Assessment of water resources and recommendation to improve water resources management

(Ref. Adaa Pilot Learning Site of the project "Improving Productivity and Market Success of Ethiopian Farmers, Oromia, Ethiopia)

Final Draft Report

By

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1 Introduction

The contents covered hereunder are in reference to the agreement between ILRI and IWMI for collaborative work on the CIDA-supported ongoing project on Improving Productivity and Market Success of Ethiopian Farmers (IPMS). This document encompasses the findings and recommendations on some of the pre-identified activities aimed at promoting irrigation innovations for horticulture crops in Adaa Pilot Learning Site (PLS) located in Oromia region of Ethiopia, namely:

- Assessment of water resources based on existing information:
    - water resources and hydrological information,
    - resource mapping,
    - identification of potentials
    - identification of existing uses
- Carry out assessment of land and water suitability based on previous studies and reports: water quality and land capability
- Device an appropriate management approach to improve existing schemes and improve the benefit gains

The other components of the PLS activities that are related to module development and conducting training are provided in separate report

2 Methodology

Following are key questions that guided the investigations:

1. What are the surface water resources system in the Adaa wereda
2. What magnitude of water and land potential available for irrigation in the wereda and what magnitudes of these resources are used?
3. What are the performances of the existing water infrastructure used in irrigation?
4. How do we improve the management of water resources to improve productivity and success of the systems?

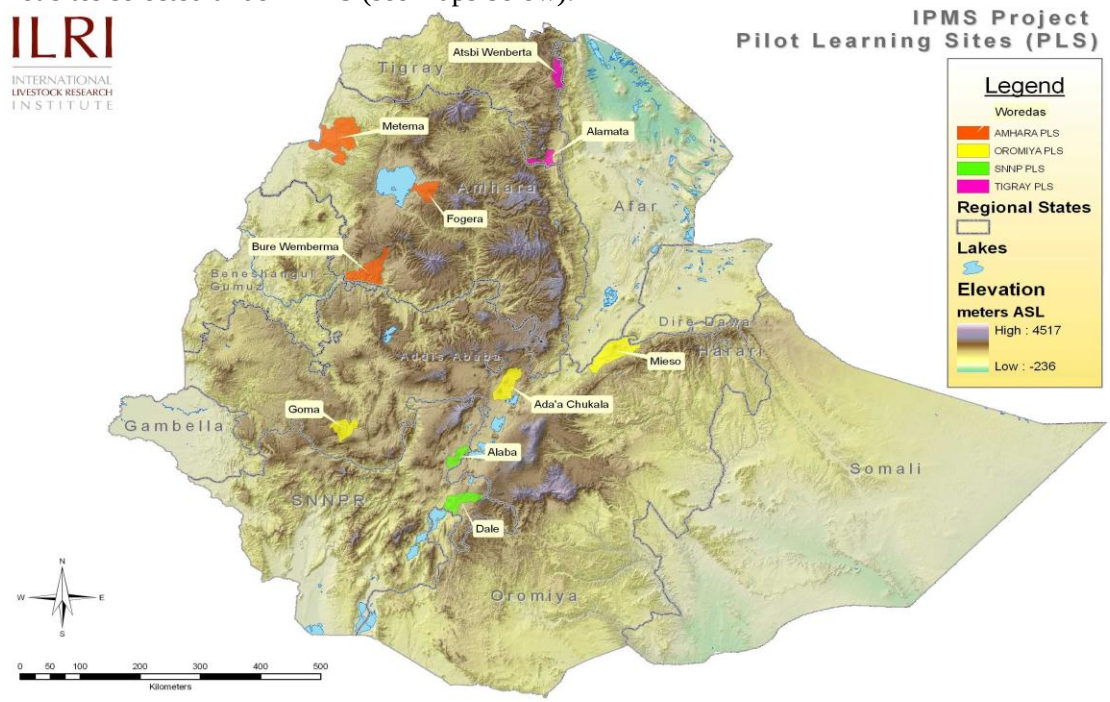
In order to respond to the objective of the project and the key question, the study was conducted using GIS based information mapping and evaluating sample project site. Relevant data have been collected based on literature review, secondary data sources, interviews with farmers and development agents, walk over survey and some field data collection.

Joint fieldtrips in various parts of Adaa have been organized with IPMS project staff and field development agents to obtain the necessary information pertinent to the above. Lessons learned and information acquired during inception phase of this task a previous fieldtrip and through participation in a stakeholder workshop in mid February has also augmented this report.

3 About Adaa PLS

The capital of Adaa wereda, Bishoftu (Debrezeit) is located some 40 km South-East of Addis Ababa. It is one of the most important wereda in Oromia and in nearby area to the capital of

Ethiopia. It is producing varieties of agricultural produce, farmers using number of technologies as input to agriculture, and has good market access due to proximity to Addis and lying the foreign export-import corridor of Addis Ababa-Djibouti tarmac. Adda Wereda is one of the 10 pilot sites selected under IPMS (see maps below).



Map 1: Map of Ethiopia with IPMS Pilot Learning Sites (PLS) (Source: IPMS, 2004)

4 Water Resources and irrigation potential of the Adaa

Currently, in the wereda 5,441ha of land has been studied and identified as potential developable (prioritized area). However, the overall potential of the wereda is not clearly known, particularly when the potential of Awash River basin potential is taken in to consideration. The wereda Agricultural office has in its record a land area of 3,561.9ha already under irrigation by farmers and a total beneficiary of 5,600 house holds. That shows an average land holding size of about 0.5ha irrigated area. However, in the wereda there are certain unaccounted private commercial and state/regional government owned schemes, which are already in place. Particularly, irrigated agriculture through development of ground water for horticulture and flower farming are emerging quite strongly. The exact extent of exploitation of the ground water resources and the developed area is not known, particularly those associated to commercial farming. According to the information gathered from the agricultural bureau of the wereda, a total of 1087 hand dug wells are also available irrigating 55ha of irrigation land.

The Ada'a Liben wereda has 10 rivers and 7 lakes of water resources bodies. Most of the rivers and lakes are currently under some form of use and some are not used at all. Most of the rivers in the wereda are not gauged. The irrigation potential of each river and lakes at present information can be shown below:

Potential Rivers, Lakes and Irrigable area in Ada Liben Wereda					
S.No	Name of River	Peasant Association	Irrigable area(ha)	Current status	Type Diversion system
1	Jello River	Oda Jida	25	Not Operational	Pumping
2	Adelle River	Liben Gadula	20	Operational	Traditional by pumping
	"	Dire Doti	10	Operational	Traditional by pumping
3	Ashufe River	Agamsa Rogicha	15	Not Operational	Spring
4	Orofe River	Gongo	15	Operational	Traditional by Diversion
5	Wadecha River	Godino	120	Operational	Traditional by Diversion
	"	Gende Gorba	166	Not Operational	
	"	Goa Worko	100	Operational	Modern by diversion
6	Chancho River	Jello Chancho	10	Not Operational	Diversion
7	Kolbe River	Kolbe Koticha	28	Operational	Diversion
8	Awash River	Liben Gadula	160	Not Operational	Pumping
	"	Gogiti Goro	260	Not Operational	Pumping
	"	Oda Jida	170	Not Operational	Pumping
	"	Mume Kosoru	190	Not Operational	Pumping
	"	Daglagala Jida	170	Not Operational	Pumping
	"	Warrajarsa	160	Not Operational	Pumping
	"	Agamsa Rogicha	90	Not Operational	Pumping
9	Mojo River	Tulu Dimtu	7	Not Operational	Pumping
	"	Kerfe	30	Operational	Pumping
	"	Hidi	85	Operational	Pumping
	"	Katila	20	Operational	Pumping
	"	Koftu	15	Not Operational	Pumping
	"	Kaliti	15	Operational	Pumping
	"	Denkaka	15	Operational	Pumping
	"	Jello Chancho	25	Not Operational	Pumping
	"	Gogiti Goro	1500	Operational	Pumping
10	Wadecha Dam	Ketaba Gimbi	350	Not Operational	Traditional diversion
	"	Godino	359	Operational	Modern by Diversion
	"	Harawa	120	Operational	Traditional by Diversion
11	Hora Kirole (lake)	Hidi	65	Semi-Operational	Pumping
12	Adekore (lake)	Gechi Da'imo	20	Semi-Operational	Pumping
13	Tute (lake)	Liben Gadula& Gogiti goro	85	Semi-Operational	Pumping
14	Belbela Dam	Koftu	265	Operational	Modern byDiversion
	"	Kaliti (Dinsho Flowering Farm)	532	Operational	Modern byDiversion
	"	Fultino	85	Operational	Modern by diversion
	"	Dhanama	45	Operational	Traditional by Diversion
15	Chaleleka lake	Bishoftu	14	Semi-Operational	Pumping
	"	Gende Gorba	80	Not Operational	Pumping

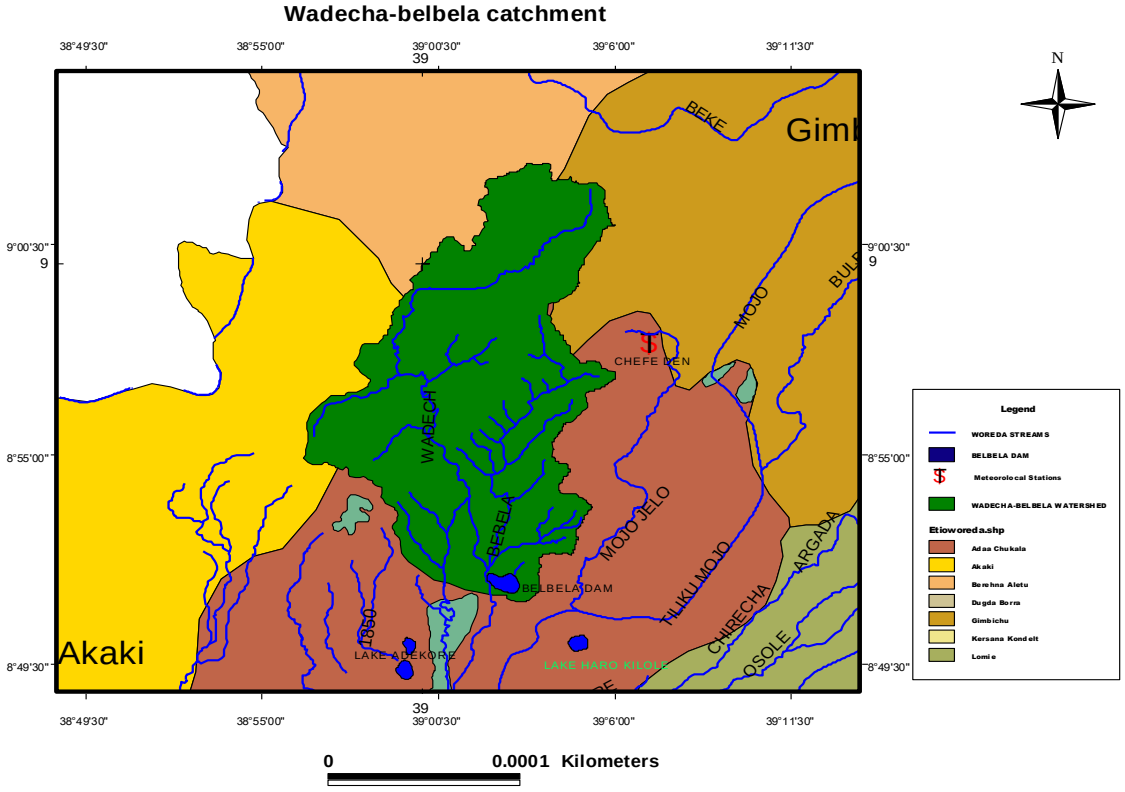


Figure.1 Wadecha-Belbela River system watershed

5 Geomorphology and Soils of the Wereda

The soil of the study area is dominated by clay (black cotton soil) and brown in color which the type of clay mineral that assumed greater importance with respect to soil water storage. The physical assessment of soils of the study area shows dominated by vertisols or black cotton soil. The average soil depth is about 0.65 to 1.05cm with medium infiltration rate and medium water holding capacity.

Table.2 the textural classification of soil of the wereda.

S.No	Soil type	Wereda (Ada'a) in %
1	Sand and silt	3.0
2	Clay (Black cotton)	88.0
3	Clay Loam	9.0

Source:- Office of Agriculture (Ada'a)

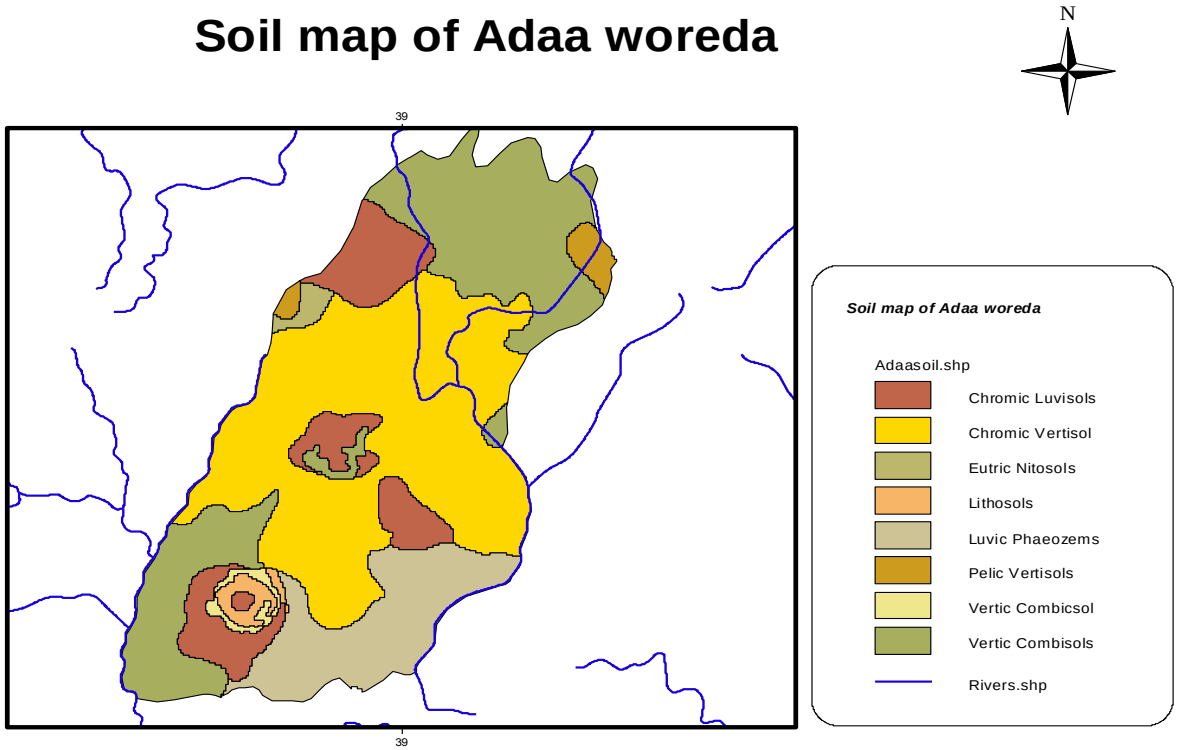


Figure .2 Soil Map of the Ada'a Liben Wereda

6 Socio-economic Information of the wereda

The Ada'a Liben wereda is bounded by six neighboring wereda's, which are Berehna Aletu wereda in the north, Akaki in the west, Kersana kondaltiti in the South west, Lome in east, Dugda bora in the South, and Gimbichu wereda in the north east . All these wereda's are riparian wereda for the rivers contributing as water resources potential of the Ada'a Liben district (Figure.3).

The total population of Ada'a was 310,059 comprising 149,491 females and 160,565 males according to the data obtained from the wereda agricultural bureau population. The majority of the people in the wereda are Oromo's with few Amhara's. The wereda has about 161,056 km^2 total area. Most of the rural populations are depending on the agricultural farming and Livestock raring and farmers mostly depend on communal pastural lands to graze live stocks but those land are heavily stocked and overgrazed.
The land use pattern of the district can be shown as below:

Land use Type	in hectare
Cultivated	106607.5

Forest land 2489.00
Grazing land 5395.38
Bush land 13834.06
Others 32730.59
Total **161056.53**

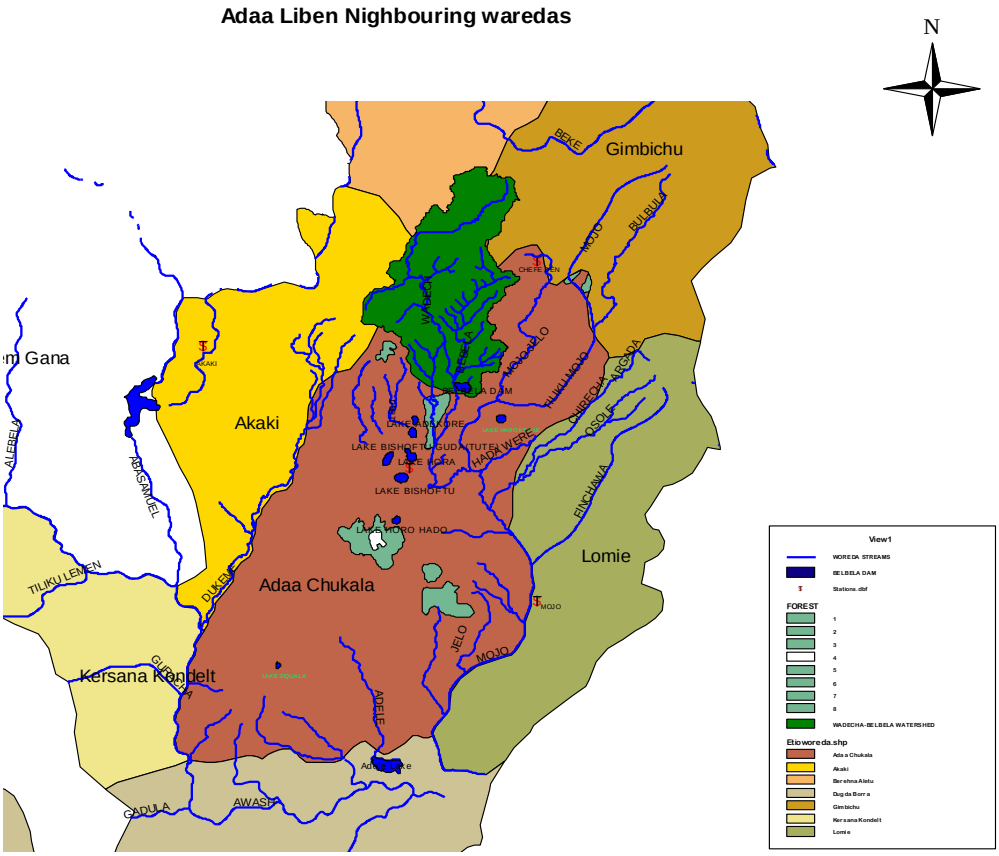


Figure .3 Ada'a Liben neighboring wereda's and River system

7 Description of the Climate data

Rainfall

The moisture for precipitation in the area originates from south-west equatorial air stream, which moves northwards with in tropical convergence zone (ITCZ), (ILRI, 2000). Ethiopia is located in the region where June through September is the main rain season. The Adaa wereda is also reflecting similar characteristics with mono-modal rainfall with single peak. The Wadecha-Belbela River system catchments however has even extended period of wet season (March-September with mean monthly rainfall varying from 50 to223 mm). June to September rainfall contributes 74% to the mean annual precipitation in the catchment.

The mean annual rainfall obtained from the monthly rainfall on the bases of 53 years of records at Debre Zeit Research Center meteorological station gauge is about 866.6mm. The highest amount of rain fall occur between June and September and the lower between February and May. The effective rainfall is 662.5mm. The mean annual and standard deviation is shown in appendices.

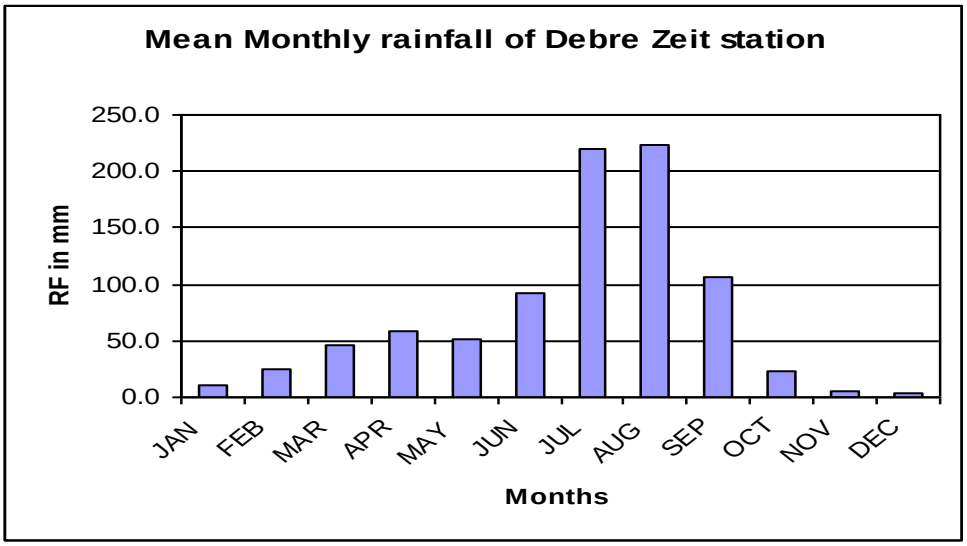


Figure 4: Mean monthly rainfalls on the Wadecha-Belbela river catchment

The other near by stations of Chefe Densa and Mojo monthly rainfall records of 6 and 41 years has been collected for the analysis. Their records are given in the appendices.

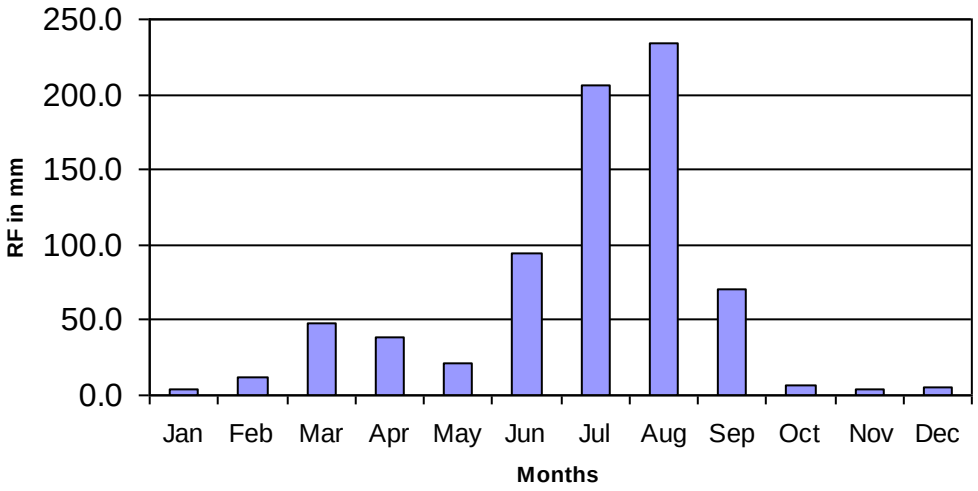


Figure 5: Mean monthly rainfall of Chefe Densa Station

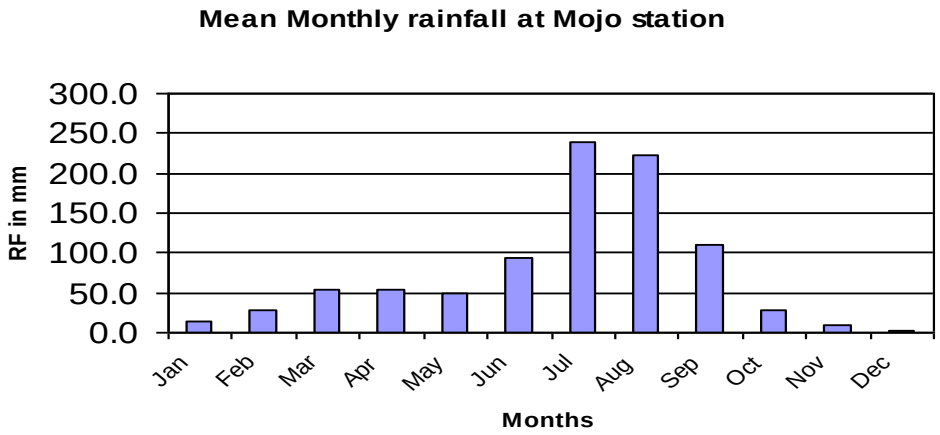


Figure 6: Mean monthly rainfall of Mojo Station

Temperature

The mean annual temperature of 54 years of record at Debre Zeit station is 18.9 ^{o}C. The hottest season is March, April, May and June and the maximum temperature is recorded in April and May. In the same way as rainfall records the temperature data 9 and 22 years have been also collected from near by station of Chefe Densa and Mojo meteorological stations respectively. Those data are shown in the appendices and the graphical representations are shown below.

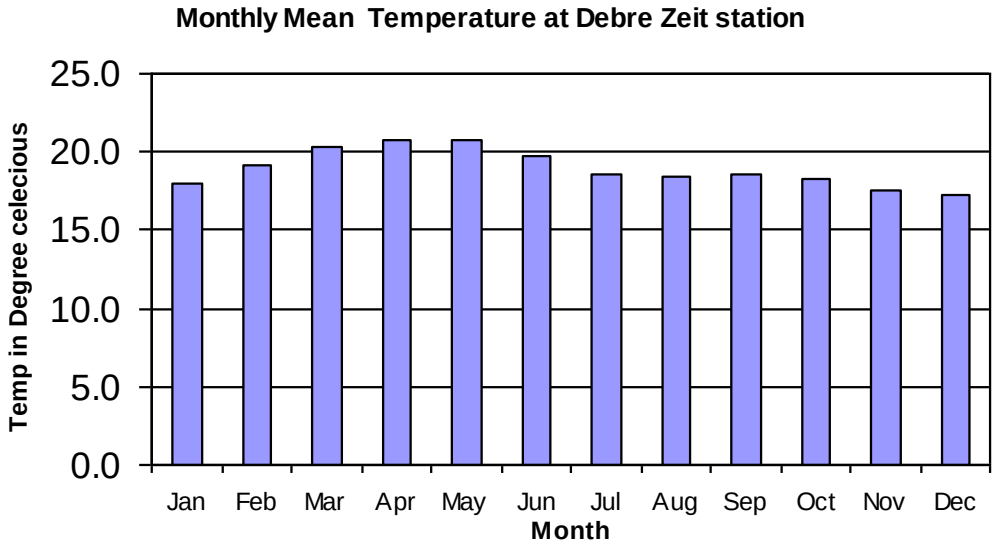


Figure 7: Mean monthly Average temperature at Debre Zeit station

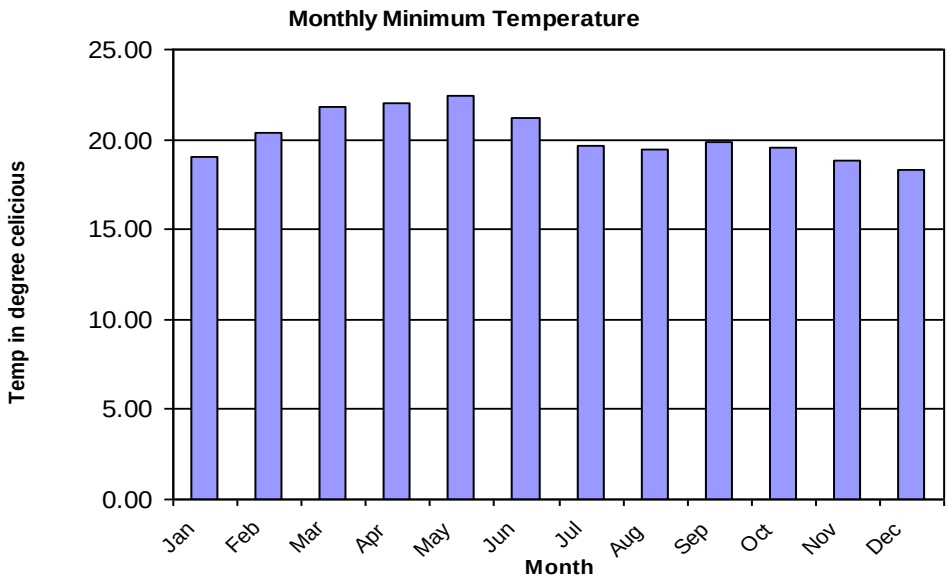


Figure 8: Mean monthly temperatures at Mojo station

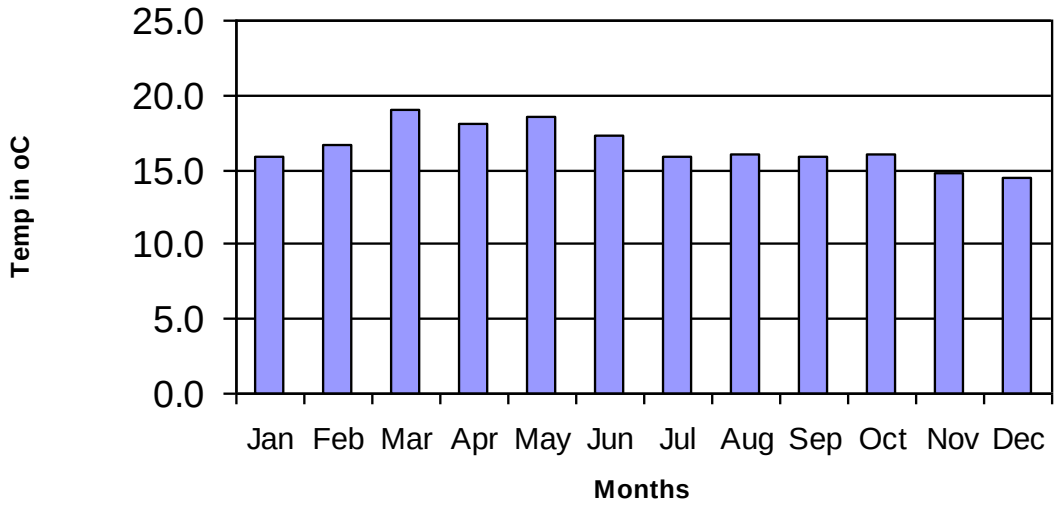


Figure 9: Mean monthly temperature at Chefe Densa station

Relative Humidity

The mean annual Relative humidity obtained from the monthly rainfall on the bases of 53 years of records at Debre Zeit Research Center meteorological station gauge is about 61%. The most humid month is August (76%) and the least humid is February (53%). The other near by stations relative humidity data are not available

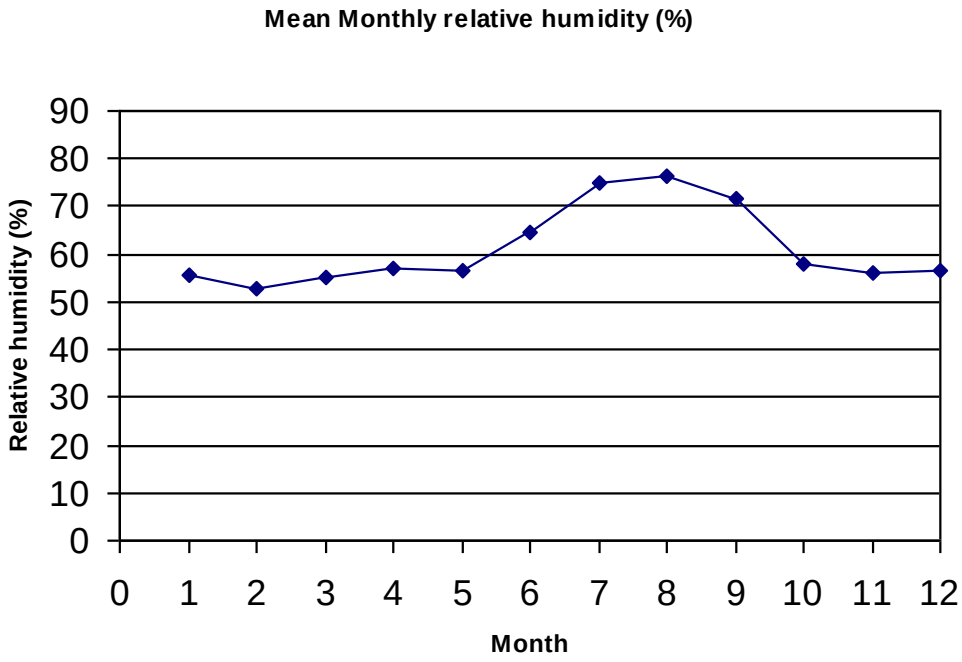


Figure 10: Mean Monthly Relative Humidity at Debre Zeit station

Evaporation

According to the Debre Zeit research center meteorological station record, the mean annual ET is 80.23 mm. The maximum and minimum evaporation are occurring in the months of March and September respectively.

Wind speed

The mean annual wind speed obtained from the monthly data on the bases of 12 years of records at Debre Zeit Research Center meteorological station gauge is about 1.39 m/s per day with the highest wind speed occurring between February and May and the lowest between June and September. In the same way the wind speed data's of other near by stations are not available.

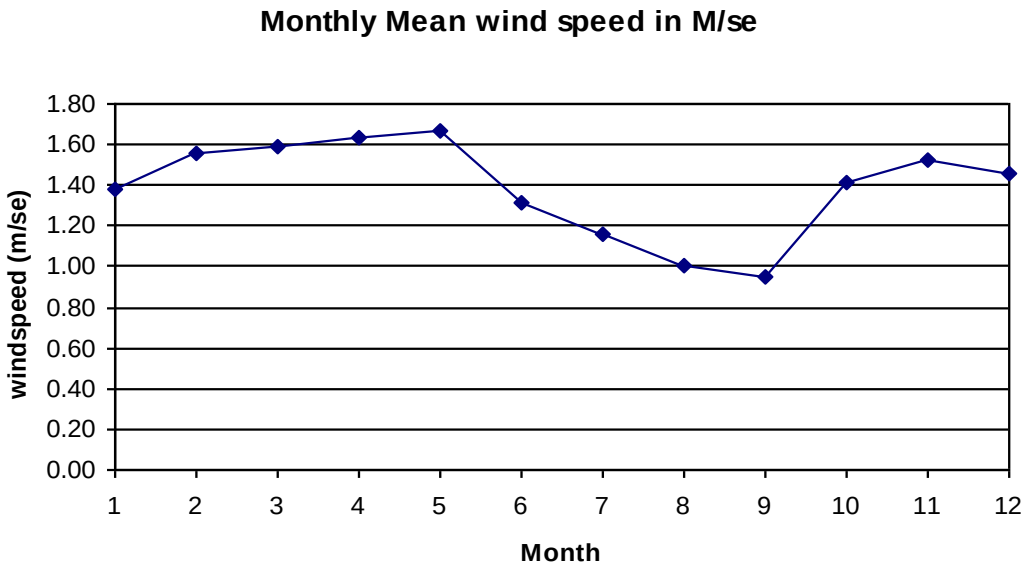


Figure.11 Mean Monthly Wind Speed at Debre Zeit station

Sunshine hours

The mean annual sunshine hours obtained from the monthly data on the bases of 12 years of records at Debre Zeit Research Center meteorological station gauge are about 8.2, the maximum being 9.8 in the month of December and the minimum 5.5 hours in the month of July.

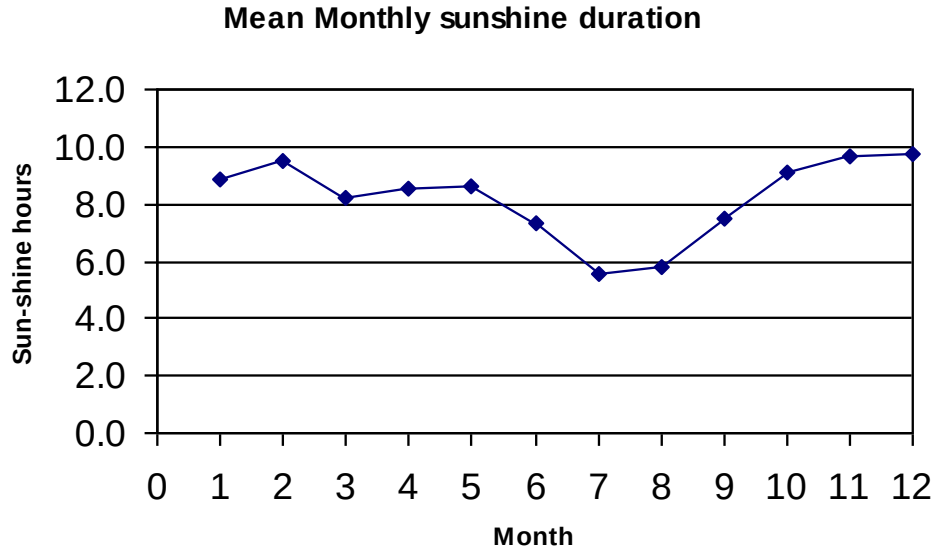


Figure 12: Mean Monthly Sunshine hours at Debre Zeit station

Summary table of the meteorological stations in the catchment

S. N	Station	Longitude	Latitude	Altitude (m)	Observed mean annual rainfall (mm)		Distance from the study area (Km)
					Depth	STD	
1	Debre Zeit	38o07’	08o44’	1850	886.6	205.5	15
2	Mojo	39o09’	08o37’	1880	908.6	170.3	35
3	Chefe Donsa	39o08’	08o58’	1960	742.8	124.8	7

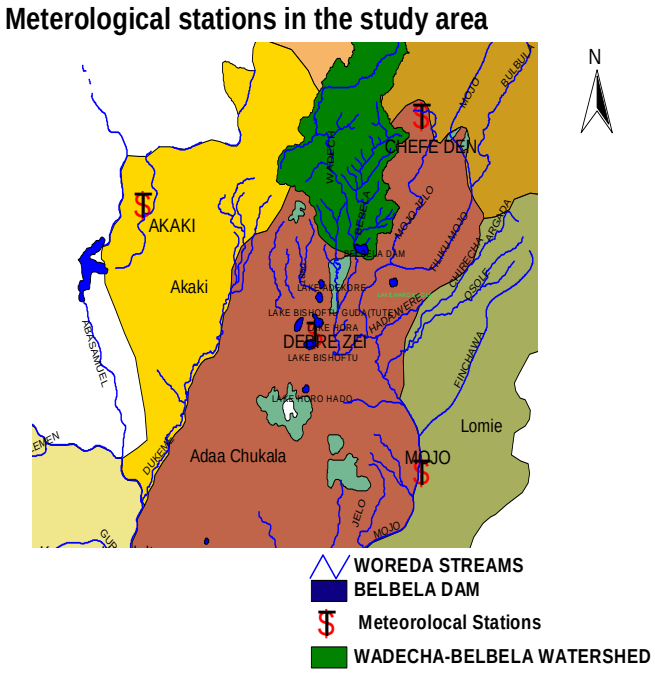


Figure 13: Adaa werda metrological stations

The Water Sources History

There exist water-storing dams already constructed on Belbela and Wadecha rivers closer to most irrigation projects mentioned before in Bishoftu area. The Cuban civil mission in collaboration with Water Resources Development Authority (WRDA) of Ethiopia constructed the dams for irrigation purpose in 1980 in the 'Derg' regime. The objectives of this two storage dams was to irrigate about 1600 ha of land area to be used by State farms and to render service to the Rehabilitation Center of People's Hero's.

During Belbela-Wadecha project identification, it was the policy of the government to promote and encourage State Farms and force private farmers to become Labourers of the State farms by taking their farmlands, and Belbela-Wadecha hydraulic complex was constructed within this context of the government policy (Oromia irrigation development Authority Central branch, Adama, 1998).

During the first phase of this project (Wadecha-Belbela) implementation 500 ha of net land was developed and distributed in the following way among the different agencies: 365 ha to the ministry of State Farm and 135 ha of land to Rehabilitation Center of people's Hero's. All this 500 ha land was taken from the peasant around the area, and those on the project area were forced to pull out and settle in the neighboring Peasant associations. Accordingly, from 1980 up to 1991 it was under full control of the mentioned organizations, which were using irrigation by the water from the two reservoirs. However, since 1991 the land (500 ha) was totally transferred to Poultry Enterprise, which doesn't use irrigation and the reservoirs are giving no service at this moment (OIDA, Central Branch, Adama, 1998).

The 1600 ha of land area to be developed was divided in to different zones. The 365 ha and 135 ha of land area was categorized as zone one and two respectively. While part of the Ful-Tino irrigation project was identified as part of zone three in the second phase of Belbela-Wadecha irrigation project implementation. However, the second phase of this project was not implemented due to change of government policy in agriculture.

The reservoirs were under the direct supervision of WARDA under the then Water Resources Commission. As the result of restructuring of the government policy and institutions, these reservoirs were handed over the Oromia Bureau of Natural Resources Development & Environmental Protection in early 1993. Since then, the Bureau has been carrying on studies and surveys on how this stored water can be fully utilized. As a part of this study Godino, Dhanama, Ful-Tino, Kitaba Gembi, Goha Worke, and other irrigation projects getting its irrigation water supply from Wadecha -Belbela reservoirs.

Currently, there has been created area conflicts among beneficiaries due establishment of Dam in the vicinity of other district which does not serve them. On the other hand, the whole system has no proper institutionally established management and the most part of the structures such as spillway, outlets pipes, Gates, Canal are already damaged.

8 Comments and Conclusions

During the pre-field a field trip has been organized to collect secondary data from different sources and primary data from the study area. The source of most relevant meteorological data (rainfall, relative humidity, temperature, wind speed, and sunshine hours) is National Meteorological Service of Ethiopia. Soil map and Land use and land cover map are obtained from Ministry of Rural Development and Agriculture and Topographic map from National Mapping Agency. Socio-economic, Irrigation potential, crop data of the wereda and Demographic data has been collected from Ada'a Liben wereda Bureau of agriculture.

The other dam characteristics that are not available are;

- Clear area-volume curves
- No observed discharge data of rivers in the wereda
- No design document of the two reservoirs
- No coordinate information of the existing irrigation potential in the wereda

9 Recommendations of this work and next steps

Having defined the water resources systems of the wereda, discussing current and potential use of land and water resources as well as based on the first phase of the study of the wereda, it is decided to further look in depth through engagiging graduate student focusing on the Belbela-Wedecha dams and irrigation systems. The main aim to focus on this particular system is that

- Estimation of irrigation water requirement potentials of Wadecha-Belbela irrigation systems.
- Analyzing the operations of the Belbela-Wadecha reservoir system.
- Establish water release guide rules to the Belbela-Wadecha irrigation schemes

This particular system is chosen due to the fact that:

- The system is providing improved agricultural productivity opportunities for farmers
- Is already constrained by water use conflicts
- The system shows that there is interesting development as one goes from upstream dam site to downstream end. The system depicts rainfed-agriculture, traditional irrigation, modern irrigation and industrial scale commercial

irrigation system, as one moves from upstream to downstream, and hence amenable to look an improved water management

Useful References

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OIDA (2002) Ful-Tino Small Scale Irrigation Project final design draft, Adama.

APPENDICES

Mean monthly rainfall at Debre Zeit station

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Year Total
1951	0.0	0.0	50.0	36.5	25.9	15.2	110.5	80.4	40.0	25.9	2.0	0.0	386.4
1952	0.0	0.0	0.0	42.6	17.2	59.5	134.2	191.1	127.4	8.2	0.0	0.0	580.2
1953	0.0	24.4	11.0	88.0	17.0	77.8	96.6	165.2	45.2	0.0	0.0	24.7	549.9
1954	0.0	0.0	57.0	30.5	6.6	70.5	160.0	160.7	114.2	28.9	0.0	0.0	628.4
1955	11.1	0.0	23.0	36.4	0.0	80.1	353.9	208.4	142.9	0.0	0.0	0.0	855.8
1956	1.5	1.4	8.9	48.0	7.1	84.3	134.4	78.0	0.0	48.6	8.5	0.4	421.1
1957	0.0	25.6	64.4	91.8	48.1	123.1	209.5	305.4	24.8	5.0	1.0	0.0	898.7
1958	65.5	52.3	23.8	49.4	7.0	175.9	273.8	243.2	172.2	16.3	0.8	0.0	1080.2
1959	18.0	34.0	38.4	43.9	42.1	108.3	244.3	215.4	125.4	14.5	0.0	16.0	900.3
1960	0.8	5.0	43.3	11.2	99.5	56.5	167.9	301.9	161.6	0.0	5.2	0.0	852.9
1961	0.0	3.2	111.2	41.9	28.2	107.2	153.8	191.2	89.9	39.3	16.7	0.0	782.6
1962	0.0	1.0	62.0	24.7	3.7	0.0	201.1	237.3	181.8	46.5	0.9	21.6	780.6
1963	0.0	1.6	0.0	61.9	103.5	76.0	281.2	448.0	105.2	0.0	2.7	27.5	1107.6
1964	0.0	0.0	0.0	184.0	42.3	56.0	434.5	365.3	187.1	22.6	0.0	11.0	1302.8
1965	37.8	0.0	58.5	29.5	0.0	38.2	408.5	240.5	125.6	76.9	6.7	0.0	1022.2
1966	0.0	256.2	27.5	135.2	25.1	122.5	251.4	409.6	168.5	40.0	0.0	0.0	1436.0
1967	0.0	0.0	100.0	73.9	164.8	62.1	314.2	259.6	136.0	16.0	79.1	0.0	1205.7
1968	0.0	190.1	12.6	102.0	5.0	60.1	272.3	140.2	203.0	0.0	17.8	0.0	1003.1
1969	11.0	0.0	56.7	104.0	24.9	137.1	125.1	278.6	64.6	7.5	3.2	0.0	812.7
1970	44.1	31.1	7.5	71.4	45.3	46.0	250.7	290.1	112.0	5.9	0.0	0.0	904.1
1971	0.7	0.0	16.5	63.0	107.6	121.3	215.8	281.0	123.1	2.9	0.3	14.4	946.6
1972	0.0	95.2	53.7	136.0	47.7	102.1	214.4	124.6	66.0	2.6	0.0	0.0	842.3
1973	0.0	0.0	0.0	2.7	28.0	108.3	138.5	241.9	133.7	42.1	0.0	2.0	697.2
1974	0.0	12.5	104.2	7.6	98.1	114.4	307.3	199.0	136.0	3.0	0.0	0.0	982.1
1975	0.0	6.3	19.5	72.1	54.5	149.7	382.1	223.4	154.4	7.0	0.0	0.0	1069.0
1976	0.0	0.0	71.1	106.0	80.7	102.9	230.9	232.2	42.2	3.8	35.2	0.8	905.8
1977	43.1	1.0	87.7	90.2	57.6	101.6	272.8	202.7	82.2	112.7	3.4	0.0	1055.0
1978	1.4	69.0	34.5	47.4	28.5	133.7	132.3	191.1	122.3	24.6	1.7	0.1	786.6
1979	77.7	0.0	54.7	13.5	76.0	110.9	224.9	187.6	83.8	12.6	0.0	0.0	841.7
1980	20.0	10.1	32.3	24.2	69.4	75.1	242.4	215.5	58.1	40.7	0.0	0.0	787.8
1981	0.0	20.5	164.2	62.1	7.1	35.8	294.6	151.8	162.8	4.2	0.0	1.2	904.3
1982	20.8	75.4	34.5	47.3	57.7	91.0	123.9	233.6	46.1	25.5	9.4	0.0	765.2
1983	0.0	10.2	62.8	105.2	209.5	149.4	128.8	344.8	88.6	23.4	0.0	0.0	1122.8
1984	0.0	0.0	19.3	0.0	108.7	80.7	220.5	217.3	85.0	0.0	0.0	3.6	735.2
1985	3.5	0.0	14.5	63.7	111.4	74.1	307.3	292.7	130.0	1.1	0.0	0.0	998.4
1986	1.8	30.7	76.4	76.9	132.7	69.5	81.8	116.9	120.6	11.3	0.0	0.0	718.8
1987	0.0	61.4	138.2	90.1	154.0	65.0	83.3	155.9	80.9	4.6	0.0	0.0	833.7
1988	8.0	15.9	6.0	44.7	36.8	100.7	146.0	236.8	121.4	16.7	0.0	0.0	733.0
1989	0.6	12.2	35.1	47.0	0.4	59.1	183.7	171.5	135.2	21.2	0.0	3.3	669.4
1990	0.0	123.3	58.2	86.4	36.6	76.0	224.0	173.2	102.4	0.0	0.0	0.0	880.2

1994	0.0	0.0	29.2	19.5	19.6	74.5	232.8	187.3	108.6	0.0	10.2	0.0	681.8
1995	0.0	2.4	7.8	34.0	5.5	92.5	188.4	169.6	75.1	0.0	0.0	11.9	587.3
1996	16.4	0.0	103.1	55.3	105.4	261.5	164.1	275.6	90.0	0.1	5.9	0.0	1077.5
1997	27.8	0.0	26.7	74.8	13.6	121.7	235.8	171.8	71.4	99.9	10.9	0.0	854.5
1998	32.0	51.4	13.9	77.2	41.8	77.7	206.3	293.5	97.6	93.3	0.0	0.0	984.9
1999	0.5	0.0	36.6	0.0	10.0	176.9	298.7	258.6	48.7	90.9	0.0	0.0	920.9
2000	0.0	0.0	8.6	50.4	65.4	77.4	244.3	181.4	139.4	40.0	23.4	3.4	833.7
2001	0.0	4.6	166.4	21.8	104.0	79.5	242.3	143.4	64.3	38.2	0.0	0.0	864.5
2002	8.6	0.0	48.0	34.6	11.0	109.1	179.3	178.0	58.4	0.0	0.0	21.3	648.3
2003	38.3	55.4	64.4	100.3	21.1	81.4	277.9	285.5	120.0	6.0	3.6	35.4	1089.3
Mean	**9.8**	**25.7**	**46.9**	**59.2**	**52.3**	**92.6**	**220.1**	**223.0**	**105.5**	**22.6**	**5.0**	**4.0**	**866.6**
S.Dev	**18.0**	**49.8**	**40.7**	**38.2**	**48.6**	**43.5**	**81.6**	**75.4**	**45.0**	**28.6**	**12.7**	**8.5**	**205.5**

Mean monthly Maximum temperature at Debre Zeit station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1952	26.2	26.8	29.2	27.2	28.4	28.6	23.7	25.3	24.7	25.3	25.3	25.3
1953	26.6	27.7	28.2	27.1	29.2	27.7	23.3	23.8	24.8	26.6	26.5	24.9
1954	26.4	28.0	28.0	28.6	29.5	26.8	22.9	22.8	23.5	24.4	25.5	25.6
1955	25.8	26.8	28.7	28.2	29.1	27.0	24.5	23.6	24.3	25.9	26.6	26.5
1956	25.8	27.9	29.3	28.1	28.9	27.2	23.1	24.1	24.4	24.1	23.7	24.4
1957	26.2	26.1	25.9	26.6	27.5	27.3	24.5	23.6	26.4	27.2	27.0	25.2
1958	25.7	24.9	28.5	28.7	30.4	26.5	22.9	23.3	24.8	25.8	25.7	26.2
1959	27.4	27.8	28.4	29.5	29.4	28.4	23.5	23.2	24.5	26.0	25.5	25.4
1960	25.2	27.5	27.4	28.5	27.7	27.6	24.0	24.0	24.9	26.3	25.7	25.5
1961	26.4	26.9	27.2	27.0	29.3	26.4	22.7	23.0	24.7	24.9	24.1	25.2
1962	26.0	27.0	27.3	29.4	29.2	27.6	25.1	24.1	24.5	24.8	25.2	26.0
1963	25.2	27.5	28.0	26.5	27.2	27.7	25.2	23.6	25.3	26.6	25.5	25.0
1964	25.8	28.1	29.7	27.2	28.0	26.3	23.3	23.6	23.9	24.7	25.2	24.1
1965	26.0	27.1	28.0	27.7	29.6	29.1	24.8	23.8	25.7	25.4	25.0	25.8
1966	27.1	26.0	27.4	27.1	29.3	27.5	25.0	24.2	25.1	26.2	25.5	26.7
1967	25.7	27.3	27.5	27.1	27.5	27.3	22.9	24.0	24.4	24.8	24.1	24.1
1968	26.0	23.8	26.5	26.4	28.2	27.0	24.7	24.3	25.7	25.9	25.6	25.8
1969	26.1	25.4	26.4	28.5	28.2	26.4	24.2	23.9	25.8	27.1	26.2	26.1
1970	25.3	27.7	26.8	28.5	29.4	28.4	24.8	23.1	25.0	26.4	25.3	25.2
1971	25.5	27.7	27.9	28.4	27.1	25.8	23.7	23.8	24.8	26.2	24.6	23.7
1972	26.1	25.5	27.0	26.1	27.9	27.1	24.2	24.2	25.4	27.3	26.8	27.5
1973	27.7	29.3	30.3	30.7	28.6	26.6	24.7	23.6	24.6	25.5	25.6	24.5
1974	26.6	26.9	26.5	28.1	27.4	26.1	23.4	23.6	24.2	27.1	24.9	25.5
1975	26.2	27.1	28.9	27.7	28.4	25.7	22.9	22.2	23.7	25.1	24.6	25.0
1976	25.7	27.3	28.0	28.0	26.8	26.9	23.8	23.3	25.2	26.7	24.7	25.5
1977	24.6	25.9	27.4	27.5	27.2	26.3	23.6	23.8	24.7	26.2	24.5	25.1
1978	25.8	26.3	27.1	28.2	28.4	26.9	22.9	24.2	24.7	25.6	25.4	25.2
1979	24.5	26.8	27.2	28.3	27.9	27.0	24.0	24.1	25.0	26.2	26.2	26.1
1980	26.2	28.2	29.1	28.6	29.2	27.2	24.0	23.9	25.0	25.7	25.9	26.0

1981	27.1	27.3	25.9	25.7	28.8	29.1	24.4	23.9	23.2	25.4	25.5	25.6
1982	25.9	26.1	27.9	26.8	27.6	27.5	24.6	23.0	25.0	24.6	25.3	25.3
1983	25.9	27.1	28.2	26.9	27.6	26.8	25.5	23.5	24.8	25.6	26.4	26.0
1984	26.3	27.4	29.1	30.1	28.0	26.0	24.1	23.2	25.0	26.6	26.5	25.4
1985	26.5	26.8	28.5	26.7	27.0	27.3	23.2	22.9	24.4	25.9	26.2	25.7
1986	26.1	27.0	27.6	26.8	27.0	26.8	24.2	24.6	25.0	26.5	26.6	25.9
1987	25.7	27.1	26.7	26.9	27.0	26.3	26.3	25.3	26.8	27.5	26.8	26.4
1988	26.5	28.0	29.8	28.9	29.4	27.3	23.1	23.7	24.3	25.2	25.6	25.8
1989	24.5	26.5	28.0	26.5	28.9	27.7	23.3	22.4	24.6	25.2	26.1	25.2
1990	26.5	26.3	26.7	26.5	29.0	27.6	24.6	23.9	24.8	26.8	26.8	26.2
1991	26.2	27.3	28.0	27.9	28.6	27.2	24.1	23.8	25.0	26.0	25.7	25.6
1992	26.2	27.3	28.0	27.9	28.6	27.2	24.1	23.8	25.0	26.0	25.7	25.6
1993	26.2	27.3	28.0	27.9	28.6	27.2	24.1	23.8	25.0	26.0	25.7	25.6
1994	27.1	27.8	28.4	28.9	29.6	26.9	23.8	23.1	24.4	26.0	25.0	25.5
1995	26.4	28.7	28.5	27.8	29.9	29.2	24.4	23.7	25.0	26.2	26.1	26.4
1996	26.0	28.7	28.0	27.8	27.2	24.2	24.0	24.2	25.5	26.5	25.7	25.7
1997	26.1	27.4	29.0	27.2	29.7	27.7	24.9	25.2	26.9	25.9	25.3	25.9
1998	26.6	27.8	28.6	30.1	29.6	28.9	24.6	23.6	25.3	25.8	25.7	25.4
1999	26.9	28.8	27.8	29.7	30.0	28.0	23.7	24.3	25.1	25.5	25.1	25.4
2000	26.7	28.2	29.7	29.4	29.1	27.5	24.8	23.7	24.9	25.1	25.5	25.8
2001	26.5	29.2	27.7	29.1	28.4	26.7	24.6	24.1	26.9	27.6	26.9	27.6
2002	27.0	29.9	29.3	30.4	31.4	29.1	26.8	25.3	26.4	27.9	27.3	26.2
2003	26.9	28.9	28.6	27.8	29.3	27.6	23.6	23.9	25.0	26.6	26.3	24.7
2004	26.6	29.0	27.5	26.5	28.6	26.7	24.0	24.1	25.3	25.5	25.5	25.4
2005	**26.1**	**27.2**	**28.0**	**28.0**	**28.5**	**27.2**	**24.1**	**23.8**	**25.0**	**26.0**	**25.6**	**25.6**
Mean	**26.2**	**27.3**	**28.0**	**27.9**	**28.6**	**27.2**	**24.1**	**23.8**	**25.0**	**26.0**	**25.7**	**25.6**
S.Dev	**0.660198**	**1.132**	**0.999**	**1.169**	**1.009**	**0.95**	**0.848**	**0.64**	**0.755**	**0.84**	**0.779**	**0.728**

Mean monthly Minimum temperature at Debre Zeit station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1952	8.7	10.2	12.2	13.6	11.8	11.4	12.5	8.9	11.3	9.8	8.1	8.9
1953	9	10.6	12.5	13.7	12.4	12.3	13.3	13.1	11.4	10.2	10	9.1
1954	8.1	11.1	12.7	13.4	12.2	12	10.9	12.3	12.1	9.4	9.2	8.1
1955	10.6	9.3	11.4	13	11.5	11.2	11.9	12	11.8	9.9	9.6	10
1956	9.8	8.7	12	13.1	12.3	12.1	12.6	14.8	11.8	11	7.8	8.7
1957	9.1	10.4	12.3	13	12.8	10.2	12.6	12.6	11	10.4	9.8	8.7
1958	11.1	12.5	12.5	14.1	12.9	12.9	13.6	12.9	12.8	10.2	8.5	10.3
1959	11.3	12	12.4	13.6	13.6	12.4	13.5	12.8	12.4	11.5	8.7	8.6
1960	8.7	10.1	13.2	13.1	13.5	12.2	13	12.9	12.4	10.4	9	10.2
1961	9.6	11.3	12.7	13.5	12.8	12.5	13.4	12.9	13	11.1	12	8.3
1962	7.6	9	12	12.5	12.6	12.1	12.9	13.1	13.3	9.8	10.6	10.2
1963	10	12	13	13.9	13.2	12.2	13.2	13.2	12.2	10.6	10.7	10.2

1964	11.3	12.8	13.8	13.7	12	11.2	12.9	12.4	12.1	11	9.1	8.4
1965	10.1	10	11.8	13.9	12.8	12.7	12.6	13	12.2	10.9	10.9	9.4
1966	10.5	13	12.8	13.9	13.2	12.1	12.4	13.3	11.2	11.3	10.5	7.9
1967	8	11.8	13.6	13.4	12.7	12.1	12.8	12.5	12.6	10.6	11.1	6.3
1968	7.3	12.4	10.7	13.4	12.7	12.6	11.5	12.4	12.4	10.8	9.7	9.1
1969	11.9	11.1	12.6	12.7	12.7	11.3	12.9	13	12.2	10.5	10.5	7.8
1970	12	11.8	13.7	13.7	13.3	12.6	13.6	13.2	12.5	11	7.2	7
1971	9.8	9.4	12	12.2	12.4	12.1	12.8	11.6	11.2	9.6	8.6	7.9
1972	8.3	10.1	10	11.7	11	10.6	11.7	11.2	10.2	9.1	8	8.1
1973	8.6	9.4	12.1	14.2	12.8	11.35	12.2	11.6	11.5	8.8	7.9	5.8
1974	8.9	10.2	12.7	12.3	12.6	12.1	12.4	11.9	11.8	9.7	6.8	7.5
1975	8	11.1	12.7	12.8	12.7	12.1	12.3	12.9	12.1	9.6	8.6	7.6
1976	8	12	12.5	12.75	12.5	11.9	12.6	12.7	12	11.6	10.5	9
1977	9.7	10	12.5	12.7	12.8	12.2	12.9	12.2	11.1	11.1	9.2	8.3
1978	7.9	11.3	12.8	13.8	12.1	11.7	13.7	13.1	12.1	10.6	8.65	9.4
1979	11.5	10.9	12.2	12.9	13	12.4	12.1	12.7	12.3	10.5	8.1	9.2
1980	9	10.3	12.9	13	12.2	12.3	13.3	12.3	11.9	10.8	9.8	7.6
1981	9.8	11.2	13.6	13.3	12.5	11.7	12.9	12.6	12.2	9.5	8.4	6
1982	9.7	11.3	10.8	11.6	13.1	11.8	12.3	13.1	12.3	10.8	10.8	10.6
1983	9.8	12.7	13.8	13.6	14.3	12.4	13.3	13.9	12.6	10.7	9.1	8.2
1984	7.8	7.8	12.1	13.9	13.4	13	12.8	12.9	12	9.6	9.5	8.1
1985	8.5	9.8	12.4	12.8	12.3	11.6	11.8	11.9	11.3	9.2	9.2	8.9
1986	9.15	10.55	13.05	13	13.45	12.25	13	13.4	12.3	10.8	10	10
1987	9.8	11.3	13.7	13.2	14.6	12.9	13.9	13.7	12.8	12.3	9.9	10.3
1988	11.6	13.9	14.1	15.3	13.6	13.5	14.6	13.6	13	11.1	7.6	8.3
1989	8.6	14.6	13.1	17.2	11.9	12.7	13.5	12.4	12.7	10.1	9.7	12
1990	10	13.8	12.9	13.2	12.6	11.2	13.5	13.6	13.2	10.4	9.8	8.6
1991	9.67	11.09	12.74	13.50	12.91	12.34	13.02	12.94	12.27	10.58	9.39	8.81
1992	9.67	11.09	12.74	13.50	12.91	12.34	13.02	12.94	12.27	10.58	9.39	8.81
1993	9.67	11.09	12.74	13.50	12.91	12.34	13.02	12.94	12.27	10.58	9.39	8.81
1994	9.44	10.8	13.5	14.5	13.9	13.2	13.7	13.3	12.4	10.4	9.8	9.1
1995	9.2	12.2	13.9	14.7	14	12.6	13.6	13.9	12.1	11.6	9.8	11.5
1996	11.8	11.4	14.3	13.7	13.7	13.9	13.3	13.7	12.6	10.7	9.8	9
1997	11.9	10.3	13.9	13.8	14.1	13.8	13.8	13.8	13.3	13.3	12.6	9.8
1998	12.8	14.2	14.7	15.2	14.5	13.8	14.5	14.3	13.5	12.2	8.4	7.6
1999	9.8	10.2	13.5	14.3	13.7	13.2	13.4	13.5	13.4	11.85	8.1	8.5
2000	9	10.3	12.5	14.3	13.3	12.9	13.6	13.2	13.3	11.5	10.5	9.9
2001	10.2	11.1	13.7	13.8	14.1	13.3	13.9	14.5	12.6	11.8	9.8	11.1
2002	11.4	11.8	14.3	14.4	13.7	14.2	14.3	14.1	13.3	12.2	10.8	12.6
2003	11.2	13	14	15.1	14.1	14.5	14.2	14.4	13.7	11.2	11.4	10
2004	9.65	10.5	9.5	11.9	9.6	12	13.1	13	11.9	8.4	7.3	8.2
2005	8.1	8	12.1	12.3	13.1	12.2	13	13.6	12.6	8.2	7.4	3.5
Mean	**9.68**	**11.09**	**12.74**	**13.50**	**12.91**	**12.34**	**13.02**	**12.94**	**12.27**	**10.58**	**9.39**	**8.81**
S.Dev	**1.32**	**1.44**	**1.03**	**0.96**	**0.88**	**0.84**	**0.74**	**0.93**	**0.71**	**0.98**	**1.24**	**1.54**

Mean monthly Average temperature at Debre Zeit station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Total
1952	17.5	18.5	20.7	20.4	20.1	20.0	18.1	17.1	18.0	17.6	16.7	17.1	221.7
1953	17.8	19.2	20.4	20.4	20.8	20.0	18.3	18.5	18.1	18.4	18.3	17.0	227.0
1954	17.3	19.6	20.4	21.0	20.9	19.4	16.9	17.6	17.8	16.9	17.4	16.9	221.8
1955	18.2	18.1	20.1	20.6	20.3	19.1	18.2	17.8	18.1	17.9	18.1	18.3	224.6
1956	17.8	18.3	20.7	20.6	20.6	19.7	17.9	19.5	18.1	17.6	15.8	16.6	222.9
1957	17.7	18.3	19.1	19.8	20.2	18.8	18.6	18.1	18.7	18.8	18.4	17.0	223.2
1958	18.4	18.7	20.5	21.4	21.7	19.7	18.3	18.1	18.8	18.0	17.1	18.3	228.9
1959	19.4	19.9	20.4	21.6	21.5	20.4	18.5	18.0	18.5	18.8	17.1	17.0	230.9
1960	17.0	18.8	20.3	20.8	20.6	19.9	18.5	18.5	18.7	18.4	17.4	17.9	226.5
1961	18.0	19.1	20.0	20.3	21.1	19.5	18.1	18.0	18.9	18.0	18.1	16.8	225.5
1962	16.8	18.0	19.7	21.0	20.9	19.9	19.0	18.6	18.9	17.3	17.9	18.1	226.0
1963	17.6	19.8	20.5	20.2	20.2	20.0	19.2	18.4	18.8	18.6	18.1	17.6	228.9
1964	18.6	20.5	21.8	20.5	20.0	18.8	18.1	18.0	18.0	17.9	17.2	16.3	225.3
1965	18.1	18.6	19.9	20.8	21.2	20.9	18.7	18.4	19.0	18.2	18.0	17.6	229.2
1966	18.8	19.5	20.1	20.5	21.3	19.8	18.7	18.8	18.2	18.8	18.0	17.3	229.6
1967	16.9	19.6	20.6	20.3	20.1	19.7	17.9	18.3	18.5	17.7	17.6	15.2	222.1
1968	16.7	18.1	18.6	19.9	20.5	19.8	18.1	18.4	19.1	18.4	17.7	17.5	222.5
1969	19.0	18.3	19.5	20.6	20.5	18.9	18.6	18.5	19.0	18.8	18.4	17.0	226.8
1970	18.7	19.8	20.3	21.1	21.4	20.5	19.2	18.2	18.8	18.7	16.3	16.1	228.8
1971	17.7	18.6	20.0	20.3	19.8	19.0	18.3	17.7	18.0	17.9	16.6	15.8	219.4
1972	17.2	17.8	18.5	18.9	19.5	18.9	18.0	17.7	17.8	18.2	17.4	17.8	217.6
1973	18.2	19.4	21.2	22.5	20.7	19.0	18.5	17.6	18.1	17.2	16.8	15.2	224.0
1974	17.8	18.6	19.6	20.2	20.0	19.1	17.9	17.8	18.0	18.4	15.9	16.5	219.6
1975	17.1	19.1	20.8	20.3	20.6	18.9	17.6	17.6	17.9	17.4	16.6	16.3	220.0
1976	16.9	19.7	20.3	20.4	19.7	19.4	18.2	18.0	18.6	19.2	17.6	17.3	225.0
1977	17.2	18.0	20.0	20.1	20.0	19.3	18.3	18.0	17.9	18.6	16.9	16.7	220.7
1978	16.9	18.8	20.0	21.0	20.3	19.3	18.3	18.7	18.4	18.1	17.0	17.3	223.9
1979	18.0	18.9	19.7	20.6	20.5	19.7	18.1	18.4	18.7	18.4	17.2	17.7	225.6
1980	17.6	19.3	21.0	20.8	20.7	19.8	18.7	18.1	18.5	18.3	17.9	16.8	227.2
1981	18.5	19.3	19.8	19.5	20.7	20.4	18.7	18.3	17.7	17.5	17.0	15.8	222.8
1982	17.8	18.7	19.4	19.2	20.4	19.7	18.5	18.1	18.7	17.7	18.1	18.0	223.9
1983	17.9	19.9	21.0	20.3	21.0	19.6	19.4	18.7	18.7	18.2	17.8	17.1	229.4
1984	17.1	17.6	20.6	22.0	20.7	19.5	18.5	18.1	18.5	18.1	18.0	16.8	225.3
1985	17.5	18.3	20.5	19.8	19.7	19.5	17.5	17.4	17.9	17.6	17.7	17.3	220.4
1986	17.6	18.8	20.3	19.9	20.2	19.5	18.6	19.0	18.7	18.7	18.3	18.0	227.5
1987	17.8	19.2	20.2	20.1	20.8	19.6	20.1	19.5	19.8	19.9	18.4	18.4	233.6
1988	19.1	21.0	22.0	22.1	21.5	20.4	18.9	18.7	18.7	18.2	16.6	17.1	233.9
1989	16.6	20.6	20.6	21.9	20.4	20.2	18.4	17.4	18.7	17.7	17.9	18.6	228.7
1990	18.3	20.1	19.8	19.9	20.8	19.4	19.1	18.8	19.0	18.6	18.3	17.4	229.3
1991	17.9	19.2	20.4	20.7	20.7	19.8	18.6	18.4	18.6	18.3	17.5	17.2	227.2

1992	17.9	19.2	20.4	20.7	20.7	19.8	18.6	18.4	18.6	18.3	17.5	17.2	227.2
1993	17.9	19.2	20.4	20.7	20.7	19.8	18.6	18.4	18.6	18.3	17.5	17.2	227.2
1994	18.3	19.3	21.0	21.7	21.8	20.1	18.8	18.2	18.4	18.2	17.4	17.3	230.3
1995	17.8	20.5	21.2	21.3	22.0	20.9	19.0	18.8	18.6	18.9	18.0	19.0	235.7
1996	18.9	20.1	21.2	20.8	20.5	19.1	18.7	19.0	19.1	18.6	17.8	17.4	230.7
1997	19.0	18.9	21.5	20.5	21.9	20.8	19.4	19.5	20.1	19.6	19.0	17.9	237.8
1998	19.7	21.0	21.7	22.7	22.1	21.4	19.6	19.0	19.4	19.0	17.1	16.5	238.9
1999	18.4	19.5	20.7	22.0	21.9	20.6	18.6	18.9	19.3	18.7	16.6	17.0	231.9
2000	17.9	19.3	21.1	21.9	21.2	20.2	19.2	18.5	19.1	18.3	18.0	17.9	232.4
2001	18.4	20.2	20.7	21.5	21.3	20.0	19.3	19.3	19.8	19.7	18.4	19.4	237.6
2002	19.2	20.9	21.8	22.4	22.6	21.7	20.6	19.7	19.9	20.1	19.1	19.4	247.1
2003	19.1	21.0	21.3	21.5	21.7	21.1	18.9	19.2	19.4	18.9	18.9	17.4	238.0
2004	18.1	19.8	18.5	19.2	19.1	19.4	18.6	18.6	18.6	17.0	16.4	16.8	219.9
2005	17.1	17.6	20.0	20.1	20.8	19.7	18.6	18.7	18.8	17.1	16.5	14.5	219.6
Mean	***17.9***	***19.2***	***20.4***	***20.7***	***20.7***	***19.8***	***18.6***	***18.4***	***18.6***	***18.3***	***17.5***	***17.2***	***227.2***
STDV	***0.75***	***0.88***	***0.77***	***0.84***	***0.71***	***0.66***	***0.61***	***0.58***	***0.55***	***0.70***	***0.75***	***0.94***	***5.86***

Mean monthly Average Relative humidity at Debre Zeit station

Year	Jan	Feb	March	Apr	May	Jun	July	August	Sept	Nov	Oct	Dec	Year total
1951	41	35	51	65	59	52	72	73	63	54	49	53	667
1952	46	42	48	58	59	71	79	50	59	48	39	42	642
1953	42	41	43	55	42	57	70	74	70	49	48	54	645
1954	43	46	46	37	36	54	69	70	71	47	43	43	605
1955	52	29	31	40	38	51	63	70	64	42	37	42	559
1956	48	38	34	44	34	47	67	70	64	55	41	41	582
1957	42	49	56	57	45	53	68	73	61	54	59	56	672
1958	56	62	52	47	48	70	83	80	77	52	50	55	731
1959	57	57	54	54	76	78	82	83	81	73	67	71	834
1960	65	52	63	57	64	65	78	79	76	55	55	57	765
1961	53	58	59	69	59	70	81	81	77	69	72	69	818
1962	60	54	68	57	55	61	76	80	82	74	65	57	789
1963	58	57	48	66	64	56	74	77	66	41	63	67	737
1964	68	61	55	72	73	74	80	79	77	67	59	69	834
1965	62	50	56	66	55	60	75	78	71	66	64	60	764
1966	51	67	65	67	58	70	76	78	72	58	52	49	762
1967	47	46	52	62	65	65	81	79	74	67	71	63	772
1968	55	76	57	68	62	66	78	77	75	61	67	65	808
1969	69	75	70	60	61	73	80	81	72	55	61	64	821
1970	66	60	64	55	58	66	59	76	72	57	57	59	750
1971	60	51	55	55	65	71	54	77	71	60	61	65	746
1972	61	69	61	67	58	63	75	78	70	54	54	54	763
1973	53	44	40	40	55	64	75	81	76	59	52	53	692
1974	57	59	64	53	60	65	77	77	77	56	50	49	743

1975	49	62	52	63	59	73	80	83	78	64	65	63	792
1976	62	65	64	65	70	71	81	81	71	63	69	65	827
1977	75	69	65	67	70	74	81	81	78	69	73	66	868
1978	59	64	66	66	67	73	83	80	80	75	71	71	855
1979	79	71	72	69	72	76	84	82	78	71	68	69	891
1980	69	67	62	65	63	75	83	83	78	70	66	66	847
1981	64	68	78	77	66	71	83	83	82	68	66	67	872
1982	72	72	66	73	70	73	82	83	76	71	76	75	888
1983	73	73	71	76	74	77	79	85	81	74	67	70	900
1984	68	63	60	56	71	79	80	78	76	59	62	66	819
1994	48	45	49	51	57	66	74	74	68	49	60	56	697
1995	38	42	47	51	41	51	69	71	64	41	47	47	610
1996	45	37	50	49	47	62	72	72	66	40	43	43	627
1997	50	35	45	49	42	60	69	71	62	49	51	45	627
1998	52	46	46	46	42	51	69	74	63	55	44	36	625
1999	42	36	47	36	42	53	71	70	69	59	46	45	616
2000	42	33	40	44	51	59	72	71	70	61	51	50	645
2001	49	42	57	46	60	65	71	73	63	53	44	47	669
2002	53	37	49	46	49	61	68	72	63	40	39	56	633
2003	49	44	45	54	38	57	73	76	75	45	46	50	651
2004	54	44	48	58	42	62	69	72	66	53	49	52	668
2005	56	44	56	52	58	66	75	74	70	51	48	44	694
Mean	**56**	**53**	**55**	**57**	**56**	**65**	**75**	**76**	**72**	**58**	**56**	**57**	**735**
S.Dev	**10.09**	**13.12**	**10.26**	**10.51**	**11.43**	**8.45**	**6.65**	**5.91**	**6.28**	**10.00**	**10.69**	**10.1**	**94.9**

Mean monthly Average Wind speed at Debre Zeit station

Year	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1994	1.5	1.6	1.6	1.9	2	1.4	1.3	1	1.1	2	1.6	1.6	18.6
1995	1.4	1.5	1.8	1.5	2.4	1.4	1.1	1	0.9	1.7	1.4	1.5	17.6
1996	1.4	1.6	1.5	1.6	1.4	1	1	1	0.9	1.5	1.5	1.4	15.8
1997	1.3	1.9	1.7	1.5	2	1.5	1.1	0.9	1.1	1.5	1.5	1.5	17.5
1998	1.5	1.3	1.7	1.6	1.4	1.2	1.2	1	0.8	0.9	1.3	1.4	15.3
1999	1.4	1.7	1.5	2	1.7	1.3	1.1	1	0.8	1.1	1.6	1.4	16.5
2000	1.5	1.7	1.8	1.8	1.4	1.3	1.1	1	0.8	1.2	1.3	1.3	16.2
2001	1.1	1.3	1	1.3	1	1.1	1	0.9	0.9	1.2	1.4	1.3	13.5
2002	1.2	1.3	1.2	1.6	1.3	1.2	1.1	1	1	1.3	1.5	1.4	15
2003	1.3	1.3	1.6	1.3	2	1.5	1.3	1	0.9	1.4	1.5	1.4	16.5
2004	1.4	1.6	1.75	1.6	1.7	1.6	1.3	1.1	1.2	1.6	1.9	1.7	18.5
2005	1.5	1.9	1.9	1.9	1.7	1.3	1.3	1.2	1	1.6	1.9	1.7	18.9
Mean	**1.38**	**1.56**	**1.59**	**1.63**	**1.67**	**1.32**	**1.16**	**1.01**	**0.95**	**1.41**	**1.53**	**1.46**	**16.7**
S.Dev	**0.13**	**0.22**	**0.26**	**0.23**	**0.39**	**0.17**	**0.12**	**0.08**	**0.13**	**0.30**	**0.20**	**0.14**	**1.6**

Mean monthly Sunshine duration at Debre Zeit station

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
1990	8.55	6.7	8.8	7.3	7.9	7	5.4	6.4	7	10	10	10.1	95.2
1994	10.4	10.1	8.8	8.7	9.6	6.3	4.9	5.5	7.4	10.2	9	10.2	101.1
1997	7.5	10.6	8.9	7.2	9.9	8.1	5.8	6.3	8.9	7.8	7.6	9.8	98.4
1998	8	7.9	7.8	8.9	8.2	7.8	5.5	4.6	6.3	7.6	10	10.4	93.4
1999	9.5	10.6	7.4	10	8.9	8	4.5	6.4	5.9	7.85	10	10.6	99.8
2000	10.1	10.3	7	9.95	8.4	6.9	6.2	5.2	5.5	8.1	9.1	9.5	96.3
2001	9.1	10	6.6	9.9	7.9	6.5	6.1	4.7	8.7	9.8	10	10	99.5
2002	8.2	10.1	8.1	9.2	8.5	9.9	7	6.4	8.2	9.9	10	7.1	103.0
2003	8.8	8.9	9.8	7.3	9.5	7.1	5	4.9	10.4	10.4	9.9	9.3	101.3
2004	8.65	9.5	8.4	7.6	9.3	6.6	5.8	5.9	7.4	8.4	10	9.5	97.3
2005	8.5	10.1	9	8.1	7	6.5	4.8	7.1	6.9	9.9	9.7	10.8	98.4
Mean	**8.8**	**9.5**	**8.2**	**8.6**	**8.6**	**7.3**	**5.5**	**5.8**	**7.5**	**9.1**	**9.7**	**9.8**	**98.5**
S.Dev	**0.88**	**1.23**	**0.96**	**1.12**	**0.88**	**1.06**	**0.73**	**0.83**	**1.45**	**1.12**	**0.84**	**1.00**	**2.85**

Mean monthly rainfall at Mojo station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**
1983	19.06	20.58	22.60	22.90	22.45	22.10	19.60	19.85	20.20	19.60	18.45	18.00	**245.39**
1984	17.55	18.55	22.30	23.35	22.80	21.50	20.05	20.70	20.75	19.50	19.75	18.20	**245.00**
1985	18.60	19.95	22.20	22.15	22.05	22.10	19.25	18.65	19.30	18.85	18.95	18.40	**240.45**
1986	17.15	22.00	22.05	21.68	22.05	20.60	19.30	17.00	16.85	15.90	15.40	18.50	**228.48**
1987	19.30	20.00	21.90	21.20	21.20	21.40	21.05	20.20	21.35	21.00	19.50	19.30	**247.40**
1988	20.00	22.30	23.05	22.65	23.45	21.25	19.55	19.55	19.60	19.85	17.30	18.50	**247.05**
1989	17.80	20.85	22.03	20.90	23.20	21.08	19.40	19.55	19.50	19.28	18.23	19.70	**241.50**
1990	19.30	20.95	20.70	21.25	23.05	21.10	19.50	19.30	19.55	18.90	18.80	17.00	**239.40**
1991	20.20	21.30	22.10	22.15	22.75	22.35	19.45	19.10	19.70	20.10	18.15	18.80	**246.15**
1992	19.75	20.85	23.15	23.05	22.90	21.50	19.15	18.70	18.80	18.75	18.90	19.60	**245.10**
1993	19.40	19.50	21.45	21.80	21.60	21.05	20.30	19.90	19.70	20.40	19.10	18.55	**242.75**
1994	18.78	20.20	22.85	23.15	24.05	20.70	20.00	19.30	19.60	19.10	18.10	17.75	**243.58**
1995	18.15	20.90	21.65	22.15	22.75	22.00	19.50	19.80	20.00	20.75	19.30	19.80	**246.75**
1996	18.95	19.85	21.20	21.60	21.70	21.25	20.80	19.65	19.95	18.85	18.75	17.65	**240.20**
1997	19.75	19.10	22.75	21.20	22.05	21.85	19.90	20.45	20.35	20.10	20.40	18.80	**246.70**
1998	20.35	20.75	21.85	22.90	22.50	22.65	20.45	19.95	20.10	20.00	17.55	16.90	**245.95**
1999	19.65	21.35	22.35	22.05	21.70	21.35	21.15	20.80	20.85	20.65	21.30	17.43	**250.63**
2000	18.95	19.90	22.10	22.65	22.65	16.95	19.35	18.80	19.90	19.60	18.95	17.95	**237.75**
2001	17.90	19.95	21.05	22.00	22.00	20.95	19.90	20.00	20.10	20.20	19.95	18.30	**242.30**
2002	19.10	19.35	20.85	21.25	21.45	21.15	21.05	21.00	20.55	19.50	19.25	18.55	**243.05**
2003	19.15	20.00	20.35	21.65	22.75	21.20	17.10	17.65	19.70	19.15	19.25	16.85	**234.80**
2004	19.10	19.35	20.20	21.10	22.95	20.05	17.15	18.35	19.75	19.00	18.70	17.78	**233.48**
Mean	***19.00***	***20.34***	***21.85***	***22.04***	***22.46***	***21.19***	***19.68***	***19.47***	***19.83***	***19.50***	***18.82***	***18.29***	**339.67**
S.Dev	***1.08***	***1.24***	***1.19***	***1.09***	***1.15***	***1.81***	***1.72***	***1.86***	***1.60***	***1.45***	***1.48***	***1.30***	**7.73**
C.V	***1.32***	***1.68***	***1.45***	***1.19***	***1.34***	***3.55***	***3.04***	***3.59***	***2.59***	***2.43***	***2.41***	***1.82***	**59.68**

Mean monthly Maximum temperature at Mojo station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1983	10.0	11.9	14.8	15.8	15.9	15.7	12.5	14.3	13.9	11.8	9.7	9.8
1984	8.0	9.1	13.8	15.6	16.1	16.0	14.4	15.1	14.0	11.3	11.3	8.7
1985	8.5	11.0	13.0	13.5	13.5	12.7	12.6	12.7	12.0	9.7	9.3	7.9
1986	6.3	13.6	14.2	13.7	14.4	14.7	13.3	8.7	7.7	4.2	4.2	10.5
1987	11.4	11.3	15.3	13.9	14.5	15.0	15.1	14.7	14.6	13.1	10.3	10.3
1988	11.9	14.5	14.8	15.3	15.4	14.2	15.3	14.7	14.2	11.5	7.3	9.9
1989	8.6	11.7	14.0	14.3	15.1	13.6	14.6	14.4	13.7	11.0	8.5	11.9
1990	10.4	14.1	13.1	13.3	14.8	12.9	13.9	14.1	13.2	10.4	9.6	7.5
1991	11.0	13.6	14.5	14.3	14.2	14.0	14.4	13.9	13.1	11.8	8.7	10.1
1992	11.5	12.7	14.7	14.3	13.6	13.1	13.5	13.9	11.9	10.4	10.6	11.3
1993	11.0	11.5	11.3	13.8	13.9	13.5	13.9	13.9	13.2	12.2	9.5	8.6
1994	9.7	12.1	13.7	14.5	15.1	13.0	15.2	14.7	14.0	11.0	9.7	9.3
1995	8.4	12.6	14.2	15.2	14.8	14.0	14.5	14.8	14.0	13.6	10.4	11.4
1996	10.0	11.0	13.3	13.3	13.5	13.2	15.0	14.4	13.0	10.2	10.0	8.1
1997	11.5	9.7	14.6	13.3	13.4	15.1	14.6	14.6	12.6	11.7	13.3	9.0
1998	11.5	11.1	12.6	13.8	13.1	13.0	14.0	15.4	14.5	13.0	8.4	6.8
1999	10.5	11.9	14.2	13.1	12.5	12.7	12.9	12.7	12.9	12.7	13.3	7.3
2000	9.4	10.1	13.3	14.7	14.7	13.6	14.4	13.9	13.4	11.7	9.5	7.7
2001	7.7	10.3	12.6	13.1	13.9	13.6	13.5	14.0	12.4	10.7	10.4	7.0
2002	9.0	8.7	12.3	12.6	12.4	12.9	14.0	14.5	12.3	10.6	9.2	9.4
2003	9.7	10.7	10.8	13.7	13.4	12.4	8.7	8.5	10.0	8.0	9.6	6.1
2004	9.0	9.3	10.2	11.1	12.9	9.9	6.9	7.6	9.2	8.6	6.9	6.5
Mean	**9.8**	**11.5**	**13.4**	**13.9**	**14.1**	**13.6**	**13.5**	**13.4**	**12.7**	**10.9**	**9.5**	**8.9**
S.Dev	**1.48**	**1.61**	**1.35**	**1.06**	**1.03**	**1.29**	**2.03**	**2.20**	**1.74**	**2.02**	**1.94**	**1.67**
C.V	**2.18**	**2.59**	**1.83**	**1.12**	**1.07**	**1.67**	**4.12**	**4.85**	**3.04**	**4.10**	**3.75**	**2.79**

Mean monthly Minimum temperature at Mojo station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1983	28.2	29.2	30.4	30.1	29.0	28.5	26.7	25.4	26.5	27.4	27.2	26.2	334.7
1984	27.1	28.0	30.8	31.1	29.5	27.0	25.7	26.3	27.5	27.7	28.2	27.7	336.6
1985	28.7	28.9	31.4	30.8	30.6	31.5	25.9	24.6	26.6	28.0	28.6	28.9	344.5
1986	28.0	30.4	30.0	29.7	29.7	26.5	25.3	25.3	26.0	27.6	26.6	26.5	331.5
1987	27.2	28.7	28.5	28.5	27.9	27.8	27.0	25.7	28.1	28.9	28.7	28.3	335.3
1988	28.1	30.1	31.3	30.0	31.5	28.3	23.8	24.4	25.0	28.2	27.3	27.1	335.1
1989	27.0	30.0	30.1	27.5	31.3	28.6	24.2	24.7	25.3	27.6	28.0	27.5	331.8
1990	28.2	27.8	28.3	29.2	31.3	29.3	25.1	24.5	25.9	27.4	28.0	26.5	331.5
1991	29.4	29.0	29.7	30.0	31.3	30.7	24.5	24.3	26.3	28.4	27.6	27.5	338.7
1992	28.0	29.0	31.6	31.8	32.2	29.9	24.8	23.5	25.7	27.1	27.2	27.9	338.7
1993	27.8	27.5	31.6	29.8	29.3	28.6	26.7	25.9	26.2	28.6	28.7	28.5	339.2
1994	27.9	28.4	32.0	31.8	33.0	28.4	24.8	23.9	25.2	27.2	26.5	26.2	335.2
1995	27.9	29.2	29.1	29.1	30.7	30.0	24.5	24.8	26.0	27.9	28.2	28.2	335.6
1996	28.0	28.7	29.1	29.9	29.9	29.3	26.6	24.9	26.9	27.5	27.5	27.2	335.5
1997	28.0	28.5	30.9	29.1	30.7	28.6	25.2	26.3	28.1	28.5	27.5	28.6	340.0
1998	29.2	30.4	31.1	32.0	31.9	32.3	26.9	24.5	25.7	27.0	26.7	27.0	344.7
1999	28.9	30.8	30.5	31.0	30.9	30.0	29.4	28.9	28.8	28.6	29.3	27.6	354.7
2000	28.5	29.7	30.9	30.6	30.6	20.3	24.3	23.7	26.4	27.5	28.4	28.2	329.1
2001	28.1	29.6	29.5	30.9	30.1	28.3	26.3	26.0	27.8	29.7	29.5	29.6	345.4
2002	29.2	30.0	29.4	29.9	30.5	29.4	28.1	27.5	28.8	28.4	29.3	27.7	348.2
2003	28.6	29.3	29.9	29.6	32.1	30.0	25.5	26.8	29.4	30.3	28.9	27.6	348.0
2004	29.2	29.4	30.2	31.1	33	30.2	27.4	29.1	30.3	29.4	30.5	29.1	358.9
Mean	**28.2**	**29.2**	**30.3**	**30.2**	**30.8**	**28.8**	**25.9**	**25.5**	**26.9**	**28.1**	**28.1**	**27.7**	**339.7**
S.Dev	**0.68**	**0.88**	**1.03**	**1.12**	**1.27**	**2.33**	**1.40**	**1.52**	**1.46**	**0.87**	**1.03**	**0.92**	**7.73**
C.V	**0.46**	**0.77**	**1.07**	**1.25**	**1.62**	**5.44**	**1.97**	**2.32**	**2.14**	**0.76**	**1.06**	**0.85**	**59.68**

Mean monthly Average temperature at Mojo station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**
1983	19.06	20.58	22.60	22.90	22.45	22.10	19.60	19.85	20.20	19.60	18.45	18.00	**245.39**
1984	17.55	18.55	22.30	23.35	22.80	21.50	20.05	20.70	20.75	19.50	19.75	18.20	**245.00**
1985	18.60	19.95	22.20	22.15	22.05	22.10	19.25	18.65	19.30	18.85	18.95	18.40	**240.45**
1986	17.15	22.00	22.05	21.68	22.05	20.60	19.30	17.00	16.85	15.90	15.40	18.50	**228.48**
1987	19.30	20.00	21.90	21.20	21.20	21.40	21.05	20.20	21.35	21.00	19.50	19.30	**247.40**
1988	20.00	22.30	23.05	22.65	23.45	21.25	19.55	19.55	19.60	19.85	17.30	18.50	**247.05**
1989	17.80	20.85	22.03	20.90	23.20	21.08	19.40	19.55	19.50	19.28	18.23	19.70	**241.50**
1990	19.30	20.95	20.70	21.25	23.05	21.10	19.50	19.30	19.55	18.90	18.80	17.00	**239.40**
1991	20.20	21.30	22.10	22.15	22.75	22.35	19.45	19.10	19.70	20.10	18.15	18.80	**246.15**
1992	19.75	20.85	23.15	23.05	22.90	21.50	19.15	18.70	18.80	18.75	18.90	19.60	**245.10**
1993	19.40	19.50	21.45	21.80	21.60	21.05	20.30	19.90	19.70	20.40	19.10	18.55	**242.75**
1994	18.78	20.20	22.85	23.15	24.05	20.70	20.00	19.30	19.60	19.10	18.10	17.75	**243.58**
1995	18.15	20.90	21.65	22.15	22.75	22.00	19.50	19.80	20.00	20.75	19.30	19.80	**246.75**
1996	18.95	19.85	21.20	21.60	21.70	21.25	20.80	19.65	19.95	18.85	18.75	17.65	**240.20**
1997	19.75	19.10	22.75	21.20	22.05	21.85	19.90	20.45	20.35	20.10	20.40	18.80	**246.70**
1998	20.35	20.75	21.85	22.90	22.50	22.65	20.45	19.95	20.10	20.00	17.55	16.90	**245.95**
1999	19.65	21.35	22.35	22.05	21.70	21.35	21.15	20.80	20.85	20.65	21.30	17.43	**250.63**
2000	18.95	19.90	22.10	22.65	22.65	16.95	19.35	18.80	19.90	19.60	18.95	17.95	**237.75**
2001	17.90	19.95	21.05	22.00	22.00	20.95	19.90	20.00	20.10	20.20	19.95	18.30	**242.30**
2002	19.10	19.35	20.85	21.25	21.45	21.15	21.05	21.00	20.55	19.50	19.25	18.55	**243.05**
2003	19.15	20.00	20.35	21.65	22.75	21.20	17.10	17.65	19.70	19.15	19.25	16.85	**234.80**
2004	19.10	19.35	20.20	21.10	22.95	20.05	17.15	18.35	19.75	19.00	18.70	17.78	**233.48**
Mean	***19.00***	***20.34***	***21.85***	***22.04***	***22.46***	***21.19***	***19.68***	***19.47***	***19.83***	***19.50***	***18.82***	***18.29***	**339.67**
S.Dev	***1.08***	***1.24***	***1.19***	***1.09***	***1.15***	***1.81***	***1.72***	***1.86***	***1.60***	***1.45***	***1.48***	***1.30***	**7.73**
C.V	***1.32***	***1.68***	***1.45***	***1.19***	***1.34***	***3.55***	***3.04***	***3.59***	***2.59***	***2.43***	***2.41***	***1.82***	**59.68**

Mean monthly rainfall at Chefe Densa station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1999	0.0	0.0	22.8	0.0	14.4	123.7	232.9	264.0	48.9	26.9	0.0	0.2	733.8
2000	0.0	0.0	23.8	40.0	18.9	96.2	182.9	226.8	47.8	13.5	19.1	0.0	668.9
2001	0.0	23.8	109.7	17.4	69.1	89.0	202.6	111.2	46.6	0.0	0.0	6.3	675.7
2002	0.0	0.0	41.7	20.0	17.0	59.6	156.0	265.8	53.4	0.0	0.0	12.0	625.5
2003	12.1	43.4	54.3	78.0	0.0	73.7	228.3	353.0	113.8	0.0	0.0	15.5	972.1
2004	14.2	1.3	36.0	73.1	4.3	122.3	230.1	184.3	108.8	0.0	5.6	0.8	780.8
Mean	***4.4***	***11.4***	***48.1***	***38.1***	***20.6***	***94.1***	***205.5***	***234.2***	***69.9***	***6.7***	***4.1***	***5.8***	***742.8***
S.Dev	***6.8***	***18.3***	***32.4***	***31.7***	***24.9***	***25.7***	***31.1***	***82.1***	***32.2***	***11.3***	***7.7***	***6.7***	***124.8***

Mean monthly Maximum Temperature at Chefe Densa station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997	22	22.2	22.1	22	24.9	23.3	20.4	21.2	22.2	20.3	20.2	20.6
1998	21.8	23.3	23	25.1	24.9	24.3	20.1	20	20.8	20.7	20.6	20.5
1999	21.7	24	22.7	25.1	25.7	23.7	19.7	19.7	21.2	20.8	20.4	20.5
2000	27.8	23.1	24.6	23.9	24.8	23	20.3	19.4	18.2	21.6	20.4	20.7
2001	21.2	22.7	21.9	23.8	23.8	21.7	20.7	20	15.1	22.4	21.7	21.2
2002	21	24.3	23.7	23.8	25.7	24.8	22.6	22	22.3	22.7	22.1	21.1
2003	22.1	24.3	23.7	23.2	25.8	23.7	20.2	20.6	21.2	21.9	21.5	20.4
2004	22.5	22.7	23.4	22.8	26.1	23.3	21.2	21.1	21.8	21.6	21.2	21.5
2005	21.7	24.3	24.5	24.6	23.5	23.2	20.9	21.7	21.9	22.5	22.1	21.6
Total	***201.8***	***210.9***	***209.6***	***214.3***	***225.2***	***211***	***186.1***	***186***	***185***	***195***	***190***	***188.1***
Mean	***22.4***	***23.4***	***23.3***	***23.8***	***25.0***	***23.4***	***20.7***	***20.6***	***20.5***	***21.6***	***21.1***	***20.9***
S.Dev	***2.07***	***0.81***	***0.96***	***1.04***	***0.91***	***0.87***	***0.85***	***0.92***	***2.39***	***0.86***	***0.75***	***0.46***

Mean monthly Minimum Temperature at Chefe Densa station

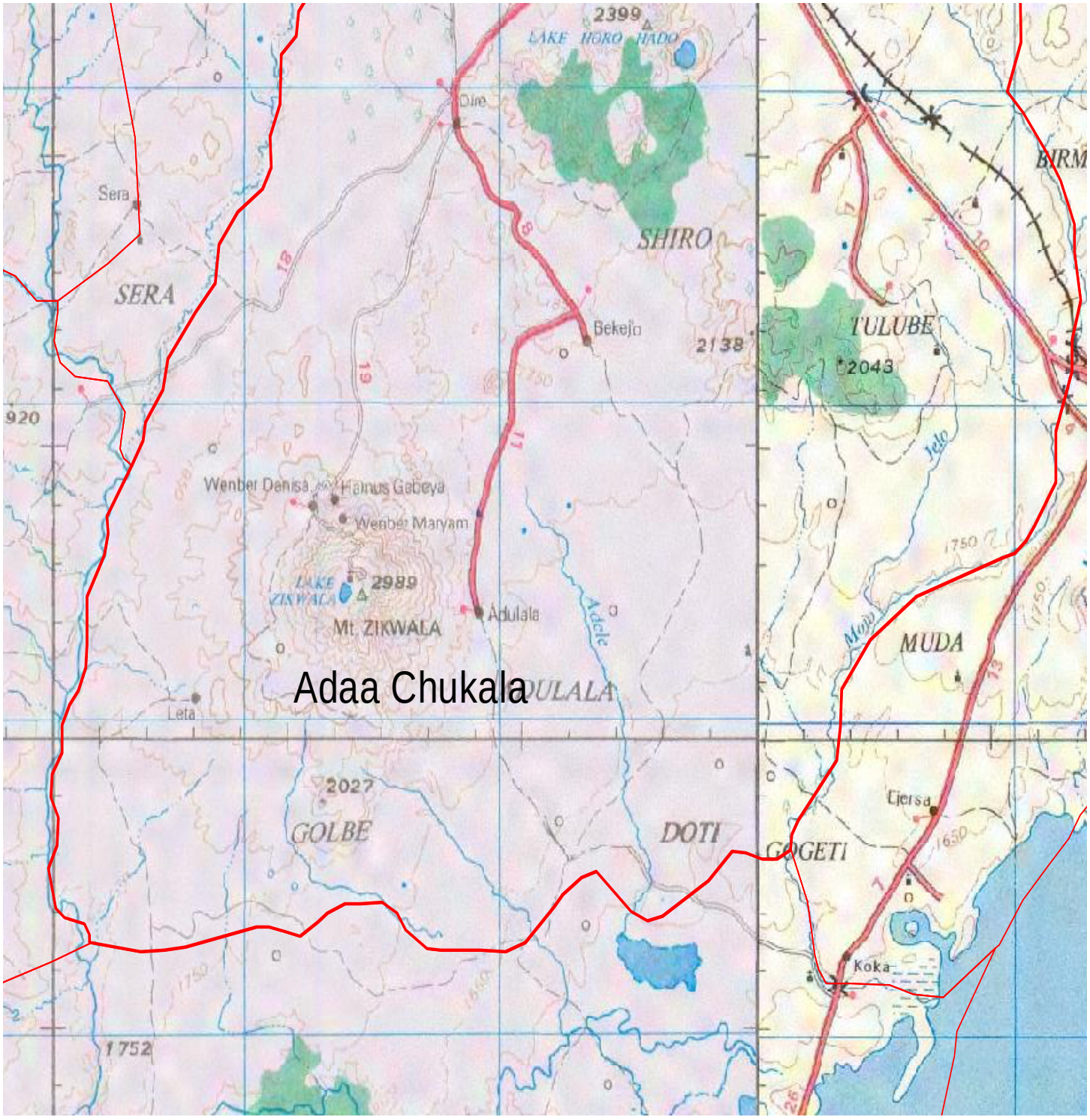
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997	9.75	8.8	10.15	11.5	11.9	11.3	11.5	11.5	11.9	11.4	10.9	8.8
1998	10.7	12.1	12.9	12.9	12.8	11.7	12	11.8	11.6	10.6	7.7	6.9
1999	8.7	9.2	11.5	12	11.8	11.2	11.1	10.9	10.7	10.5	7.5	7.1
2000	7.7	8.7	40.8	12.2	12.2	10.7	11	11.4	10.55	10.1	8.8	7.3
2001	7.9	9.8	11.2	11.1	11.2	10.6	10.9	11.5	10.4	9.7	7.9	8.2
2002	9.2	9.4	11.6	11.4	11.8	11.6	10.7	11	12.8	11.7	8	10
2003	9.5	10.6	13.3	14.4	14.5	12	11.1	11.4	11.4	9.5	9	7.3
2004	10.6	9.5	10.9	12.2	10.7	10.9	10.9	11.5	11.2	9.7	8.1	9.9
2005	9.1	11.1	11.7	12.3	12.3	11.2	11.7	11.6	11.7	9.8	8.25	6.7
Total	***83.15***	***89.2***	***134.1***	***110***	***109***	***101***	***101***	***102.6***	***102***	***93***	***76.15***	***72.2***
Mean	***9.2***	***9.9***	***14.9***	***12.2***	***12.1***	***11.2***	***11.2***	***11.4***	***11.4***	***10.3***	***8.5***	***8.0***
S.Dev	***1.05***	***1.14***	***9.76***	***0.98***	***1.08***	***0.47***	***0.43***	***0.28***	***0.76***	***0.79***	***1.03***	***1.27***

Mean monthly Average Temperature at Chefe Densa station

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997	15.9	15.5	16.1	16.8	18.4	17.3	16.0	16.4	17.1	15.9	15.6	14.7
1998	16.3	17.7	18.0	19.0	18.9	18.0	16.1	15.9	16.2	15.7	14.2	13.7
1999	15.2	16.6	17.1	18.6	18.8	17.4	15.4	15.3	16.0	15.7	14.0	13.8
2000	17.8	15.9	32.7	18.1	18.5	16.9	15.7	15.4	14.4	15.9	14.6	14.0
2001	14.6	16.3	16.6	17.5	17.5	16.2	15.8	15.8	12.8	16.1	14.8	14.7
2002	15.1	16.9	17.7	17.6	18.8	18.2	16.7	16.5	17.6	17.2	15.1	15.6
2003	15.8	17.5	18.5	18.8	20.2	17.9	15.7	16.0	16.3	15.7	15.3	13.9
2004	16.6	16.1	17.2	17.5	18.4	17.1	16.1	16.3	16.5	15.7	14.7	15.7
2005	15.4	17.7	18.1	18.5	17.9	17.2	16.3	16.7	16.8	16.2	15.2	14.2
Total	***142.5***	***150.1***	***171.8***	***162.2***	***167.2***	***156.1***	***143.5***	***144.2***	***143.5***	***143.8***	***133.2***	***130.2***
Mean	***15.8***	***16.7***	***19.1***	***18.0***	***18.6***	***17.3***	***15.9***	***16.0***	***15.9***	***16.0***	***14.8***	***14.5***
S.Dev	***0.94***	***0.81***	***5.16***	***0.74***	***0.73***	***0.63***	***0.38***	***0.48***	***1.49***	***0.50***	***0.52***	***0.75***

SUMMARY OF FINANCIAL EXPENSES

No	Description	Unit	Amt	Unit price	Total Price
1	Photocopy	Page	226	0.15	33.90
3	Map scanning	Ls	2	3	6.00
4	Removal disk (Flash disk)	Pcs	1	360	360.00
5	Floppy disk	Pcs	1	3.5	3.50
6	Bed rent during field work	Days	23	-	705.00
7	Transport A/minch to A/A	Trip	2	-	156.00
8	Transport A/A to D.Zeit	Trip	4	6	24.00
9	Transport A/A to Nazereth	Trip	4	10	40.00
10	Transport D/Zeit to Nazereth	Trip	4	8	32.00
11	Perdium for Researcher	Days	24	85	2040.00
Total					3400.40



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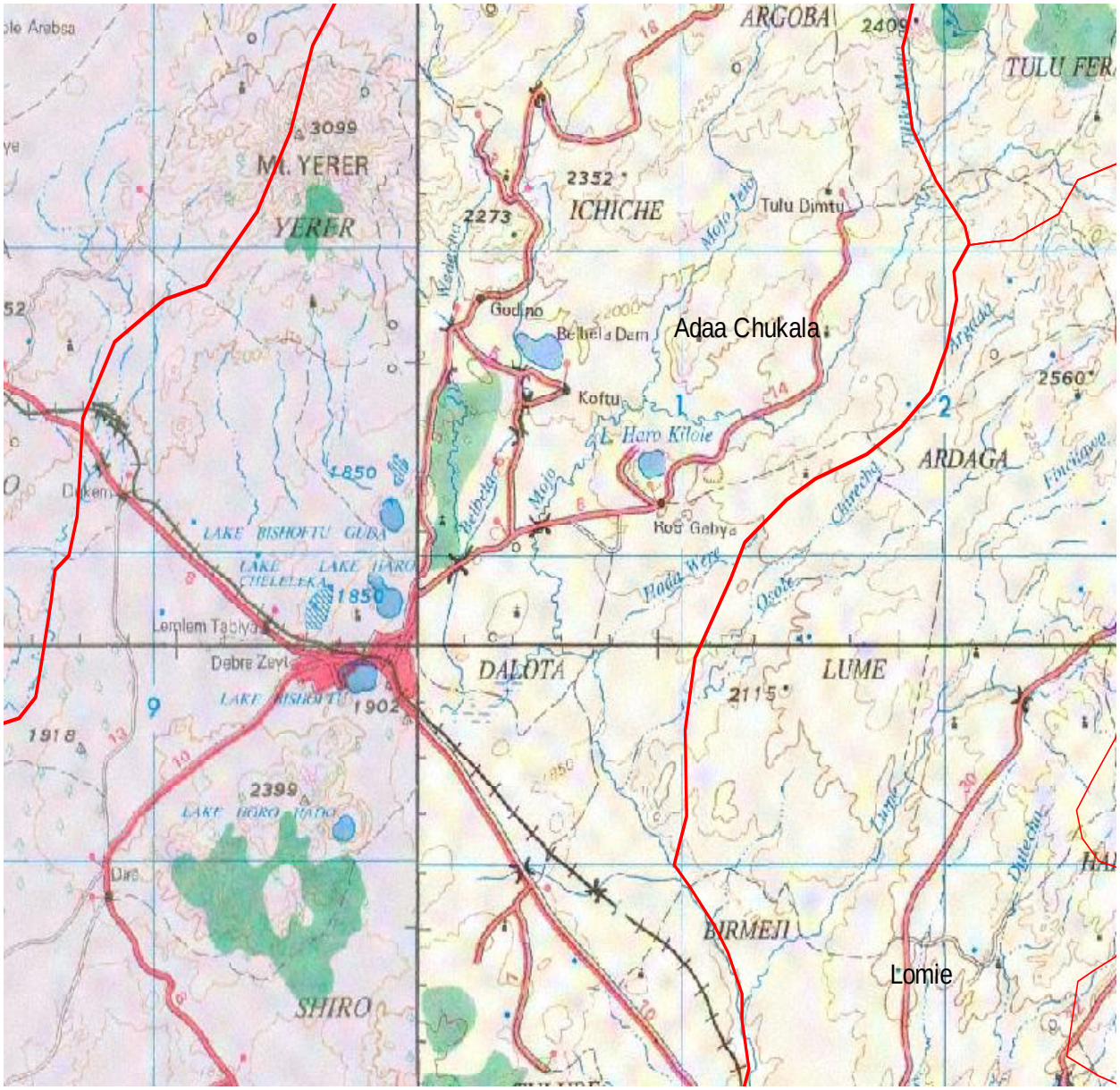
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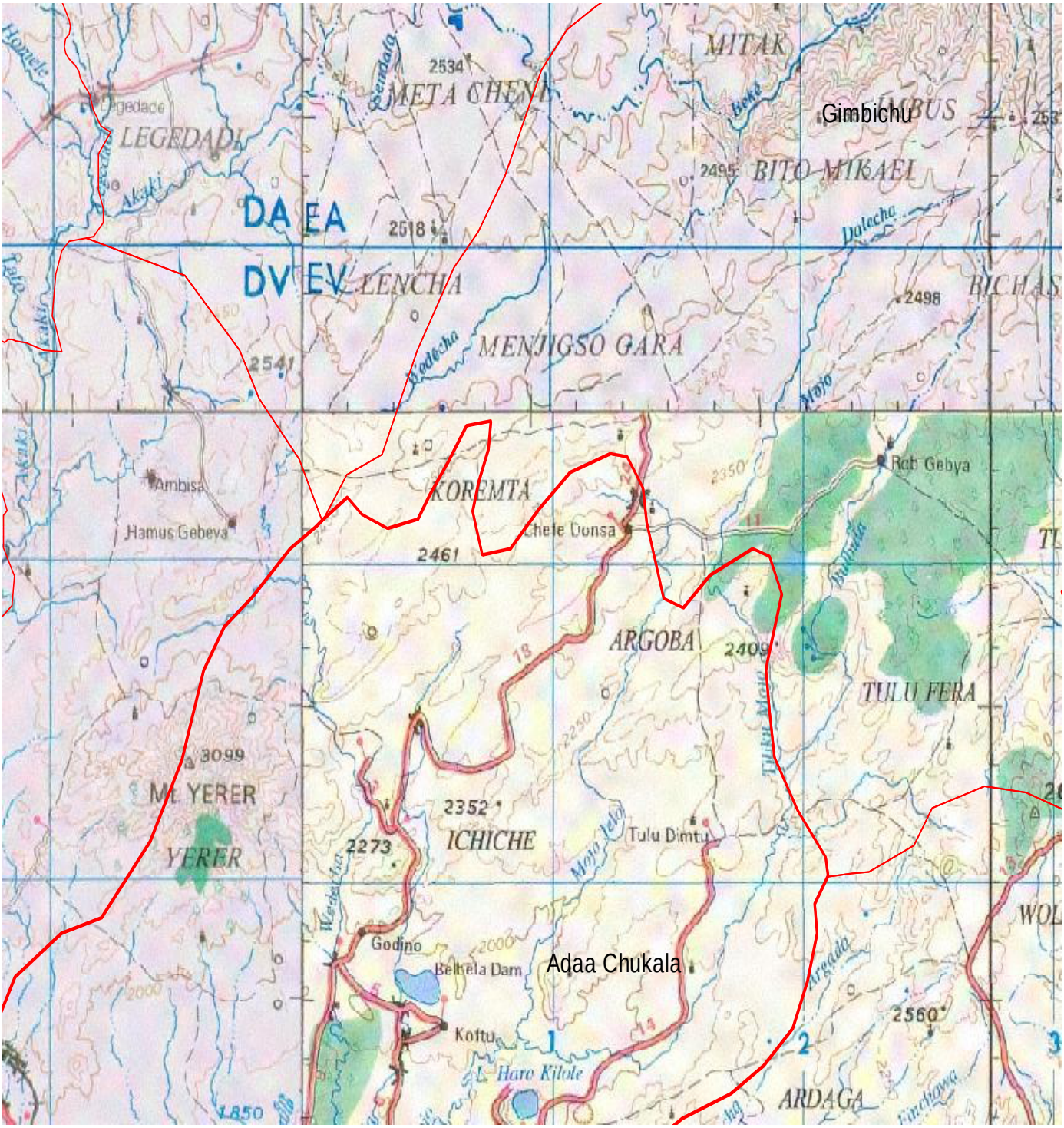
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