94	115.	193.	-78.	1.68
AVE	23.1	.74	16.3	96.	0.	444.	.96	.77	1.01	116.	49.	67.	.43

83.588 SAO JOAO DEL REI M.G. LAT 21 8 LONG 44 16 ELEV 907

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	21.9	.77	11.0	238.	167.	543.	.93	.73	.94	125.	151.	-27.	1.21
2	22.2	.77	11.2	204.	154.	468.	.93	.72	.94	108.	119.	-12.	1.11
3	21.2	.79	11.1	190.	174.	468.	.91	.70	.94	102.	105.	-3.	1.03
4	19.5	.79	11.6	57.	178.	386.	.87	.72	1.00	87.	16.	71.	.18
5	17.1	.77	12.7	31.	193.	336.	.81	.74	1.08	78.	2.	76.	.03
6	15.7	.75	13.9	22.	190.	294.	.78	.75	1.08	68.	0.	68.	.00
7	15.5	.73	14.3	12.	214.	317.	.77	.79	1.08	76.	0.	76.	.00
8	17.2	.68	15.5	10.	229.	370.	.81	.86	1.08	101.	0.	101.	.00
9	18.7	.69	13.7	50.	151.	426.	.85	.84	1.00	110.	9.	101.	.08
10	20.1	.73	11.9	125.	157.	500.	.88	.79	.94	119.	50.	70.	.42
11	20.5	.76	10.9	191.	146.	519.	.89	.75	.94	118.	106.	12.	.90
12	21.0	.79	10.3	297.	133.	548.	.90	.70	.94	118.	212.	-94.	1.79
AVE	19.2	.75	12.3	120.	175.	431.	.86	.76	1.00	101.	54.	37.	.56

Table 3. (Continued)

83.541 SAO JOAO EVANGELISTA M.G. LAT 18 25 LONG 42 47 ELEV 562

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	21.6	.84	12.0	205.	0.	537.	.92	.61	.94	102.	120.	-19.	1.18
2	21.7	.84	12.2	147.	0.	467.	.92	.61	.94	89.	66.	22.	.75
3	21.4	.86	11.4	160.	0.	474.	.91	.59	.94	86.	77.	9.	.89
4	19.8	.85	11.8	89.	0.	398.	.88	.59	1.00	74.	27.	48.	.36
5	17.5	.85	12.9	32.	0.	353.	.82	.61	1.08	68.	2.	65.	.04
6	15.8	.84	14.2	16.	0.	312.	.78	.62	1.08	58.	0.	58.	.00
7	15.1	.83	14.3	17.	0.	335.	.76	.63	1.08	62.	0.	62.	.00
8	15.7	.81	16.1	8.	0.	384.	.78	.68	1.08	78.	0.	78.	.00
9	17.9	.80	14.6	42.	0.	434.	.83	.69	1.08	97.	6.	91.	.06
10	20.0	.81	12.2	106.	0.	502.	.88	.66	.94	99.	37.	62.	.37
11	20.8	.84	10.8	223.	0.	514.	.90	.61	.94	95.	138.	-43.	1.45
12	21.4	.86	10.2	315.	0.	541.	.91	.58	.94	96.	230.	-134.	2.39
AVE	19.1	.84	12.7	113.	0.	438.	.86	.62	1.00	84.	59.	25.	.62

83.736 SAO LOURENCO M.G. LAT 22 6 LONG 45 1 : ELEV 873

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	21.9	.79	11.6	261.	172.	545.	.93	.71	.94	121.	176.	-54.	1.45
2	21.7	.80	11.7	244.	155.	467.	.92	.68	.94	100.	159.	-59.	1.60
3	21.0	.80	12.5	185.	187.	465.	.90	.68	.94	98.	101.	-3.	1.03
4	18.8	.79	13.8	66.	190.	381.	.85	.70	1.00	82.	15.	66.	.19
5	15.6	.80	16.1	41.	196.	329.	.77	.69	1.08	69.	5.	64.	.07
6	13.9	.73	17.1	25.	181.	287.	.73	.71	1.08	58.	0.	58.	.01
7	13.4	.75	18.6	16.	210.	310.	.72	.76	1.08	66.	0.	66.	.00
8	15.2	.70	19.1	20.	224.	364.	.76	.83	1.08	90.	0.	90.	.00
9	17.7	.69	17.1	57.	171.	422.	.82	.84	1.00	106.	11.	94.	.11
10	19.6	.72	13.9	134.	169.	499.	.87	.80	.94	118.	56.	62.	.46
11	20.5	.74	12.8	171.	168.	520.	.89	.78	.94	122.	87.	36.	.71
12	21.1	.78	11.3	279.	163.	551.	.91	.72	.94	122.	194.	-72.	1.59
AVE	18.4	.76	14.6	125.	162.	428.	.84	.74	1.00	96.	67.	29.	.60

Table 3. (Continued)

83.684 TRES CORACOES M.G. LAT 21 42 LONG 45 15 ELEV 893

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	22.3	.79	11.6	259.	0.	544.	.94	.70	.94	121.	174.	-53.	1.44
2	22.3	.81	11.5	221.	0.	468.	.94	.67	.94	100.	136.	-36.	1.36
3	21.2	.80	11.5	192.	0.	466.	.91	.68	.94	98.	97.	0.	1.00
4	19.5	.80	12.7	52.	0.	383.	.87	.69	1.00	83.	9.	74.	.11
5	16.8	.79	14.3	36.	0.	332.	.80	.69	1.08	72.	4.	69.	.05
6	14.9	.77	15.8	19.	0.	290.	.76	.74	1.08	63.	0.	63.	.00
7	15.1	.75	15.7	13.	0.	313.	.76	.76	1.08	71.	0.	71.	.00
8	16.9	.69	17.0	18.	0.	367.	.81	.84	1.08	97.	0.	97.	.00
9	18.9	.71	15.2	68.	0.	424.	.85	.82	1.00	107.	16.	91.	.15
10	20.3	.73	12.9	129.	0.	500.	.89	.79	.94	119.	52.	67.	.44
11	20.9	.76	12.0	191.	0.	520.	.90	.74	.94	118.	96.	22.	.81
12	21.4	.80	10.9	272.	0.	550.	.91	.69	.94	118.	187.	-69.	1.59
AVE	19.2	.77	13.4	121.	0.	430.	.86	.73	1.00	97.	64.	33.	.58

83.691 UBA M.G. LAT 21 7 LONG 42 57 ELEV 349

MO	TM	HM	TD	PREC	INS	RMM	CT	CH	CW	ETP	PD	ETDF	MAI
1	24.8	.80	11.8	205.	0.	544.	1.00	.69	.94	124.	120.	4.	.97
2	24.9	.80	12.2	166.	0.	469.	1.00	.69	.94	107.	82.	25.	.77
3	24.1	.81	11.7	143.	0.	469.	.98	.66	.94	102.	63.	39.	.62
4	22.1	.81	12.2	57.	0.	387.	.93	.66	1.00	85.	11.	73.	.13
5	19.7	.82	13.3	31.	0.	337.	.87	.66	1.08	74.	2.	72.	.03
6	18.2	.82	14.4	20.	0.	295.	.84	.65	1.08	62.	0.	62.	.00
7	17.7	.80	14.8	13.	0.	318.	.82	.69	1.08	69.	0.	69.	.00
8	18.9	.76	15.7	14.	0.	371.	.85	.75	1.08	90.	0.	90.	.00
9	20.7	.75	13.6	43.	0.	426.	.90	.76	1.08	111.	6.	105.	.05
10	22.4	.77	11.7	119.	0.	501.	.94	.74	.94	116.	45.	70.	.39
11	23.2	.78	11.0	173.	0.	520.	.96	.71	.94	118.	89.	30.	.75
12	23.8	.82	10.4	283.	0.	550.	.97	.65	.94	117.	203.	-87.	1.74
AVE	21.7	.80	12.7	106.	0.	432.	.92	.69	1.00	98.	52.	46.	.45

Requirements for Irrigation

Irrigation development has frequently been most successful in arid regions. In areas where rainfall is adequate during a poertion of the year, agriculturists are frequently able to choose between extensive agriculture and more intensive developments. Table 3 provides an analysis of the probability of adequacy of rainfall in meeting moisture demands for agricultural purposes.

In the states of Paraiba, Pernambuco and Alagoas the coastal area (Zona da Mata) is characterized by about six months of severe moisture deficiency and two to four months of excessive rainfall. Rainfall during the other months varies from moderately deficient to fully adequate. In the interior more elevated areas (Certao) precipitation is significantly less, but normally only about six months can be definitely classed as severely deficient and usually one or two months have excessive precipitation. It is only rarely or in limited portions of the Certao that three or more consecutive months have fully adequate precipitation.

The coastal portions of Bahia generally do not have severe moisture deficiencies. Precipitation is frequently excessive during three to five months. In the interior portions, particularly in the Sao Francisco river valley areas, rainfall may be severely deficient during six to eleven months, and precipitation is rarely excessive during any one month.

Within the State of Minas Gerais precipitation is generally severely deficient during about five months and may be excessive during one to three months.

The above conditions are approximations and generalizations. Significant local variations from general conditions are encountered.

For the areas that may be considered for irrigation from the Sao Francisco river, rainfall is severely limiting during five to eleven months depending upon location. For development to a good level of intensive agricultural production, irrigation should be available during all months of severe rainfall deficiency.

The potential evapotranspiration estimated in this study is for short grass under conditions of rapid growth. Many crops during periods of full crop cover and periods of rapid growth require more water than does short grass. When fruit is sizing up, grain is setting or tubers are increasing rapidly in size, the crop water use is at a significantly higher rate than is average for full crop cover conditions.

Table 4 gives crop coefficients, K, to be used with estimated values of ETP for computing usual crop water requirements. ETP x K gives the average or usual requirement.

When moisture supply is severely deficient (moisture availability index, MAI, less than .33), crop growth is quite limited. At these low moisture levels fertilizer application and other improved practices do not have much effect on plant growth. Fertilizer application during periods of severe moisture shortage may accentuate moisture deficiencies and further reduce yields.

Table 4. Crop Coefficients, K

CROP	Root Depth in Meters	Full Crop Cover		Seasonal K	
		Range in K	Average K	Range	Mean
Field and Oil Crops	1.00-1.30	1.10-1.32	1.22	.73-.99	.89
Fruits					
Grapefruit	1.20		.79		.79
Naval Oranges	1.07		.65		.65
Grain and Forage Crops	1.12-1.35	1.08-1.70	1.37	.95-1.15	1.04
Grass Crops					
Bermuda Lawn	1.19		1.05		1.05
Blue Panicium Grass	1.20		1.11		1.11
Green Manure Crops	.86-1.31	.97-1.22	1.11	.85-1.18	.96
Winter Vegetables	.64-.95	1.22-1.86	1.45	.85-1.18	1.01
Summer Vegetables	.86-.95	1.22-1.40	1.28	.82-.84	.83

Notes: Root depth is zone from which 90 percent of soil moisture depletion occurred. Coefficients are to be used with estimated potential evapotranspiration, ETP.

Source: Erie, L.J., Orrin F. French and Karl Harris, "Consumptive Use of Water by Crops in Arizona". (Tech. Bulletin 169: University of Arizona Agricultural Experiment Station, 1965), 44 pp.

Middleton, J.E., O. W. Pruitt, P. C. Crandall and M. C. Jensen, "Central and Western Washington Consumptive Use and Evaporation Data, 1954-62", (Bulletin 681: Washington State University Agricultural Experiment Station, 1967), 7 pp.

Conclusions and Recommendations

The available monthly precipitation data for a period of years, preferably ten or more, should be summarized and a gamma distribution analysis run in order to better define rainfall probabilities of occurrence at the seventy-five percent probability level as well as other probabilities

Relative humidity data at 1200, 1800 and 2400 hours Greenwich time may not provide a precise index for evaluating humidity effects upon wate requirements. However, comparison of reported values with 24-hour graphs from hydrothermographs would make it possible to further evaluate published humidity data.

Wind data are not generally published in Brazil. Undoubtedly data are available from a number of airports. These should be summarized together with information on the height of instrument, the hours of measurement and weather instantaneous or totalizing. Availability of representative wind speed data will permit a more precise evaluation of moisture requirements.

Most crop consumptive use measurements have been related to some form of evaporation. The most widely used and best standardized form of evaporation measurements are those from a Class A pan. Measurements made by the Piche aparatus are difficult to standardize and to interpret. No practical use is known for measured Piche evaporation. The publication of Class A pan evaporation data together with complete descriptions of pan locations and exposure conditions would contribute

towards a better evaluation of irrigation requirements. Description of conditions should include information on vegetative surroundings, whether or not a body of water is near and whether the area is irrigated or non-irrigated. Condition of the pan, including color, and any significant departure from standard requirements, should be recorded.

This study is brief and preliminary in nature. It should be improved and updated as soon as additional data are processed or become available. This is particularly true of the precipitation data already available but not processed for probability analysis.

The needs for irrigation and moisture deficiencies are only one aspect to be considered. The stage of economic development, availability of infrastructure, local ability to manage irrigation and other factors are usually of much greater importance than an analysis of moisture deficiencies. It is assumed that these factors have been well studied for the Sao Francisco river basin and that these studies can now be combined with an improved analysis of requirements for irrigation.

It should be emphasized that irrigation is only one factor amongst those required for advancement towards a more intensive and technological agricultural development. If introduced without the availability of fertilizer, adequate equipment, pesticides, herbicides and other necessary inputs, the possibilities for the economic success of irrigation development are minimized.

APPENDIX A

PRECIPITATION PROBABILITIES

Fifteen climatic stations having precipitation records of from 27 to 57 years are analyzed in order to show the various levels of probability of occurrence. Probabilities at the 95 percent level (equalled or exceeded 19 years out of 20 based upon the recorded data) at the 90, 80, 75, 70, 60, 50, 40, 30, 25, 20, 10 and 5 percent probability levels are shown for each month. Gamma parameters used in the computation are given by months. PMAX, the absolute maximum precipitation, and PMIN, the absolute minimum precipitation for the period of record are shown by months for each location.

The values of precipitation at the 75 percent probability level were plotted against mean precipitation for the period of record.

The best fit equation can be written

$$PD = -5 + .16 \times PM + .0022 \times PM^2 \qquad \text{(A1)}$$

in which

PD = precipitation at the 75 percent probability level

PM = mean monthly precipitation

If PM exceeds 191 mm, then the equation becomes

$$PD = -85 + PM \qquad \text{(A1a)}$$

Negative computed values of PD are taken as equal to zero.

The computer printout for the 15 locations is presented in the following table.

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION, IN MM.

STATION NAME TERESINA PIAUI SER. NO. 578
LAT. 5 5. LONG. 42 49. ELEV. 79. YEARS OF DATA 54

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	189.	59.	77.	104.	115.	127.	149.	172.	197.	227.	244.	265.	324.	379.
FEB	242.	68.	91.	126.	141.	156.	186.	217.	251.	291.	315.	343.	425.	502.
MAR	315.	123.	152.	194.	211.	228.	261.	294.	330.	371.	395.	424.	505.	578.
APR	271.	65.	90.	130.	148.	165.	200.	237.	279.	328.	358.	393.	495.	591.
MAY	96.	5.	10.	21.	28.	34.	49.	67.	88.	116.	134.	155.	222.	289.
JUN	17.	0.	0.	0.	1.	1.	2.	5.	9.	16.	21.	27.	51.	77.
JUL	6.	0.	0.	0.	0.	0.	0.	1.	2.	5.	7.	9.	19.	32.
AUG	7.	0.	0.	0.	0.	0.	0.	1.	2.	4.	6.	9.	21.	35.
SEP	11.	0.	0.	0.	0.	1.	2.	3.	6.	10.	13.	18.	33.	51.
OCT	27.	0.	0.	2.	3.	4.	8.	13.	19.	29.	36.	44.	72.	102.
NOV	59.	1.	2.	6.	8.	12.	20.	31.	46.	66.	80.	97.	154.	213.
DEC	111.	17.	26.	42.	50.	57.	73.	91.	111.	135.	150.	168.	221.	273.
ANN	1352.	564.	779.	936.	1001.	1061.	1178.	1294.	1418.	1558.	1640.	1734.	1999.	2236.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.019	.013	.016	.010	.010	.019	.037	.030	.028	.019	.010	.016	.006
R	3.54	3.12	4.93	2.62	1.00	.33	.24	.20	.32	.52	.59	1.77	7.76
LNGAM	1.2	.8	3.1	.4	.0	1.0	1.3	1.5	1.0	.5	.4	-.1	8.0
PMAX	462.	567.	703.	767.	308.	89.	59.	81.	83.	147.	270.	304.	0.
PMIN	14.	13.	16.	15.	0.	0.	0.	0.	0.	0.	0.	4.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
***GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION. IN M.M.

STATION NAME GARANHUNS PERNAMBUCO SER. NO. 893
LAT. 8 53. LONG. 36 31. ELEV. 927. YEARS OF DATA 42

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	34.	1.	3.	6.	8.	10.	15.	22.	30.	40.	47.	55.	81.	108.
FEB	42.	2.	4.	9.	11.	14.	21.	28.	38.	50.	58.	68.	99.	129.
MAR	85.	6.	11.	22.	28.	34.	47.	62.	81.	104.	119.	137.	193.	249.
APR	76.	11.	17.	28.	33.	39.	50.	62.	76.	93.	103.	115.	153.	189.
MAY	123.	40.	52.	69.	77.	84.	98.	112.	128.	147.	158.	171.	208.	242.
JUN	120.	43.	54.	71.	78.	84.	98.	111.	126.	143.	153.	164.	198.	229.
JUL	114.	60.	69.	82.	87.	92.	101.	110.	120.	130.	137.	144.	164.	182.
AUG	85.	21.	29.	41.	46.	52.	63.	74.	87.	103.	112.	123.	154.	184.
SEP	33.	7.	10.	14.	17.	19.	23.	28.	33.	40.	44.	49.	62.	75.
OCT	22.	0.	0.	2.	3.	4.	6.	10.	16.	24.	29.	36.	58.	82.
NOV	17.	0.	0.	0.	1.	1.	3.	5.	10.	16.	21.	27.	49.	74.
DEC	25.	0.	0.	1.	1.	2.	4.	8.	15.	25.	32.	41.	74.	111.
ANN	777.	436.	496.	576.	609.	639.	697.	754.	814.	881.	920.	965.	1089.	1199.

PARAMETERS FOR GAMMA DISTRIBUTION.AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.025	.022	.013	.023	.031	.036	.081	.031	.068	.024	.021	.014	.014
R	.85	.93	1.11	1.71	3.78	4.27	9.24	2.65	2.22	.53	.36	.36	10.98
LNGAM	.1	.0	-.1	-.1	1.5	2.1	11.1	.4	.1	.5	.9	.9	15.1
PMAX	139.	193.	428.	232.	319.	350.	194.	210.	91.	133.	191.	179.	0.
PMIN	0.	0.	4.	8.	32.	33.	53.	11.	6.	0.	0.	0.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1 PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION. IN MM.

STATION NAME RECIFE OLINDA PBCO SER. NO. 898
LAT. 8 1. LONG. 34 51. ELEV. 56. YEARS OF DATA 57

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	77.	4.	7.	16.	21.	26.	38.	53.	70.	93.	107.	125.	180.	236.
FEB	97.	6.	12.	24.	31.	38.	53.	70.	91.	118.	134.	155.	218.	280.
MAR	168.	33.	48.	73.	84.	95.	118.	143.	171.	204.	225.	249.	320.	388.
APR	208.	63.	83.	112.	125.	138.	162.	188.	216.	249.	269.	292.	359.	421.
MAY	283.	92.	118.	158.	175.	192.	224.	258.	295.	338.	364.	394.	481.	560.
JUN	274.	108.	133.	169.	185.	199.	227.	256.	287.	322.	344.	368.	438.	501.
JUL	230.	90.	111.	142.	155.	167.	191.	215.	241.	271.	289.	310.	369.	423.
AUG	151.	51.	65.	86.	95.	104.	121.	138.	157.	180.	193.	208.	253.	294.
SEP	66.	10.	16.	25.	30.	34.	44.	54.	66.	80.	89.	100.	131.	162.
OCT	36.	3.	6.	11.	13.	16.	21.	27.	35.	44.	50.	57.	78.	98.
NOV	35.	2.	4.	8.	11.	13.	18.	25.	33.	42.	49.	56.	80.	104.
DEC	42.	5.	8.	14.	17.	19.	26.	33.	41.	51.	57.	65.	87.	110.
ANN	1667.	1009.	1129.	1286.	1350.	1408.	1519.	1628.	1741.	1868.	1941.	2025.	2256.	2459.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.012	.011	.013	.016	.013	.018	.021	.026	.027	.036	.030	.035	.008
R	.95	1.11	2.17	3.41	3.70	5.01	4.93	3.92	1.79	1.32	1.04	1.46	14.06
LNGAM	.0	-.1	.1	1.1	1.4	3.2	3.1	1.7	-.1	-.1	-.0	-.1	22.7
PMAX	1113.	700.	485.	776.	662.	642.	586.	394.	240.	350.	159.	155.	0.
PMIN	2.	3.	8.	41.	23.	56.	55.	25.	7.	3.	0.	1.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION. IN MM.

STATION NAME MACEIO ALAGOAS SER. NO. 994
LAT. 9 40. LONG. 35 42. ELEV. 46. YEARS OF DATA 56

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	57.	2.	5.	11.	15.	19.	27.	38.	51.	68.	79.	93.	135.	177.
FEB	68.	12.	18.	28.	32.	37.	46.	57.	68.	82.	91.	101.	132.	161.
MAR	123.	21.	31.	49.	58.	66.	83.	102.	124.	150.	166.	185.	242.	296.
APR	183.	50.	57.	94.	105.	117.	139.	163.	190.	221.	240.	262.	325.	385.
MAY	271.	80.	106.	144.	161.	178.	210.	244.	282.	326.	352.	383.	472.	555.
JUN	230.	60.	91.	115.	130.	144.	173.	204.	237.	278.	302.	330.	413.	490.
JUL	184.	68.	85.	110.	121.	131.	150.	170.	192.	218.	232.	250.	299.	345.
AUG	110.	43.	53.	68.	74.	80.	91.	103.	115.	129.	138.	148.	176.	202.
SEP	79.	16.	23.	35.	40.	46.	56.	68.	81.	97.	106.	117.	151.	182.
OCT	46.	5.	9.	15.	19.	22.	29.	37.	45.	57.	63.	72.	97.	121.
NOV	29.	3.	5.	9.	11.	13.	17.	22.	28.	35.	40.	45.	62.	78.
DEC	35.	1.	3.	7.	9.	12.	17.	24.	32.	42.	49.	57.	82.	108.
ANN	1415.	925.	1017.	1136.	1184.	1228.	1310.	1391.	1474.	1567.	1620.	1680.	1846.	1991.

PARAMETERS FOR GAMMA DISTRIBUTION.AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.015	.029	.015	.016	.012	.012	.025	.045	.028	.032	.047	.027	.013
R	.91	1.96	1.99	2.99	3.29	2.84	4.53	4.96	2.23	1.50	1.37	.93	18.84
LNGAM	.1	-.0	-.0	.7	1.0	.5	2.5	3.1	.1	-.1	-.1	.0	35.9
PMAX	245.	178.	401.	469.	807.	615.	390.	262.	263.	206.	98.	162.	0.
PMIN	0.	6.	9.	28.	46.	30.	54.	46.	11.	1.	0.	0.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION, IN MM.

STATION NAME PROPRIA SERGIPE SER. NO. 97
LAT. 10 12. LONG. 36 52. ELEV. 34. YEARS OF DATA 55

PROBABILITY	95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	
MONTH	MEAN	PRECIPITATION											
JAN	32.	1.	2.	5.	6.	9.	13.	19.	27.	38.	45.	53.	80.	108.
FEB	29.	0.	1.	3.	4.	6.	10.	15.	22.	32.	39.	47.	75.	103.
MAR	56.	1.	4.	9.	12.	16.	25.	35.	49.	66.	78.	92.	138.	184.
APR	101.	16.	25.	40.	47.	53.	68.	83.	101.	123.	136.	152.	200.	245.
MAY	159.	38.	53.	77.	87.	97.	118.	139.	164.	193.	210.	230.	290.	346.
JUN	130.	46.	58.	76.	84.	91.	105.	120.	135.	154.	165.	178.	214.	248.
JUL	118.	45.	56.	72.	78.	85.	97.	110.	124.	140.	149.	161.	192.	221.
AUG	74.	19.	26.	37.	42.	46.	56.	65.	76.	89.	97.	106.	133.	158.
SEP	49.	6.	10.	17.	21.	24.	32.	40.	49.	60.	67.	76.	101.	125.
OCT	28.	1.	2.	5.	7.	9.	13.	18.	25.	33.	39.	46.	68.	90.
NOV	34.	0.	0.	1.	2.	4.	7.	13.	21.	34.	43.	55.	94.	137.
DEC	37.	0.	1.	3.	4.	6.	11.	18.	27.	40.	49.	60.	98.	137.
ANN	847.	514.	575.	654.	696.	716.	772.	827.	885.	949.	986.	1028.	1145.	1248.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.023	.021	.014	.018	.017	.033	.039	.038	.033	.030	.013	.015	.017
R	.74	.60	.79	1.86	2.64	4.23	4.65	2.83	1.61	.85	.42	.54	14.17
NGAM	.2	.4	.2	-.1	.4	2.1	2.7	.5	-.1	.1	.7	.5	23.0
PMAX	141.	132.	257.	413.	465.	260.	395.	269.	161.	138.	253.	222.	0.
PMIN	0.	0.	0.	5.	18.	26.	44.	7.	5.	0.	0.	0.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
***GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION. IN MM.

STATION NAME ARACAJU SEPGIPE SER. NO. 96
LAT. 10 55. LONG. 37 5. ELEV. 6. YEARS OF DATA 56

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	55.	2.	5.	11.	15.	18.	27.	37.	49.	66.	76.	88.	128.	168.
FEB	59.	5.	9.	17.	21.	26.	35.	45.	57.	72.	82.	94.	129.	163.
MAR	138.	14.	24.	43.	53.	63.	83.	107.	134.	168.	189.	215.	293.	368.
APR	206.	38.	57.	87.	101.	115.	143.	174.	209.	251.	277.	307.	397.	483.
MAY	307.	89.	118.	162.	181.	200.	237.	276.	318.	369.	399.	434.	536.	631.
JUN	215.	28.	46.	76.	91.	106.	138.	173.	213.	263.	293.	330.	441.	547.
JUL	205.	31.	48.	78.	92.	106.	136.	168.	205.	251.	279.	312.	412.	508.
AUG	125.	36.	48.	66.	74.	81.	96.	112.	129.	150.	162.	177.	218.	257.
SEP	77.	9.	15.	26.	31.	37.	48.	61.	76.	94.	105.	119.	160.	199.
OCT	60.	4.	8.	15.	19.	24.	33.	44.	56.	73.	83.	96.	134.	172.
NOV	56.	1.	4.	9.	12.	16.	24.	35.	48.	66.	77.	91.	136.	181.
DEC	51.	2.	4.	10.	13.	16.	24.	33.	45.	60.	70.	82.	120.	159.
ANN	1553.	730.	866.	1051.	1129.	1201.	1341.	1480.	1629.	1799.	1898.	2013.	2335.	2625.

PARAMETERS FOR GAMMA DISTRIBUTION. AND ABS. MAX. AND MIN. PREC. RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.017	.022	.010	.010	.010	.007	.009	.026	.020	.019	.014	.017	.005
R	.94	1.28	1.39	2.08	3.22	1.61	1.76	3.22	1.53	1.13	.80	.88	7.03
LNGAM	.0	-.1	-.1	.0	.9	-.1	-.1	.9	-.1	-.1	.2	.1	6.6
PMAX	230.	255.	690.	941.	835.	849.	713.	379.	349.	325.	332.	254.	0.
PMIN	1.	0.	3.	14.	54.	0.	0.	31.	3.	5.	0.	0.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION. IN MM.

STATION NAME ITABAIANINHA SERGIPE SER. NO. 195
LAT. 11 17. LONG. 37 49. ELEV. 225. YEARS OF DATA 48

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN						PRECIPITATION							
JAN	35.	1.	1.	4.	6.	8.	13.	20.	29.	40.	48.	58.	89.	122.
FEB	42.	0.	1.	5.	7.	9.	15.	23.	33.	48.	58.	70.	109.	150.
MAR	72.	1.	2.	7.	11.	15.	25.	39.	57.	81.	98.	119.	186.	257.
APR	103.	11.	19.	32.	39.	47.	62.	79.	100.	125.	141.	160.	218.	275.
MAY	161.	17.	28.	50.	61.	73.	97.	124.	155.	195.	219.	249.	339.	426.
JUN	122.	15.	25.	43.	51.	60.	78.	98.	121.	149.	167.	188.	252.	314.
JUL	132.	44.	57.	75.	83.	90.	105.	121.	138.	157.	169.	183.	222.	258.
AUG	91.	24.	32.	45.	51.	57.	68.	80.	94.	110.	119.	130.	163.	193.
SEP	66.	10.	15.	25.	30.	34.	44.	54.	66.	80.	89.	99.	130.	160.
OCT	51.	1.	3.	8.	11.	15.	22.	32.	44.	60.	70.	83.	123.	163.
NOV	63.	0.	0.	2.	4.	7.	14.	24.	40.	63.	80.	101.	175.	255.
DEC	52.	2.	4.	10.	13.	16.	25.	34.	46.	62.	73.	85.	125.	165.
ANN	988.	524.	604.	712.	756.	797.	876.	953.	1035.	1128.	1182.	1244.	1416.	1570.

PARAMETERS FOR GAMMA DISTRIBUTION.AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.019	.015	.009	.014	.009	.013	.029	.032	.028	.016	.007	.017	.010
R	.67	.63	.51	1.33	1.40	1.57	3.88	2.86	1.81	.81	.42	.87	9.43
LNGAM	.3	.4	.4	-.1	-.1	-.1	1.6	.6	-.1	.1	.7	.1	11.5
PMAX	164.	153.	341.	265.	463.	292.	354.	305.	193.	202.	434.	162.	0.
PMIN	0.	0.	0.	0.	0.	0.	46.	14.	4.	0.	0.	0.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION, IN MM.

STATION NAME REMANSO BAHIA SER. NO. 979
LAT. 9 41, LONG. 42 4, ELEV. 411, YEARS OF DATA 56

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	90.	2.	4.	12.	17.	22.	35.	52.	74.	104.	124.	148.	227.	307.
FEB	90.	1.	3.	9.	13.	18.	30.	47.	69.	101.	121.	148.	233.	322.
MAR	117.	4.	8.	20.	27.	35.	53.	74.	102.	138.	162.	191.	282.	375.
APR	54.	0.	0.	1.	3.	4.	9.	18.	31.	51.	66.	86.	153.	229.
MAY	9.	0.	0.	0.	0.	0.	0.	1.	2.	5.	8.	12.	26.	45.
JUN	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	3.	6.
JUL	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	3.	5.
AUG	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
SEP	2.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	3.	7.	14.
OCT	19.	0.	0.	0.	0.	1.	2.	4.	8.	15.	21.	29.	57.	91.
NOV	83.	1.	2.	7.	10.	14.	25.	41.	62.	91.	111.	136.	220.	308.
DEC	110.	6.	12.	25.	32.	40.	57.	77.	101.	133.	153.	177.	253.	329.
ANN	576.	261.	312.	382.	412.	440.	497.	546.	604.	669.	708.	752.	877.	990.

PARAMETERS FOR GAMMA DISTRIBUTION.AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.068	.007	.007	.007	.023	.161	.182	.982	.063	.014	.007	.009	.011
R	.69	.60	.83	.37	.20	.18	.18	.20	.16	.27	.55	1.01	6.50
LNGAM	.3	.4	.1	.9	1.5	1.6	1.7	1.5	1.8	1.2	.5	-.0	5.7
PMAX	434.	300.	394.	258.	102.	24.	31.	3.	67.	120.	285.	375.	0.
PMIN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION, IN MM.

STATION NAME IBIPETUBA BAHIA SER. NO. 76
LAT. 11 1. LONG. 44 31. ELEV. 434. YEARS OF DATA 49

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	127.	24.	36.	54.	63.	72.	89.	108.	129.	155.	171.	190.	245.	297.
FEB	134.	30.	42.	62.	71.	80.	97.	116.	137.	163.	178.	196.	249.	299.
MAR	120.	21.	31.	49.	57.	65.	82.	100.	121.	147.	162.	181.	236.	288.
APR	65.	3.	7.	14.	18.	23.	33.	45.	59.	78.	90.	105.	151.	196.
MAY	11.	0.	0.	0.	0.	0.	1.	2.	5.	9.	12.	17.	33.	52.
JUN	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	4.
JUL	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	3.	5.
AUG	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	4.	7.
SEP	11.	0.	0.	0.	0.	0.	1.	2.	4.	9.	12.	16.	33.	53.
OCT	59.	4.	7.	15.	19.	23.	32.	43.	56.	72.	82.	95.	134.	173.
NOV	142.	34.	47.	68.	77.	86.	105.	124.	146.	172.	187.	206.	260.	311.
DEC	171.	50.	66.	91.	101.	112.	132.	154.	178.	206.	222.	242.	298.	351.
ANN	844.	531.	529.	664.	625.	723.	775.	827.	881.	941.	975.	1014.	1123.	1217.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.017	.018	.016	.015	.025	.227	.180	.137	.023	.018	.018	.019	.019
R	2.11	2.44	1.94	.99	.28	.19	.18	.18	.26	1.09	2.59	3.25	16.14
LNGAM	.0	.2	-.0	.0	1.2	1.6	1.7	1.6	1.3	-.0	.3	.9	28.3
PMAX	369.	431.	392.	254.	81.	20.	18.	23.	83.	159.	287.	490.	0.
PMIN	10.	3.	7.	0.	0.	0.	0.	0.	0.	0.	2.	36.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
***GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION, IN MM.

STATION NAME - BARRA BAHIA SER. NO. 179
LAT. 11 5, LONG. 43 10, ELEV. 408, YEARS OF DATA 57

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN						PRECIPITATION							
JAN	112.	6.	13.	26.	34.	41.	59.	79.	104.	136.	156.	180.	256.	332.
FEB	118.	18.	28.	45.	54.	62.	79.	97.	118.	144.	160.	179.	235.	289.
MAR	128.	9.	16.	32.	41.	50.	70.	93.	120.	155.	177.	204.	287.	369.
APR	61.	2.	4.	10.	13.	17.	26.	38.	52.	72.	85.	100.	150.	201.
MAY	14.	0.	0.	0.	0.	0.	1.	3.	6.	11.	15.	21.	42.	67.
JUN	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	3.	5.
JUL	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	4.
AUG	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	4.	8.
SEP	9.	0.	0.	0.	0.	0.	0.	1.	2.	5.	7.	11.	26.	45.
OCT	45.	0.	1.	4.	6.	9.	15.	24.	35.	51.	61.	74.	117.	163.
NOV	121.	8.	15.	30.	38.	47.	66.	87.	113.	147.	168.	193.	272.	350.
DEC	142.	29.	41.	62.	72.	81.	101.	121.	145.	173.	190.	210.	270.	326.
ANN	754.	430.	488.	564.	595.	624.	679.	732.	789.	852.	889.	931.	1048.	1151.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.009	.015	.009	.013	.019	.187	.237	.119	.022	.013	.009	.016	.015
R	1.04	1.81	1.12	.77	.26	.19	.19	.17	.19	.60	1.11	2.21	11.62
LNGAM	-.0	-.1	-.1	.2	1.2	1.6	1.6	1.7	1.6	.4	-.1	.1	16.6
PMAX	418.	351.	502.	199.	81.	11.	17.	33.	87.	173.	300.	356.	0.
PMIN	0.	6.	1.	0.	0.	0.	0.	0.	0.	0.	0.	14.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION. IN MM.

STATION NAME JACOBINA BAHIA SER. NO. 186
LAT. 11 11. LONG. 40 31. ELEV. 470. YEARS OF DATA 56

PROBABILITY	95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION											
JAN	86.	2.	6.	14.	19.	24.	37.	53.	74.	101.	118.	140.	209.	279.
FEB	82.	0.	1.	5.	8.	12.	22.	37.	57.	87.	108.	134.	221.	315.
MAR	94.	2.	5.	14.	19.	25.	39.	56.	79.	110.	130.	154.	233.	314.
APR	92.	1.	3.	9.	13.	18.	30.	48.	71.	103.	124.	151.	240.	333.
MAY	70.	4.	8.	17.	22.	26.	37.	50.	65.	85.	97.	112.	159.	206.
JUN	63.	2.	4.	10.	13.	17.	27.	39.	54.	73.	86.	102.	153.	205.
JUL	59.	5.	9.	17.	21.	26.	35.	45.	57.	72.	82.	93.	128.	163.
AUG	48.	8.	12.	19.	22.	26.	32.	40.	48.	59.	65.	72.	95.	116.
SEP	30.	0.	1.	2.	3.	5.	8.	14.	21.	32.	39.	49.	80.	113.
OCT	32.	0.	0.	1.	2.	3.	7.	12.	20.	32.	40.	51.	89.	129.
NOV	83.	1.	3.	10.	14.	19.	31.	46.	67.	95.	113.	136.	211.	288.
DEC	103.	2.	6.	15.	20.	27.	42.	61.	86.	120.	141.	169.	255.	344.
ANN	840.	166.	242.	366.	423.	479.	593.	716.	855.	1022.	1124.	1244.	1600.	1937.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.009	.006	.008	.006	.015	.012	.022	.039	.017	.013	.008	.007	.003
P	.79	.49	.74	.59	1.07	.78	1.29	1.87	.51	.42	.66	.73	2.19
LNSAM	.2	.6	.2	.4	-.0	.2	-.1	-.0	.5	.7	.3	.2	.1
PMAX	797.	301.	619.	246.	227.	233.	139.	133.	108.	139.	324.	354.	0.
PMIN	1.	0.	0.	0.	0.	0.	0.	3.	0.	0.	0.	0.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
***GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION. IN MM.

STATION NAME PARATINGA BAHIA SER. NO. 238
LAT. 12 41. LONG. 43 11. ELEV. 422. YEARS OF DATA 56

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	106.	3.	16.	30.	38.	45.	61.	80.	102.	130.	147.	168.	232.	295.
FEB	117.	8.	16.	31.	38.	47.	65.	85.	110.	142.	162.	186.	261.	334.
MAR	101.	13.	21.	36.	43.	50.	65.	81.	100.	124.	138.	156.	208.	259.
APR	53.	2.	5.	11.	14.	18.	26.	36.	48.	64.	74.	86.	125.	164.
MAY	13.	0.	0.	0.	0.	0.	1.	2.	4.	9.	13.	18.	39.	63.
JUN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
JUL	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	3.	5.
AUG	2.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	6.	10.
SEP	12.	0.	0.	0.	0.	0.	0.	1.	3.	7.	11.	16.	36.	61.
OCT	48.	0.	1.	4.	6.	8.	14.	23.	35.	52.	64.	78.	127.	178.
NOV	147.	15.	25.	45.	56.	66.	88.	113.	143.	180.	203.	231.	315.	397.
DEC	143.	31.	44.	65.	74.	84.	103.	123.	146.	174.	190.	210.	268.	323.
ANN	744.	418.	475.	552.	583.	612.	667.	722.	779.	843.	880.	923.	1041.	1146.

PARAMETERS FOR GAMMA DISTRIBUTION.AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.012	.010	.016	.018	.018	.790	.183	.084	.017	.011	.009	.016	.015
R	1.25	1.15	1.59	.93	.74	.21	.18	.16	.20	.54	1.36	2.34	11.05
LNGAM	-.1	-.1	-.1	.0	1.3	1.5	1.7	1.8	1.5	.5	-.1	.2	15.2
PMAX	349.	723.	299.	203.	84.	6.	28.	60.	147.	174.	327.	404.	0.
PMIN	0.	0.	5.	0.	0.	0.	0.	0.	0.	0.	0.	12.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
***GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION, IN MM.

STATION NAME CAETITE BAHIA SER. NO. 339
LAT. 14 4. LONG. 42 29. ELEV. 872. YEARS OF DATA 57

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	124.	3.	8.	20.	27.	35.	54.	77.	107.	146.	171.	203.	303.	405.
FEB	109.	3.	8.	19.	25.	33.	49.	69.	95.	129.	150.	177.	262.	348.
MAR	102.	3.	6.	16.	22.	29.	44.	63.	88.	120.	141.	167.	249.	333.
APR	59.	1.	3.	8.	11.	15.	24.	35.	49.	69.	81.	97.	149.	201.
MAY	17.	0.	0.	0.	1.	1.	3.	6.	10.	16.	21.	27.	49.	73.
JUN	8.	0.	0.	0.	1.	1.	2.	3.	6.	9.	11.	14.	23.	33.
JUL	10.	0.	0.	1.	1.	1.	3.	4.	7.	11.	13.	16.	27.	38.
AUG	9.	0.	0.	0.	0.	0.	1.	2.	4.	8.	10.	14.	27.	41.
SEP	16.	0.	0.	0.	0.	0.	1.	3.	6.	12.	17.	24.	49.	79.
OCT	63.	2.	5.	12.	16.	20.	30.	41.	56.	75.	87.	102.	149.	196.
NOV	157.	32.	46.	69.	79.	90.	111.	134.	160.	191.	209.	232.	297.	359.
DEC	173.	40.	56.	82.	93.	104.	127.	151.	178.	210.	230.	252.	320.	383.
ANN	847.	491.	554.	639.	673.	705.	765.	824.	886.	956.	997.	1043.	1171.	1284.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.006	.008	.008	.012	.021	.054	.049	.034	.015	.014	.014	.015	.014
R	.79	.83	.79	.71	.36	.45	.49	.31	.25	.89	2.23	2.52	12.12
LNGAM	.2	.1	.2	.3	.9	.7	.6	1.1	1.3	.1	.1	.3	17.8
PMAX	618.	294.	357.	185.	93.	33.	46.	132.	123.	214.	403.	528.	0.
PMIN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	6.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION, IN MM.

STATION NAME JANUARIA MINAS GERAIS SER. NO. 386
LAT. 15 30. LONG. 44 21. ELEV. 439. YEARS OF DATA 55

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	171.	15.	27.	49.	61.	73.	99.	129.	164.	208.	236.	269.	371.	472.
FEB	132.	7.	14.	29.	38.	47.	67.	92.	121.	159.	183.	213.	304.	396.
MAR	115.	6.	12.	26.	34.	41.	59.	80.	106.	139.	160.	186.	265.	344.
APR	51.	1.	3.	7.	10.	13.	21.	30.	43.	59.	70.	83.	126.	170.
MAY	12.	0.	0.	0.	0.	0.	1.	2.	4.	8.	12.	17.	37.	62.
JUN	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	4.	7.
JUL	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	4.	6.
AUG	3.	0.	0.	0.	0.	0.	0.	0.	1.	2.	3.	4.	10.	18.
SEP	18.	0.	0.	0.	0.	0.	1.	3.	7.	13.	19.	26.	55.	89.
OCT	69.	2.	5.	12.	16.	20.	31.	44.	60.	82.	96.	113.	168.	223.
NOV	177.	51.	68.	93.	105.	115.	137.	159.	184.	213.	230.	250.	309.	364.
DEC	231.	100.	121.	150.	162.	173.	196.	218.	242.	270.	286.	305.	358.	406.
ANN	983.	551.	627.	729.	770.	809.	881.	953.	1029.	1114.	1164.	1220.	1377.	1516.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.007	.008	.009	.014	.018	.138	.168	.048	.013	.012	.018	.026	.011
R	1.27	1.00	1.01	.73	.22	.18	.20	.16	.24	.82	3.23	5.91	10.99
LNGAM	-.1	.0	-.0	.2	1.4	1.6	1.5	1.7	1.3	.1	.9	4.6	15.1
PMAX	461.	408.	512.	200.	107.	25.	19.	46.	168.	229.	430.	515.	0.
PMIN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	37.	48.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

TABLE A1. PRECIPITATION FOR GIVEN PROBABILITY LEVELS USING A GAMMA DISTRIBUTION, IN MM.

STATION NAME ARACUAI MINAS GERAIS SER. NO. 442
LAT. 16 51. LONG. 41 59. ELEV. 264. YEARS OF DATA 27

PROBABILITY		95.	90.	80.	75.	70.	60.	50.	40.	30.	25.	20.	10.	5.
MONTH	MEAN	PRECIPITATION												
JAN	161.	13.	24.	45.	56.	67.	92.	120.	153.	196.	222.	254.	353.	449.
FEB	86.	6.	12.	23.	29.	35.	48.	64.	82.	105.	120.	137.	191.	245.
MAR	98.	10.	17.	30.	37.	44.	59.	75.	95.	120.	135.	154.	210.	265.
APR	59.	5.	9.	16.	20.	24.	33.	44.	56.	72.	81.	93.	129.	165.
MAY	13.	0.	0.	1.	1.	2.	4.	6.	9.	14.	17.	21.	35.	49.
JUN	8.	0.	0.	0.	1.	1.	2.	3.	5.	8.	10.	13.	22.	32.
JUL	7.	0.	0.	0.	0.	1.	1.	2.	4.	7.	8.	11.	20.	29.
AUG	4.	0.	0.	0.	0.	0.	0.	1.	2.	3.	5.	6.	13.	21.
SEP	18.	0.	0.	0.	0.	0.	1.	3.	7.	14.	20.	27.	55.	88.
OCT	64.	0.	1.	4.	6.	9.	17.	28.	44.	68.	84.	105.	175.	251.
NOV	157.	9.	18.	37.	47.	58.	82.	111.	145.	190.	218.	252.	358.	463.
DEC	191.	8.	17.	38.	50.	63.	93.	128.	172.	228.	265.	309.	448.	589.
ANN	867.	411.	486.	589.	632.	672.	750.	827.	910.	1004.	1059.	1122.	1300.	1461.

PARAMETERS FOR GAMMA DISTRIBUTION, AND ABS.MAX.AND MIN.PREC.RECORD

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
LAMBA	.008	.014	.014	.021	.040	.055	.054	.062	.014	.007	.007	.005	.008
R	1.22	1.18	1.35	1.21	.52	.42	.37	.27	.26	.48	1.05	.92	7.14
LNGAM	-.1	-.1	-.1	-.1	.5	.7	.9	1.2	1.2	.6	-.0	.0	6.8
PMAX	511.	325.	451.	240.	76.	47.	61.	39.	105.	224.	314.	416.	0.
PMIN	15.	1.	2.	4.	0.	0.	0.	0.	0.	0.	0.	0.	0.

* PRECIPITATION FOR MONTH OR YEAR IS NORMALLY DISTRIBUTED
****GAMMA PARAMETERS UNDEFINED

APPENDIX B

COMPARISON OF PAN EVAPORATION FORMULAS

In order to develop and evaluate methods of estimating Class A pan evaporation, eleven climatic stations were selected as having the most complete and reliable data. Three additional climatic stations having measured Class A pan evaporation were used to evaluate relationships developed from other countries and from the Brazilian climatic data.

The equations used to estimate various relationships are given in SUBROUTINE COMP. The computer printout for the eleven stations with averages and for the three locations with evaporation data is presented following SUBROUTINE COMP.

Column headings and values presented in the computer printout are given as follows:

Column Number	Symbol	Description
1	MO	The month of the year.
2	TM	Mean monthly temperature in ^{o}C.
3	HM	Mean relative humidity expressed decimally.
4	EVPM	The average pan evaporation estimated from three equations (for the first eleven stations). The measured Class A pan evaporation in mm for the last three locations (Remanso, Caxias and Terezina).
5	PREC	Monthly precipitation in mm.
6	RMM	Extraterrestrial radiation for the month at the mean temperature expressed in mm of evaporation.
7	TD	Temperature difference in ^{o}C (mean maximum minus mean minimum temperature).
8	HRS	Hours of actual bright sunshine for the month.

Column Number	Symbol	Description
9	PICHE	Measured Piche evaporation in mm per month.
10	EVPP	Estimated pan evaporation based on Piche evaporation.
11	REVP	EVPM/EVPP.
12	S	Measured percentage of possible sunshine expressed decimally.
13	SC	Percentage of possible sunshine estimated from equations using HM, elevation, TM and PREC.
14	RS	S/SC.
15	EVC	Estimated pan evaporation using Christiansen's formula with sunshine.
16	RCS	EVPM/EVC.
17	EVX	Estimated pan evaporation using Christiansen's formula without sunshine.
18	RCX	EVPM/EVX.
19	EVH	Estimated pan evaporation using Hargreaves' formula.
20	RCH	EVPM/EVH.
21	W6	Estimated wind speed at an anemometer height of 6 mm ($W6 = 12 - .04 \times PREC + .00005 \times PREC^2$ with a minimum value of 4.0).

The mean absolute errors shown represent absolute departures of the estimated values from the measured except that for the eleven stations evaporation was not measured and the average of the three estimated values (disregarding that estimated from the Piche measurements) was used in place of the measured evaporation. The constants in the equations used were adjusted to best fit measured evaporation from prevailing pan exposure conditions. It is believed that Hargreaves' formula with a constant of .43 (XVH = .430) approximately estimates pan evaporation from an irrigated area exposure.

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00001      1*          SUBROUTINE COMP
00002      2*          COMMON HM,TD,EL,TM,OP,SC,S,RS,ERS,FVPP,REVP,ERP,PICH,EVC,RCS,ERC,W
00003      3*         1E,EVX,RCX,FRX,EVH,RCH,ERH,RHM,XPI,XSX,XVC,XVX,XVH,EVPM,M,PREC
00004      4*          DIMENSION HM(12),TM(12),PICH(12),EVPM(12),RHM(12),PREC(12)
00004      5*     C---COMPUTATION OF COMPUTED SUNSHINE PERCENTAGE-------------------
00005      6*          CSHM=1.65-.65*(HM(M)/.75)
00006      7*          CSE=.94+.06*(EL/1000.)
00007      8*          CST=.25+.67*(TM(M)/20.)+.08*(TM(M)/20.)**2
00010      9*          CSP=1.23-.29*(PREC(M)/100.)+.06*(PREC(M)/100.)**2
00011     10*          IF(PREC(M).GT.242.) CSP=.879
00013     11*          XSX=.485
00014     12*          SC=XSX*CSHM*CSP*CST*CSE
00015     13*          IF(S.LT.0.1) S=SC
00017     14*          RS=S/SC
00020     15*          ERS=ABS(S-SC)
00020     16*     C---COMPUTATION OF EVPP FROM PICHE EVAPORATION-------------------
00021     17*          CHMP=.25+.75*(HM(M)/.75)
00022     18*          CPRP=.75+.32*(PREC(M)/100.)-.07*(PREC(M)/100.)**2
00023     19*          IF(PREC(M).GT.230.) CPRP=1.120
00025     20*          XPI=1.700
00026     21*          FVPP=XPI*PICH(M)*CHMP*CPRP
00026     22*     C---CALCULATION OF EVC BY CHRISTIANSEN'S FORMULA WITH SUNSHINE------
00027     23*          CTC=.55+.25*(TM(M)/20.)+.20*(TM(M)/20.)**2
00030     24*          CHV=1.60-.40*(HM(M)/.80)-.20*(HM(M)/.80)**2
00031     25*          CS=1.00+.170*((S-.50)/.50)**2
00032     26*          IF(S.LT.0.40) CS=1.00
00034     27*          CE=.93+.07*(EL/1000.)
00035     28*          CPC=1.28-.28*(PREC(M)/150.)**.5
00036     29*          IF(PREC(M).GT.150.) CPC=1.00
00040     30*          XVC=.293
00041     31*          EVC=XVC*RHM(M)*CTC*CHV*CS*CE*CPC
00041     32*     C---CALCULATION OF EVPC BY CHRISTIANSEN'S FORMULA WITHOUT SUNSHINE---
00042     33*          CTX=.55+.25*(TM(M)/20.)+.20*(TM(M)/20.)**2
00043     34*          CHX=1.60-.25*(HM(M)/.80)-.35*(HM(M)/.80)**2
00044     35*          CEX=.93+.07*(EL/1000.)
00045     36*          CPX=1.35-.35*(PREC(M)/150.)**.5
00046     37*          IF(PREC(M).GT.150.) CPX=1.00
00050     38*          XVX=.291
00051     39*          EVX=XVX*RHM(M)*CEX*CHX*CTX*CPX
00051     40*     C---CALCULATION OF EVH BY HARGREAVES' FORMULA---------------------
00052     41*          CTVH=.40+.074*TM(M)
00053     42*          CHVH=.05+1.42*SQRT(1.00-HM(M))
00054     43*          W6=12.-.04*PREC(M)+.00005*PREC(M)**2.
00055     44*          IF(PREC(M).GT.400.) W6=4.0
00057     45*          CWVH=.72+.039*W6
00060     46*          CEH=1.00+.075*EL/1000.
00061     47*          XVH=.450
00062     48*          EVH=XVH*RHM(M)*CTVH*CHVH*CWVH*CEH
00062     49*     C---ASSUMING EVPM(M) IS THE AVERAGE OF EVC,EVX AND EVH-------------
00063     50*          IF(EVPM(M).LT.1.0) EVPM(M)=(EVC+EVX+EVH)/3.
00065     51*          REVP=EVPM(M)/EVPP
00066     52*          ERP=ABS(EVPM(M)-FVPP)
00067     53*          IF(PICH(M).LT.1.0) ERP=0.
00071     54*          RCS=EVPM(M)/EVC
00072     55*          ERC=ABS(EVPM(M)-EVC)
00073     56*          RCX=EVPM(M)/EVX
00074     57*          ERX=ABS(EVPM(M)-EVX)
00075     58*          RCH=EVPM(M)/EVH
00076     59*          ERH=ABS(EVPM(M)-EVH)
00077     60*          RETURN
00200     61*          END
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TABLE B1. COMPARISON OF FORMULAS FOR COMPUTING PAN EVAPORATION FOR SUVALE, BRASIL

82.578 TEREZINA PIAUI LAT 5 5 S LONG 42 49 W ELEV 79 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	27.2	.77	184.	175.	493.	10.3	195.	0.	0.	.00	.51	.54	.96	176.	1.05	176.	1.05	168.	1.09	6.5
2	26.5	.83	148.	235.	450.	9.5	165.	0.	0.	.00	.49	.48	1.01	148.	1.00	146.	1.01	126.	1.18	5.4
3	26.2	.85	157.	311.	491.	9.1	167.	0.	0.	.00	.45	.46	.96	156.	1.01	153.	1.03	122.	1.29	4.4
4	26.3	.83	129.	254.	449.	9.2	191.	0.	0.	.00	.53	.48	1.12	147.	.88	145.	.89	124.	1.04	5.1
5	26.6	.81	162.	91.	428.	9.7	252.	0.	0.	.00	.69	.57	1.22	156.	1.04	153.	1.06	142.	1.14	8.8
6	26.4	.74	169.	15.	395.	11.3	279.	0.	0.	.00	.79	.70	1.13	178.	.95	176.	.96	168.	1.01	11.4
7	26.5	.65	210.	8.	417.	13.5	307.	0.	0.	.00	.84	.77	1.10	211.	1.00	207.	1.02	204.	1.03	11.7
8	27.6	.57	246.	6.	449.	15.0	322.	0.	0.	.00	.88	.85	1.03	255.	.96	248.	.99	249.	.99	11.8
9	29.1	.55	278.	9.	468.	14.7	292.	0.	0.	.00	.81	.90	.90	272.	1.02	271.	1.03	273.	1.02	11.6
10	29.5	.57	278.	28.	499.	13.7	280.	0.	0.	.00	.75	.86	.86	272.	1.02	275.	1.01	282.	.99	10.9
11	29.2	.61	240.	60.	481.	12.6	250.	0.	0.	.00	.68	.77	.88	234.	1.03	238.	1.01	246.	.98	9.8
12	28.2	.68	212.	105.	491.	11.3	219.	0.	0.	.00	.58	.65	.88	204.	1.04	207.	1.02	212.	1.00	8.3
AVE	27.44	.705	201.1	108.1	459.2	11.66	243.2	.0	.0	.000	.667	.669	.996	200.7	1.002	199.5	1.008	192.9	1.042	8.81
MEAN ABSOLUTE ERROR, PERCENT								.0				9.9		3.3		2.8		5.1		

OVERALL AVERAGES

AVE	27.14	.640	214.1	85.6	457.6	12.74	237.9	.0	.0	.000	.716	.719	.995	216.6	.988	213.8	1.001	214.3	.999	9.38
MEAN ABSOLUTE ERROR, PERCENT								.0				5.9		5.5		6.2		9.0		
VALUE OF CONSTANTS IN EQUATIONS								1.700				.485		.293		.291		.450		
VALUE OF CONSTANTS FOR RATIOS = 1.0								.000				.483		.290		.291		.449		

TABLE B1. COMPARISON OF FORMULAS FOR COMPUTING PAN EVAPORATION FOR SUVALE, BRASIL

82.979 REMANSO BAHIA LAT 9 41 S LONG 42 . 4 W ELEV 411 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	27.5	.51	224.	92.	511.	14.7	0.	0.	0.	.00	.76	.76	1.00	257.	.87	254.	.88	280.	.80	8.7
2	27.5	.52	194.	65.	459.	14.6	0.	0.	0.	.00	.80	.80	1.00	240.	.81	236.	.82	257.	.75	9.6
3	27.1	.51	217.	108.	489.	14.2	0.	0.	0.	.00	.73	.73	1.00	235.	.92	234.	.93	258.	.84	8.3
4	27.3	.51	202.	35.	435.	14.7	0.	0.	0.	.00	.84	.84	1.00	241.	.84	235.	.86	253.	.80	10.7
5	27.0	.50	240.	10.	405.	15.1	0.	0.	0.	.00	.89	.89	1.00	241.	.99	233.	1.03	244.	.99	11.6
6	26.0	.50	234.	1.	368.	15.6	0.	0.	0.	.00	.88	.88	1.00	220.	1.07	215.	1.09	219.	1.07	12.0
7	25.6	.50	254.	1.	390.	15.8	0.	0.	0.	.00	.87	.87	1.00	228.	1.11	224.	1.13	230.	1.11	11.9
8	26.0	.48	283.	0.	430.	16.1	0.	0.	0.	.00	.89	.89	1.00	266.	1.07	259.	1.09	259.	1.09	12.0
9	27.2	.46	313.	4.	460.	15.8	0.	0.	0.	.00	.93	.93	1.00	295.	1.06	280.	1.12	269.	1.08	11.9
10	28.3	.45	346.	10.	504.	15.3	0.	0.	0.	.00	.96	.96	1.00	335.	1.04	312.	1.12	326.	1.07	11.6
11	28.0	.47	281.	78.	495.	14.6	0.	0.	0.	.00	.82	.82	1.00	269.	1.05	262.	1.07	289.	.97	9.2
12	27.5	.48	248.	93.	510.	14.5	0.	0.	0.	.00	.77	.77	1.00	260.	.95	257.	.97	284.	.87	8.7
AVE	27.08	.491	253.2	41.4	454.7	15.08	.0	.0	.0	.000	.844	.844	1.000	257.3	.984	250.1	1.012	265.7	.953	10.51
MEAN ABSOLUTE ERROR, PERCENT								.0				.0		8.2		9.9		12.1		

82.476 CAXIAS MARANHAO LAT 4 52 S LONG 43 21 W ELEV 77 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	26.8	.77	164.	169.	492.	10.3	190.	0.	0.	.00	.50	.53	.95	173.	.95	172.	.95	166.	.99	6.7
2	26.2	.83	150.	243.	450.	9.7	157.	0.	0.	.00	.46	.48	.97	147.	1.02	145.	1.04	125.	1.20	5.2
3	26.1	.84	162.	288.	491.	9.5	165.	0.	0.	.00	.44	.47	.94	158.	1.03	155.	1.05	127.	1.27	4.6
4	26.2	.84	159.	293.	449.	9.5	184.	0.	0.	.00	.52	.47	1.10	144.	1.10	142.	1.12	117.	1.36	4.7
5	26.3	.81	159.	72.	429.	9.8	244.	0.	0.	.00	.67	.58	1.15	158.	1.00	157.	1.01	147.	1.09	9.4
6	25.9	.75	166.	19.	396.	11.2	263.	0.	0.	.00	.75	.68	1.11	169.	.98	169.	.98	161.	1.03	11.3
7	25.7	.69	194.	8.	417.	13.0	291.	0.	0.	.00	.80	.72	1.10	196.	.99	195.	1.00	190.	1.02	11.7
8	26.7	.63	219.	3.	450.	14.3	309.	0.	0.	.00	.84	.80	1.06	238.	.91	235.	.93	230.	.95	11.9
9	28.1	.60	241.	13.	468.	14.0	275.	0.	0.	.00	.77	.84	.92	248.	.97	251.	.96	253.	.95	11.5
10	28.7	.60	231.	29.	499.	13.3	266.	0.	0.	.00	.71	.82	.86	255.	.91	260.	.89	267.	.87	10.9
11	28.4	.65	219.	66.	480.	12.1	233.	0.	0.	.00	.64	.72	.88	218.	1.01	223.	.98	229.	.96	9.6
12	27.6	.71	192.	95.	489.	11.2	213.	0.	0.	.00	.56	.63	.88	197.	.97	201.	.96	203.	.95	8.6
AVE	26.89	.725	187.9	107.3	459.1	11.49	232.5	.0	.0	.000	.637	.644	.989	191.8	.980	192.1	.978	184.4	1.019	8.83
MEAN ABSOLUTE ERROR, PERCENT								.0				9.7		4.2		5.0		9.1		

TABLE B1. COMPARISON OF FORMULAS FOR COMPUTING PAN EVAPORATION FOR SUVALE, BRASIL

83.386 JANUARIA M.G. LAT 15 30 S LONG 44 21 W ELEV 439 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	25.1	.79	177.	147.	528.	10.7	227.	81.	152.	1.16	.57	.52	1.11	179.	.99	177.	1.00	174.	1.02	7.2
2	25.3	.77	169.	105.	465.	11.1	218.	75.	130.	1.30	.62	.56	1.11	170.	1.00	170.	1.00	168.	1.01	8.4
3	25.2	.78	171.	103.	481.	10.8	231.	79.	140.	1.23	.61	.55	1.11	173.	.99	172.	.99	168.	1.02	8.4
4	24.6	.76	160.	52.	412.	11.2	235.	87.	133.	1.20	.67	.61	1.10	160.	1.00	161.	.99	159.	1.01	10.0
5	23.3	.72	156.	11.	370.	13.0	255.	100.	130.	1.19	.73	.65	1.12	156.	1.00	157.	.99	154.	1.01	11.6
6	22.2	.69	144.	1.	330.	14.4	251.	113.	136.	1.06	.76	.66	1.15	144.	1.00	146.	.99	142.	1.01	11.9
7	22.0	.64	164.	1.	353.	14.5	265.	137.	155.	1.05	.76	.68	1.12	162.	1.01	165.	.99	164.	1.00	12.0
8	23.4	.57	205.	1.	401.	15.5	281.	168.	177.	1.15	.79	.76	1.04	202.	1.01	204.	1.00	208.	.98	11.9
9	25.5	.57	230.	16.	446.	15.2	244.	178.	197.	1.17	.68	.79	.85	221.	1.04	229.	1.00	240.	.96	11.4
10	26.4	.63	234.	57.	505.	13.6	215.	167.	229.	1.02	.56	.71	.79	224.	1.04	232.	1.00	244.	.96	9.9
11	25.2	.76	177.	165.	509.	11.2	167.	98.	183.	.97	.44	.52	.84	177.	1.00	177.	1.00	176.	1.00	6.8
12	24.7	.81	167.	217.	530.	10.2	174.	72.	143.	1.16	.43	.47	.92	173.	.96	171.	.97	156.	1.07	5.7
AVE	24.41	.706	179.3	73.1	444.3	12.62	230.3	112.8	158.9	1.129	.636	.625	1.019	178.4	1.005	180.3	.995	179.3	1.000	9.59
MEAN ABSOLUTE ERROR, PERCENT								12.0				11.8		1.6		.7		2.1		

OVERALL AVERAGES

AVE	23.75	.758	160.8	117.1	447.0	10.98	221.3	94.6	151.2	1.063	.608	.551	1.104	162.8	.988	162.5	.990	157.1	1.023	8.47
MEAN ABSOLUTE ERROR, PERCENT								13.7				13.5		2.3		1.6		3.7		
VALUE OF CONSTANTS IN EQUATIONS								1.700				.485		.293		.291		.450		
VALUE OF CONSTANTS FOR RATIOS = 1.0								1.808				.535		.289		.288		.461		

TABLE B1. COMPARISON OF FORMULAS FOR COMPUTING PAN EVAPORATION FOR SUVALE, BRASIL

83.587 BELO HORIZONTE M.G. LAT 19 56 S LONG 43 56 W ELEV 915 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	22.8	.76	174.	268.	538.	9.4	192.	88.	169.	1.03	.47	.47	1.01	179.	.98	178.	.98	167.	1.05	4.9
2	22.9	.74	157.	194.	467.	9.6	174.	80.	150.	1.05	.49	.49	1.01	157.	1.00	158.	1.00	157.	1.00	6.1
3	22.3	.76	155.	165.	471.	9.3	205.	87.	161.	.96	.55	.48	1.14	154.	1.00	154.	1.00	156.	.99	6.8
4	21.1	.74	138.	77.	392.	9.7	219.	83.	134.	1.03	.63	.53	1.20	136.	1.02	137.	1.01	141.	.98	9.2
5	19.1	.73	127.	22.	342.	10.5	240.	89.	122.	1.04	.70	.55	1.27	125.	1.02	126.	1.00	129.	.98	11.1
6	18.0	.72	112.	10.	300.	11.1	249.	92.	118.	.95	.77	.55	1.40	112.	1.00	112.	1.00	113.	.99	11.6
7	17.7	.67	128.	6.	323.	11.2	257.	108.	130.	.98	.76	.57	1.34	125.	1.02	127.	1.01	130.	.98	11.7
8	19.0	.61	162.	9.	376.	12.1	263.	139.	160.	1.02	.75	.62	1.20	157.	1.03	160.	1.01	169.	.96	11.6
9	20.8	.63	180.	38.	430.	11.5	199.	139.	180.	1.00	.56	.62	.90	170.	1.06	178.	1.01	192.	.94	10.5
10	21.5	.69	182.	113.	501.	10.0	182.	126.	205.	.89	.47	.53	.89	176.	1.04	179.	1.02	192.	.95	8.1
11	21.7	.74	168.	215.	515.	9.1	171.	95.	179.	.94	.44	.46	.95	168.	1.00	168.	1.00	167.	1.01	5.7
12	21.6	.80	159.	354.	542.	8.4	142.	78.	155.	1.02	.35	.43	.80	167.	.95	165.	.96	145.	1.10	4.1
AVE	20.71	.716	153.5	122.8	433.0	10.16	207.9	100.4	155.3	.989	.578	.525	1.102	152.2	1.009	153.6	1.000	154.9	.991	8.46
MEAN ABSOLUTE ERROR, PERCENT								4.2				15.8		2.2		1.2		3.4		

83.589 CONCEICAO DO MATO DENTM.G. LAT 19 2 S LONG 43 26 W ELEV 675 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	22.9	.77	169.	261.	536.	11.2	182.	84.	163.	1.04	.45	.46	.98	174.	.97	173.	.98	160.	1.05	5.0
2	22.8	.78	147.	211.	466.	11.4	160.	74.	144.	1.02	.45	.46	.99	150.	.98	149.	.99	142.	1.03	5.8
3	22.3	.80	144.	193.	473.	10.8	161.	72.	142.	1.01	.43	.45	.96	147.	.98	146.	.99	139.	1.04	6.1
4	20.6	.81	120.	104.	395.	11.1	146.	64.	116.	1.03	.42	.46	.92	121.	.99	120.	.99	118.	1.01	8.4
5	18.4	.81	107.	37.	347.	12.4	171.	66.	102.	1.06	.50	.48	1.04	107.	1.00	109.	.98	106.	1.02	10.6
6	16.8	.80	95.	15.	306.	14.0	170.	65.	92.	1.03	.52	.47	1.11	94.	1.01	97.	.98	93.	1.02	11.4
7	16.4	.78	104.	15.	329.	14.0	175.	79.	109.	.95	.51	.47	1.09	102.	1.02	106.	.98	104.	1.00	11.4
8	17.3	.73	135.	8.	381.	16.0	208.	104.	134.	1.01	.59	.52	1.13	131.	1.03	136.	.99	137.	.98	11.7
9	19.6	.71	157.	44.	433.	14.7	149.	107.	153.	1.02	.42	.54	.77	151.	1.04	156.	1.01	164.	.96	10.4
10	21.0	.73	163.	141.	502.	12.4	124.	104.	185.	.88	.32	.47	.68	159.	1.02	160.	1.02	169.	.96	7.3
11	21.8	.77	157.	287.	514.	10.6	124.	83.	161.	.98	.32	.44	.72	161.	.97	161.	.98	149.	1.05	4.6
12	22.2	.79	159.	435.	540.	9.8	124.	70.	139.	1.14	.31	.44	.70	167.	.95	166.	.96	145.	1.10	4.0
AVE	20.17	.771	138.1	146.0	435.0	12.37	157.9	81.0	136.7	1.010	.437	.472	.925	138.7	.996	140.1	.986	135.5	1.019	8.06
MEAN ABSOLUTE ERROR, PERCENT								4.7				14.9		2.4		1.9		3.7		

TABLE B1. COMPARISON OF FORMULAS FOR COMPUTING PAN EVAPORATION FOR SUVALE, BRASIL

83.229 ONDINA BAHIA LAT 13 0 S LONG 38 31 W ELEV 45 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	26.2	.80	189.	76.	521.	10.7	273.	94.	160.	1.18	.70	.58	1.20	194.	.97	191.	.99	181.	1.04	9.2
2	26.6	.79	169.	85.	463.	10.6	242.	88.	151.	1.12	.69	.58	1.19	174.	.97	171.	.99	163.	1.04	9.0
3	26.6	.80	162.	153.	486.	10.5	243.	88.	170.	.95	.65	.52	1.25	167.	.97	163.	.99	155.	1.04	7.0
4	26.0	.82	130.	291.	423.	9.7	208.	76.	155.	.83	.59	.47	1.25	138.	.94	136.	.95	115.	1.13	4.6
5	24.9	.83	112.	293.	386.	9.2	186.	72.	149.	.75	.53	.45	1.16	120.	.94	118.	.95	99.	1.14	4.6
6	24.1	.82	103.	187.	347.	9.3	197.	72.	145.	.71	.58	.45	1.29	107.	.96	105.	.98	97.	1.06	6.3
7	23.3	.81	107.	209.	369.	9.2	197.	78.	158.	.68	.56	.44	1.29	111.	.96	110.	.98	100.	1.07	5.8
8	23.3	.80	133.	97.	413.	9.6	224.	86.	152.	.87	.63	.50	1.25	134.	.99	134.	.99	130.	1.02	8.6
9	23.9	.80	149.	83.	451.	9.9	220.	83.	145.	1.03	.62	.52	1.17	151.	.99	151.	.99	145.	1.03	9.0
10	24.9	.81	168.	91.	504.	10.0	246.	88.	156.	1.08	.65	.53	1.22	172.	.98	170.	.99	161.	1.04	8.8
11	25.2	.83	156.	135.	503.	10.0	222.	80.	155.	1.01	.59	.49	1.19	161.	.97	159.	.98	148.	1.05	7.5
12	25.7	.83	171.	104.	522.	10.2	242.	83.	152.	1.12	.61	.53	1.16	176.	.97	175.	.98	162.	1.06	8.4
AVE	25.05	.811	145.6	150.4	449.1	9.91	225.1	82.5	154.0	.946	.616	.506	1.217	150.4	.969	148.6	.980	137.9	1.056	7.40
MEAN ABSOLUTE ERROR, PERCENT								15.2				17.8		3.2		2.0		5.3		

83.689 BARBACENA M.G. LAT 21 15 S LONG 43 46 W ELEV 1126 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	19.9	.81	152.	237.	539.	9.9	173.	68.	137.	1.11	.42	.41	1.05	158.	.97	156.	.98	143.	1.06	5.3
2	19.9	.81	132.	212.	465.	10.1	152.	60.	121.	1.09	.43	.41	1.05	136.	.97	134.	.98	125.	1.05	5.8
3	19.1	.83	126.	186.	467.	9.5	170.	58.	118.	1.07	.45	.39	1.15	130.	.97	128.	.98	120.	1.05	6.3
4	17.5	.83	110.	64.	384.	9.6	166.	55.	93.	1.18	.48	.44	1.10	111.	.99	112.	.98	107.	1.03	9.6
5	15.9	.82	97.	31.	332.	10.7	197.	58.	89.	1.09	.58	.44	1.32	98.	1.00	100.	.98	95.	1.03	10.8
6	14.8	.81	85.	21.	290.	11.8	195.	62.	90.	.94	.61	.43	1.41	85.	1.00	87.	.98	83.	1.02	11.2
7	14.4	.78	96.	13.	313.	11.8	202.	71.	98.	.98	.60	.44	1.37	95.	1.01	98.	.98	95.	1.01	11.5
8	15.6	.74	122.	19.	368.	12.9	219.	92.	125.	.97	.63	.48	1.32	119.	1.02	122.	1.00	124.	.98	11.3
9	16.9	.75	136.	58.	424.	11.8	155.	88.	136.	1.00	.44	.46	.94	132.	1.03	135.	1.01	141.	.97	9.8
10	17.9	.79	142.	134.	498.	10.4	149.	78.	146.	.98	.39	.41	.94	141.	1.01	141.	1.01	144.	.99	7.5
11	18.4	.81	141.	185.	515.	9.8	150.	69.	138.	1.03	.39	.39	.99	144.	.98	142.	.99	138.	1.03	6.3
12	19.0	.84	142.	289.	544.	9.0	130.	58.	121.	1.18	.32	.38	.83	150.	.95	148.	.96	128.	1.11	4.6
AVE	17.44	.801	123.5	120.8	428.4	10.61	171.6	68.1	117.6	1.050	.477	.422	1.128	124.9	.989	125.3	.985	120.3	1.027	8.34
MEAN ABSOLUTE ERROR, PERCENT								6.7				15.6		2.3		1.7		3.8		

TABLE B1. COMPARISON OF FORMULAS FOR COMPUTING PAN EVAPORATION FOR SUVALE, BRASIL

83.096 ARACAJU SER LAT 10 55 S LONG 37 5 W ELEV 6 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	26.5	.77	203.	43.	515.	10.2	253.	111.	168.	1.21	.65	.64	1.01	205.	.99	207.	.98	198.	1.03	10.4
2	26.8	.77	183.	45.	461.	10.4	226.	103.	157.	1.17	.65	.64	1.01	184.	.99	186.	.98	178.	1.03	10.3
3	26.9	.78	177.	107.	488.	10.3	224.	105.	185.	.96	.60	.57	1.05	179.	.99	179.	.99	173.	1.02	8.3
4	26.4	.79	143.	162.	430.	10.2	214.	91.	174.	.82	.61	.51	1.18	147.	.98	145.	.99	138.	1.04	6.8
5	25.4	.81	122.	253.	397.	10.0	190.	80.	162.	.75	.53	.47	1.14	128.	.95	127.	.95	110.	1.10	4.9
6	24.5	.80	111.	177.	360.	9.9	186.	80.	156.	.71	.54	.47	1.16	114.	.98	113.	.99	107.	1.04	6.5
7	23.8	.80	116.	161.	382.	10.0	179.	80.	154.	.75	.51	.46	1.09	118.	.98	117.	.99	113.	1.03	6.8
8	23.7	.78	140.	104.	423.	10.0	201.	92.	162.	.86	.56	.51	1.09	139.	1.00	140.	.99	139.	1.00	8.4
9	24.5	.77	166.	54.	456.	9.9	214.	98.	154.	1.08	.60	.58	1.03	165.	1.00	168.	.99	164.	1.01	10.0
10	25.4	.77	190.	50.	503.	10.1	242.	103.	160.	1.18	.64	.61	1.05	190.	1.00	193.	.99	186.	1.02	10.1
11	25.8	.78	188.	49.	498.	10.3	246.	101.	158.	1.19	.66	.61	1.07	190.	.99	191.	.98	182.	1.03	10.2
12	26.2	.78	200.	38.	514.	10.4	268.	104.	157.	1.27	.68	.63	1.08	203.	.98	204.	.98	192.	1.04	10.5
AVE	25.49	.733	161.4	104.4	452.4	10.14	220.2	95.6	162.2	.995	.602	.560	1.076	163.5	.988	164.1	.984	156.8	1.030	8.61
MEAN ABSOLUTE ERROR, PERCENT								18.6				7.0		1.3		1.6		2.9		

83.179 BARRA BAHIA LAT 11 5 S LONG 43 10 W ELEV 408 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	26.7	.65	228.	89.	515.	12.5	270.	129.	194.	1.17	.69	.67	1.04	224.	1.02	224.	1.02	235.	.97	8.8
2	26.8	.67	201.	93.	461.	11.9	251.	116.	178.	1.13	.73	.66	1.11	199.	1.01	197.	1.02	206.	.98	8.7
3	26.6	.68	201.	119.	488.	11.9	256.	116.	190.	1.06	.68	.62	1.11	199.	1.01	198.	1.02	206.	.98	8.0
4	26.4	.66	195.	62.	430.	12.5	278.	121.	173.	1.12	.79	.69	1.15	195.	1.00	191.	1.02	198.	.98	9.7
5	25.5	.60	201.	16.	397.	14.2	299.	140.	162.	1.24	.84	.77	1.09	202.	1.00	198.	1.02	205.	.96	11.4
6	24.5	.55	197.	0.	359.	16.0	304.	148.	151.	1.30	.89	.80	1.11	201.	.98	195.	1.01	195.	1.01	12.0
7	24.1	.53	211.	0.	381.	16.5	319.	162.	162.	1.30	.90	.80	1.12	215.	.98	208.	1.01	210.	1.00	12.0
8	25.0	.48	251.	0.	423.	16.8	329.	198.	184.	1.36	.91	.86	1.06	255.	.98	246.	1.02	250.	1.00	12.0
9	27.2	.46	278.	8.	457.	15.6	288.	224.	210.	1.32	.81	.93	.87	273.	1.02	273.	1.02	287.	.97	11.7
10	28.6	.48	298.	32.	505.	13.9	285.	242.	253.	1.18	.75	.91	.83	289.	1.03	292.	1.02	312.	.95	10.8
11	27.5	.60	229.	118.	499.	12.7	245.	166.	246.	.93	.65	.68	.96	222.	1.03	224.	1.02	241.	.95	8.0
12	26.4	.68	205.	147.	515.	11.5	242.	134.	226.	.91	.62	.59	1.04	201.	1.02	202.	1.02	212.	.97	7.2
AVE	26.27	.587	224.5	56.9	452.5	13.79	280.6	158.1	194.2	1.156	.772	.747	1.033	222.9	1.007	220.8	1.017	229.7	.977	10.02
MEAN ABSOLUTE ERROR, PERCENT								16.3				9.7		1.7		1.6		2.6		

TABLE B1. COMPARISON OF FORMULAS FOR COMPUTING PAN EVAPORATION FOR SUVALE, BRASIL

82-898 RECIFE IOLINDA PBCO LAT 8 1 S LONG 34 51 W ELEV 56 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	27.0	.76	207.	40.	505.	9.7	281.	105.	157.	1.32	.73	.66	1.11	211.	.98	209.	.99	200.	1.03	10.5
2	27.1	.77	172.	89.	456.	9.7	240.	90.	154.	1.11	.70	.60	1.17	176.	.98	173.	.99	167.	1.03	8.8
3	27.0	.79	166.	197.	493.	9.9	236.	88.	171.	.97	.63	.51	1.23	172.	.96	169.	.98	156.	1.06	6.1
4	26.6	.81	141.	248.	440.	10.2	213.	74.	149.	.95	.60	.49	1.23	149.	.95	146.	.96	128.	1.10	5.1
5	25.6	.83	123.	335.	413.	10.1	201.	65.	133.	.93	.56	.47	1.20	132.	.93	130.	.95	108.	1.15	4.2
6	24.7	.83	110.	318.	377.	9.8	186.	63.	129.	.85	.54	.45	1.19	117.	.94	115.	.95	96.	1.14	4.3
7	24.2	.82	118.	274.	399.	9.8	198.	70.	142.	.83	.55	.45	1.23	123.	.96	122.	.97	109.	1.08	5.6
8	24.2	.80	135.	146.	436.	9.9	214.	80.	153.	.88	.59	.48	1.23	137.	.98	136.	.99	131.	1.03	7.2
9	25.0	.78	167.	62.	462.	9.5	244.	89.	144.	1.16	.68	.58	1.18	169.	.99	169.	.99	163.	1.03	9.7
10	25.9	.76	200.	37.	501.	9.5	280.	101.	149.	1.34	.74	.64	1.16	204.	.98	202.	.99	194.	1.03	10.6
11	26.4	.76	203.	25.	489.	9.6	285.	98.	140.	1.45	.77	.67	1.15	208.	.97	206.	.99	195.	1.04	11.0
12	26.7	.76	205.	40.	503.	9.6	294.	103.	153.	1.34	.76	.65	1.16	210.	.98	207.	.99	198.	1.04	10.5
AVE	25.87	.790	162.2	146.9	456.0	9.77	239.3	85.5	147.9	1.097	.654	.554	1.181	167.4	.969	165.4	.981	153.8	1.055	7.80

MEAN ABSOLUTE ERROR, PERCENT 17.4 15.3 3.2 2.0 5.2

82-994 MACEIO ALA LAT 9 40 S LONG 35 42 W ELEV 46 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	26.5	.76	200.	58.	511.	10.7	281.	108.	170.	1.18	.73	.62	1.16	204.	.98	202.	.99	195.	1.03	9.8
2	26.7	.77	178.	63.	459.	10.8	244.	98.	156.	1.14	.71	.62	1.14	182.	.98	180.	.99	174.	1.03	9.7
3	26.6	.79	168.	135.	489.	10.6	240.	95.	178.	.95	.64	.54	1.20	172.	.98	169.	.99	163.	1.03	7.5
4	26.1	.81	138.	225.	434.	10.1	216.	80.	160.	.86	.61	.48	1.26	145.	.95	142.	.97	127.	1.09	5.5
5	25.3	.83	119.	345.	404.	9.5	194.	72.	148.	.80	.54	.46	1.18	127.	.93	126.	.95	103.	1.15	4.2
6	24.3	.82	108.	264.	367.	9.5	186.	74.	150.	.72	.54	.45	1.21	114.	.95	112.	.96	98.	1.10	4.9
7	23.7	.81	115.	216.	390.	9.6	199.	80.	161.	.72	.56	.44	1.26	120.	.96	118.	.98	108.	1.07	5.7
8	23.7	.78	136.	134.	429.	9.6	213.	92.	170.	.80	.59	.49	1.21	137.	.99	136.	1.00	135.	1.01	7.5
9	24.5	.77	160.	86.	459.	10.0	229.	94.	159.	1.01	.64	.55	1.17	161.	1.00	161.	.99	159.	1.01	8.9
10	25.3	.76	190.	59.	503.	10.2	268.	105.	165.	1.15	.71	.60	1.19	192.	.99	191.	.99	187.	1.02	9.8
11	25.9	.76	201.	31.	494.	10.8	282.	104.	150.	1.34	.75	.65	1.16	205.	.98	203.	.99	195.	1.03	10.8
12	26.3	.76	206.	38.	510.	10.8	292.	108.	160.	1.29	.75	.65	1.16	210.	.98	208.	.99	199.	1.03	10.5
AVE	25.41	.785	160.0	137.8	454.0	10.18	237.1	92.4	160.5	.997	.648	.546	1.187	164.0	.976	162.4	.985	153.6	1.042	7.92

MEAN ABSOLUTE ERROR, PERCENT 18.7 15.7 2.5 1.5 4.0

TABLE B1. COMPARISON OF FORMULAS FOR COMPUTING PAN EVAPORATION FOR SUVALE, BRASIL

82.798 JOAO PESSOA PARAIBA LAT 7 6 S LONG 34 52 W ELEV 28 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	26.6	.76	195.	62.	501.	11.4	267.	103.	163.	1.20	.70	.62	1.12	198.	.99	197.	.99	191.	1.02	9.7
2	26.8	.77	172.	79.	454.	11.4	235.	89.	148.	1.16	.69	.60	1.14	175.	.98	173.	.99	167.	1.03	9.1
3	26.8	.78	167.	173.	491.	11.6	231.	89.	170.	.98	.62	.52	1.19	171.	.98	169.	.99	161.	1.04	6.6
4	26.3	.81	141.	227.	493.	11.6	214.	71.	143.	.99	.60	.49	1.24	148.	.95	146.	.97	130.	1.09	5.5
5	25.3	.84	121.	301.	418.	11.3	208.	61.	126.	.96	.57	.45	1.26	131.	.93	128.	.95	106.	1.15	4.5
6	24.3	.84	106.	348.	382.	11.1	192.	57.	118.	.90	.55	.44	1.27	115.	.93	113.	.94	91.	1.16	4.1
7	23.7	.84	115.	190.	404.	11.2	207.	65.	133.	.86	.58	.44	1.32	120.	.95	118.	.97	106.	1.08	6.2
8	23.7	.82	133.	132.	440.	11.5	231.	74.	142.	.94	.63	.47	1.34	137.	.97	134.	.99	128.	1.04	7.6
9	24.7	.79	165.	61.	463.	11.4	237.	87.	141.	1.17	.66	.57	1.16	167.	.99	167.	.99	161.	1.03	9.8
10	25.6	.77	202.	23.	500.	11.3	282.	105.	149.	1.36	.75	.65	1.15	206.	.98	205.	.99	195.	1.04	11.1
11	26.1	.76	197.	31.	486.	10.9	280.	106.	153.	1.29	.76	.65	1.16	202.	.98	199.	.99	190.	1.04	10.8
12	26.4	.76	200.	41.	499.	11.1	282.	106.	158.	1.26	.73	.64	1.14	204.	.98	202.	.99	194.	1.03	10.5
AVE	25.52	.795	159.6	139.0	456.8	11.32	238.9	84.4	145.4	1.097	.653	.546	1.197	164.5	.970	162.7	.981	151.6	1.053	7.96
MEAN ABSOLUTE ERROR, PERCENT								14.0				16.5		3.0		2.0		5.0		

82.781 NAZARE DA MATA PBCO LAT 7 44 S LONG 35 15 W ELEV 87 M

MO	TM	HM	EVPM	PREC	RMM	TD	HRS	PICHE	EVPP	REVP	S	SC	RS	EVC	RCS	EVX	RCX	EVH	RCH	W6
1	26.4	.74	209.	38.	503.	11.4	258.	109.	158.	1.32	.67	.66	1.01	209.	1.00	211.	.99	206.	1.01	10.6
2	26.5	.76	177.	64.	456.	10.6	216.	88.	140.	1.27	.63	.62	1.02	177.	1.00	179.	.99	174.	1.02	9.7
3	26.2	.79	172.	109.	490.	9.9	224.	83.	149.	1.15	.60	.55	1.09	174.	.99	174.	.99	167.	1.03	8.2
4	25.6	.82	138.	151.	440.	9.0	207.	65.	127.	1.09	.58	.50	1.18	142.	.97	140.	.98	132.	1.05	7.1
5	24.7	.85	119.	197.	414.	8.3	190.	54.	113.	1.06	.52	.45	1.17	126.	.95	124.	.96	108.	1.11	6.1
6	23.5	.86	102.	197.	378.	8.0	173.	48.	100.	1.02	.50	.42	1.18	109.	.94	107.	.96	91.	1.12	6.1
7	22.9	.85	112.	128.	400.	8.4	189.	53.	104.	1.08	.53	.45	1.17	117.	.96	115.	.97	105.	1.07	7.7
8	22.9	.83	134.	77.	437.	9.0	204.	63.	111.	1.22	.56	.50	1.13	138.	.98	138.	.97	128.	1.05	9.2
9	23.7	.80	161.	39.	462.	10.2	232.	75.	117.	1.38	.65	.57	1.14	164.	.98	165.	.98	155.	1.04	10.5
10	24.8	.77	198.	21.	500.	11.3	268.	100.	141.	1.41	.71	.64	1.11	200.	.99	202.	.98	192.	1.03	11.2
11	25.6	.74	202.	27.	488.	11.8	262.	108.	151.	1.33	.71	.66	1.07	202.	1.00	204.	.99	198.	1.02	10.9
12	26.1	.74	208.	33.	501.	11.6	273.	109.	156.	1.33	.71	.66	1.07	209.	.99	210.	.99	204.	1.02	10.7
AVE	24.91	.797	161.0	90.2	455.9	9.96	224.7	79.7	130.6	1.233	.614	.557	1.103	163.9	.982	164.1	.981	155.1	1.038	8.99
MEAN ABSOLUTE ERROR, PERCENT								18.9				9.3		1.8		1.9		3.7		