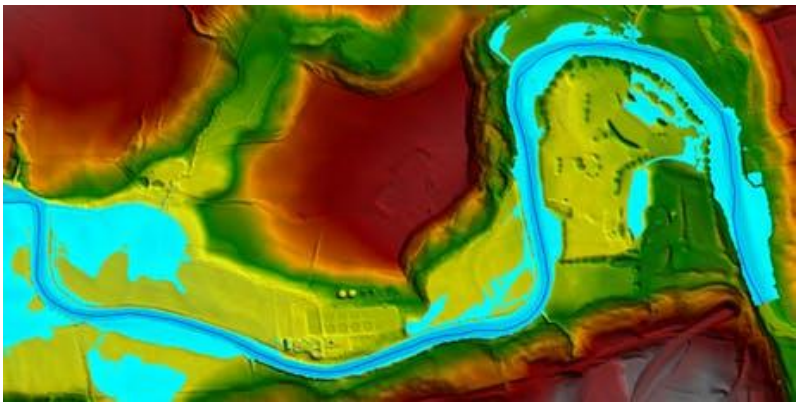


2018

ENGINEERING HYDROLOGY

DOGANPINAR POND

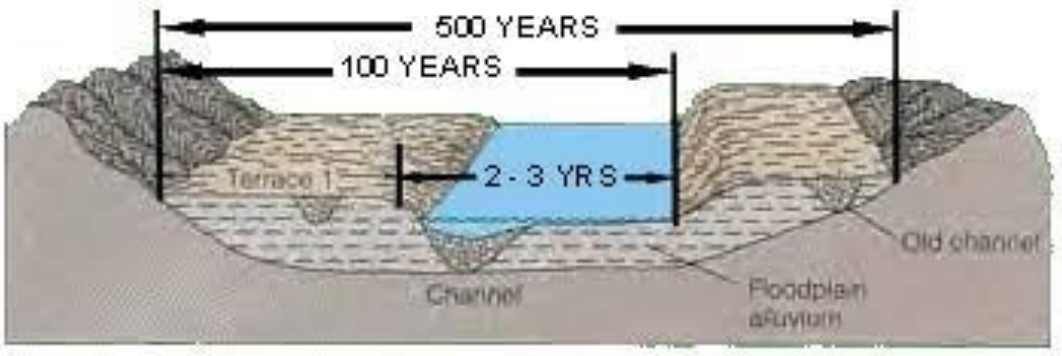
AND

IRRIGATION PROJECT

HYDROPOLITICS ACADEMY

Hydropolitics Academy

1.5.2018



Summarized for Second International Advanced

Course on Renewable Energies

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Hydropolitics Academy

2018

HYDROPOLITICS ACADEMY

HYDROPOLİTICS ASSOCIATION
PROJECT and CONSULTANCY CENTER

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HYDROPOLITICS ASSOCIATION

PROJECT and CONSULTANCY CENTER

SECTION 1

LOCATION OF PROJECT AREA AND ITS PURPOSE

1. Introduction

The original report in Turkish consists of 7 sections and those sections are summarized in the same order as follows .

1.1. Location of Project Area

Doğanpınar pond(small dam) is located in Gediz River catchment in the geographycal region of Agean Sea. Its catchment area is 59,9 km^2 at the pond axis on the Geçtin creek, shown in Figure 1.

The project area was visited by the engineering company's experts of hydrologist, agriculture engineer, geological engineer and civil engineer at the early initial stage of engineering services for the Project.

1.2. Purpose of the Project

The project will suply irrigation water to the agricultural area close to Doğanpınar village.

SECTION 2

CLIMATE

2.1. General

(i) Mediterranean climate is predominant on the project area, with hot and dry summer season and warm and rainy winter.

(ii) The hypsometric curve for the pond catchment can be seen in Figure 2.

(iii) The rainfall regime over the catchment can be represented by the mean montly rainfall data at the meteorological stations presented in Table 1. These stations are illustrated in Figure 1.

(iv) Thiessen polygons method is applied to the pond catchment as shown in Figure 3, and from the view of these polygons it is concluded that Güneşli station's rainfall data represent the whole catchment area.

(v) Yearly and daily max. rainfall data series at Güneşli are given in Table 2 and 3 with the results of frequency analyses.

(vi) Mean monthly temperature data at the surrounding meteorological stations are presented in Table 4.

(vii) Mean monthly temperature values at Simav were transferred to Güneşli station altitude and the reservoir water surface elevation by the use of temperature lapse rate of 0.5ºC/100 m and latitude correction factor of 1ºC/60'.

(viii) Mean monthly evaporation data from class A pan at Güneşli station is presented in Table 5 for the observation period from years 1987 to 1995.

Net evaporation values from the reservoir water surface in the last row of Table 5 are resulted from the step by step calculations shown in Table 5 and use of relationship in Figure 4.

The mean monthly temperature values in Table 5 for Güneşli station are obtained from the transfer of temperature values in Table 5 for Simav station.

SECTION 3

WATER SUPPLY

3.1. Stream Gauging Station

The Doğanpınar stream gauging station (SGS) No: 5-65 equipped with recording water stage gauge was established on the Geçtin creek at pond site in January 2005

The monthly flows at SGS No: 5-65 are presented in Table 6 for the obsevarion period of years 2005 to 2006.

Some characteristic figures for SGS No: 5-65 and others within the same river drainage system are given in Table 7, for which monthly flows and annual peak discharges data can be used in estimating similar values at the pond site.

To do these, the following approaches are taken into account:

a) Correlation and regressions analysis
b) Hydrological similarity
c) Frequency analyses of peak discharge data series at SGSs in Table 7
d) Regional frequency analyses of peak discharge data series at SGSs in Table 7

3.2. Water Potential Calculation

Monthly flow data at SGS No:5-65, 5-35, 5-43 and 5-26 are given in Tables 6, 8, 9 and 10 respectively and pairs of these stations are correlated for the common obervation periods as shown in Figures 5, 6, 7 and 8.

The extended values of SGS No: 5-65 from Figure 5 are presented in Table 6.

The missed monthly flow values at SGS No: 5-35 are filled from figures 6 and 7, and then the results are given Table 8.

The missed monthly flow values for year 1995 at SGS No: 5-26 are completed from the relationship in Figure 8 and the results are presented in Table 10.

Finally the monthly flows in Table 6 are adopted for Doğanpınar pond with annual mean flow value of 19.187 hm^3.

On the other hand, water potential at the pond axis is estimated by:

i) Hydrological similarity approach, $Q = CA^n$

$$Q_{Dog} = \left(\frac{A_{Dog}}{A_{5\text{-}35}} \right)^{2/3} \times Q_{5\text{-}35} = 0.774 \times Q_{5\text{-}35} = 13.11 \text{ hm}^3$$

where:

Q = annual mean flow, hm3

A = catchment size, km2

C = runoff coefficent

n = power

ii) Empirical Approaches

Turc and Coutagne equations are applied and annual mean flow is obtained from these equations as 10.97 hm3 and 9.84 hm3 respectively for the Doğanpınar pond axis.

The flow values given in Table 6 are assumed as most reliable ones and used in hydraulic design step(Section 4).

SECTION 4

SEDIMENT AND LOSSES

i) Total yearly sediment yield at pond site is estimated r=280m^3/km^2/year and then the dead storage is calculated as 59.9x280x50=838 600 m3

Water quality of Geçtin creek at pond site is determined as C_1S_1 from the analyses of water samples.

ii) Evaporation loss:

Mean volume=Dead volume+1/2 Active Volume(see Figure 8A)

= 0.8386 + ½ x 1.678 hm^3 = 1.678 hm^3

The surface area corresponding to this mean volume is read off from Figure 8A as 0.225 km^2

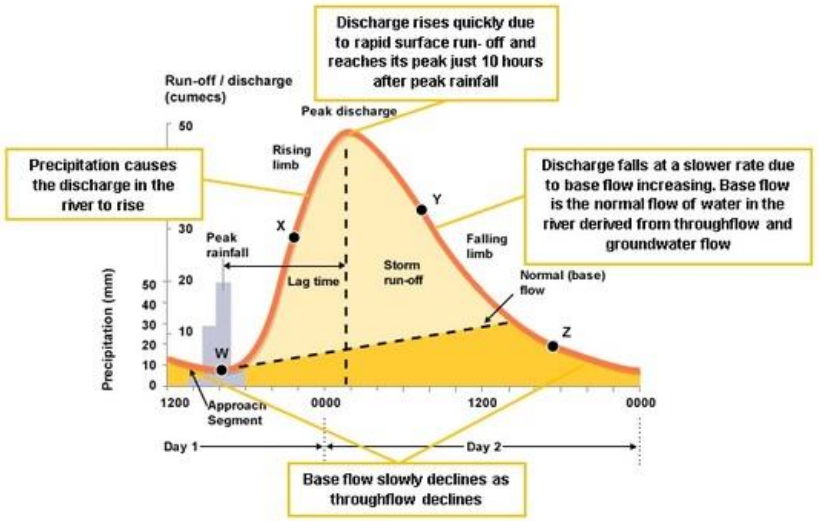
Reservoir elevation- volume-area curves for Doğanpınar pond in Figure 8A are constructed by the use of data obtained from 1/5000 scaled reservoir map.

Evaporation loss from reservoir = 0.225 x 758.1 = 0.171hm^3

Infiltration loss = Total volume x Loss coefficient = 2.516 x 0.08 = 0.201 hm^3

Total losses = Evaporation loss + Infiltration loss

= 0.171 + 0.201 = 0.372 hm^3



SECTION 5

IRRIGATION WATER REQUIREMENT

According to the crop pattern in Table 11, irrigation water requirement is calculated by the use of Blaney-Criddle method, rainfall data at Güneşli and temperature data at Simav are considered in the calculations.

The irrigation scheme consists of pipes, sprinkler and drop irrigation .

Annual total irrigation water requirement is calculated as 4446 hm^3/ha

SECTION 6

OPERATION STUDIES

These studies have been carried out for the last 3 years, calculations can be seen in Table 12, which is self-explained.

The released water for irrigation $=V_{active} - V_{loss}$

$$= 1.678 - 0.372$$

$$= 1.306\ hm^3$$

Amount of irrigation water = Irrigation areax0.9x0.97x (4446/1 000 000)

$$= 0.00388\ hm^3/ha$$

Net irrigated area= 1.306/0.00388=336.6 ha

Net irrigated area obtained from operation studies in Table 12 is 493 ha which is more reliable than 336.6 ha value.

SECTION 7

DESIGN FLOODS

7.1. Rainfall Analysis

Annual maximum daily rainfall data series at Güneşli station is used for frequency analysis and the results obtained from this analysis are given in Table 3. The best fit distrubution function is Gama 2.

7.2. Catchment Curve Number

CN=79 is determined by considering the land use of pond catchment.

7.3. Catchment Characteristic Values

Size……A= 59.9 km2

Length of main channel……L= 11.1 km

Distance between nearest point to

the gravity center and outlet ……Lc=4.8 km

Harmonic slope……...S=0.041

Curve number……CN= 0.79

Harmonic slope calculation is shown in Figure 9

7.4. Design Floods Estimation

The following 3 approaches are used for the estimation of design floods.

7.4.1. Rainfall – Runoff Relationship

DSI synthetic unit hydrograph (UH) and Mockus synthetic unit hydrograph(UH) methods are applied to the Doğanpınar pond catchment.

i) DSI UH method:

$qp=414/A^{0.225}(LxL_c/\sqrt{S})^{0.16}$ = 67.8 l/s/km^2/mm (yield)

Q_p=Ax qp =4.06 m^3/s/mm (peak discharge of UH_2)

V_b= Ax h_a= 59.9x1x10^{-3}=59 900 m^3 (volume of UH_2)

T_b = 3.65(V_b / Q_p) = 14.97 hr (base time of UH_2)

T_p = T_b /5 ≈ 3 hr (time to peak)

UH_2 graph is shown in Figure 10.

Computation of effective rainfall blocks with 2 hr duration is shown in Table 13. These blocks are converted to the total direct runoff hydrograph by the aid of UH_2 in Figure 10 and then superposed with 2 m^3/s base flow constant value obtained from the analysis of observed flows at SGS No: 5-65 and 5-35.

Hence total discharge hydrographs are obtained as shown in Figure 11, these hydrographs are produced by two consecutive 2 hr effective rainfall blocks.

ii) Mockus UH method

Application of this method to the pond catchment is as follows:

T_c= 0.00032x(L $^{0.77}$/S $^{0.385}$) ≈ 1.43 hr (time of concentration)

D=2T_c $^{1/2}$=2.39 hr≈2.5 hr (effective rainfall duration)

D=ΔD=2.5 hr (unit hydrograph duration)

Tp=0.5x ΔD+0.6Tc=2.11 hr

1.2. Qp= Kx A x h_a / Tp=5.90m3/s/mm(K=0.208) peak discharge of $UH_{2.5}$

Qp=4.83 m3/s(K=0.170) peak discharge of $UH_{2.5}$

$UH_{2.5}$ graph and its ordinates are presented in Figure 12.

Net rainfall blocks with 2.5 hr duration, and their surface runoff peak discharges compated by the aid of $UH_{2.5}$ are given Table 13.

Taking into account of A, Tp and D values, UH_2 obtained from DSI method is accepted as the most suitable one in the studies and hence the flood hyragraphs in Figure 11 are adopted in the hydraulic design studies of Doğanpınar pond.

7.4.2. Peak Discharge Frequency Analysis

The annual peak discharge data series and SGS No:5-35, closest to the pond axis, are analyzed by applying frequency analysis techniques and results are given in Table 14. The

values with different return periods obtained from best fit distribution, transferred to the pond site by the use of following relationship:

$$Q_{Dog} = (A_{Dog} / A_{5-35})^{2/3} \times Q_{5-35} = 0.774 \times Q_{5-35}$$

The results are given in Table 15.

7.4.3. Regional Flood Frequency Analysis

Frequency analysis of the peak discharge data series with min. 10 years observation period at SGSs in Table 7 are carried out as shown in Table 14, 16, 17,…22 and summary results are given in Table 23 with dimensionless ratios.

A-Q_2 relationship for 6 station in Table 23 is shown in Figure 13.

From figure 13, Q_2=15 m3/s is determined for pond catchment size and multiplying this figure by average dimensionless ratios in Table 23, the values given in Table 15 are obtained for Doğanpınar pond axis.

7.4.4. Comparision of Design Floods

The peak discharge values in Table 15 are compared among themselves and the hydrographs in Figure 11 are adopted for the hydraulic design of the Doğanpınar pond, taking into account the economy, safety and reliability of the project.

7.4.5. Spillway Design Hydrograph

Considering downstream conditions and storage capacity of Doğanpınar pond, 1000 yr design flood is accepted as spillway design hydrograph.

The spillway design hydrograph illustrated in Figure 14 is calculated by the use of two consecutive 1000 yr rainfall blocks in Table 13 and UH_2 in Figure 10, its peak discharge and volume are Q_p= 102.1 m^3/s and V_{1000}=2.05 hm^3 respectively.

8.TABLES

Table 1: Mean Rainfall Depths at Meteorological Stations Within Catchment and Surrounding Area, mm

GÖZLEM PERİYODU	İSTASYON	AYLAR												YILLIK TOPLAM
		Ocak	Şubat			Mayıs								
		101.0	81.9	69.8	56.0	45.1	18.3	8.6	4.6	14.0	33.5	79.1	126.4	638.3

Table 2: Annual Total Rainfall Depths Observed at Güneşli Meteorological Station

İSTASYON ADI	GÜNEŞLİ
İSTASYON KOTU (m)	640
İŞLETEN KURULUŞ	DSİ
YIL	Y TOP (mm)
1962	916.3
1963	720.0
1964	691.3
1965	926.5
1966	785.1
1968	854.7
1969	608.2
1970	745.1
1971	637.8
1972	429.9
1973	620.2
1974	651.5
1975	666.5
1976	596.6
1977	523.4
1978	745.5
1979	768.9
1980	695.5
1981	971.8
1982	497.2
1983	672.1
1984	527.6
1985	608.6
1986	675.3
1987	625.1
1988	520.3
1989	340.1
1990	476.7
1991	389.3
1992	383.1
1993	551.6
1994	492.3

N =	32
PORT.=	634.82
Sx =	157.96
P-M1 =	971.8
P-M2 =	926.5
Cs =	0.000
Cs Log =	-0.390
UDF =	N

YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			2	5	10	25	50	100
Nor. Dağ.								

Table 3: Annual Daily Max. Rainfall Depths Observad at Güneşli Station

İSTASYON ADI	
	Y MAX. (mm)
1962	71.6
1963	32.5
1964	56.0
1965	56.3
1966	45.0
1968	63.9
1969	46.7
1970	62.8
1971	38.8
1972	38.2
1973	66.6
1974	45.5
1975	61.1
1976	38.5
1977	82.3
1978	53.2
1979	55.5
1980	36.6
1981	72.2
1982	28.7
1983	55.4
1984	52.1
1985	56.3
1986	109.5
1987	77.6
1988	33.6
1989	45.1
1990	54.6
1991	25.2
1992	30.0
1993	57.8
1994	42.0

N =	32
PORT.=	52.85
Sx =	17.813
P-M1 =	109.5
P-M2 =	82.3
Cs =	0.674
Cs Log =	-0.030
UDF =	G2

YİNELENMELİ DEĞERLER										
DAĞ. İSMİ	1.11	1.25	2	5	10	25	50	100	500	1000
Nor. Dağ.										

Table 4: Mean Monthly Temperature Values at Surrounding Area of Project ,ºC

İSTASYON	GÖZLEM SÜRESİ	KOT (m)		AYLAR												Yıllık
				Ocak	Şubat	Mart	Nisan	Mayıs	Haziran	Temmuz	Ağustos	Eylül	Ekim	Kasım	Aralık	
GÖRDES	1980 - 1985, 1987 - 1997 (17 Yıl)	550	En Yüksek	16.1	18	24.6	29.5	34	37.5	40.5	38.6	36	33.5	25.5	16.8	40.5
			Ortalama	3.7	3.7	6.7	11.2	15.7	20.7	22.6	22.9	19.6	14.9	8.7	5.3	13.0
			En Düşük													
DEMİRCİ	1991 - 2005 (15 Yıl)	851	En Yüksek	17.1	17.3	26.1	28.3	30.5	35.2	38.6	37.8	35.5	30.8	26.8	20	38.6
			Ortalama	3.7	3.5	6.3	10.9	16.7	20.9	23.8	23.7	19.5	15.0	9.1	4.8	13.2
			En Düşük													
SİMAV	1960 - 2005 (46 Yıl)	809	En Yüksek	19.1	20.7	27.1	30.4	33	35.9	38.7	38.1	36.4	33.2	27.1	21.7	38.7
			Ortalama	2.3	3.2	6.0	10.5	15.3	19.2	21.8	21.3	17.2	12.5	7.7	4.2	11.8
			En Düşük													
Gölet Yağış Alanı																
Gölet Yeri (NSS)																
Sulama Alanı																

Gölet Yağış Alanı : 39^0 05'
Gölet Yeri (NSS) : 39^0 05'
Sulama Alanı : 39^0 01'

Table 5: Net Evaporation from Doğanpınar Pond Reservoir , mm

	Kot (m)	AYLAR												YILLIK
		Ocak	Şubat			Mayıs								
GÜNEŞLİ MET.İST.(DSİ)	640				111.6	162.2	234.3	297.1	300.9	220.8	118.4	44.2		1489.4
SİMAV MET. İST. (DMİ)	809	2.3	3.2	6.0	10.5	15.3	19.2	21.8	21.3	17.2	12.5	7.7	4.2	11.8
GÜNEŞLİ MET.İST.(DSİ)	640	3.2	4.0	6.8	11.4	16.1	20.1	22.6	22.1	18.0	13.3	8.5	5.1	12.6
PROJE YERİ (NSS)	808	2.3	3.2	6.0	10.5	15.3	19.2	21.8	21.3	17.2	12.5	7.7	4.2	11.8
PROJE YERİ (NSS)	808				79.7	163.7	234.5	279.8	271.2	197.9	113.8	28.8		
PROJE YERİ (NSS)	808				55.8	114.6	164.1	195.9	189.9	138.5	79.7	20.2		
PROJE YERİ YAĞIŞ	640	104.9	78.6	72.3	56.4	46.7	19.6	7.6	4.3	14.5	31.9	74.7	120.9	632.4
PROJE YERİ (NSS)	808					67.9	144.5	188.3	185.6	124.0	47.8			758.1

Table: 6 Montly Flows at SGS No: 5 - 65

DSİ ETÜD VE PLAN DAİRESİ BAŞKANLIĞI RASATLAR ŞUBE MÜDÜRLÜĞÜ													
RASAT TABLOSU													
İSTASYON İSMİ			GEÇTİN D.-DOĞANPINAR						İŞLT. İDARE	DSİ	RAKIM	786	
İSTASYON NO			5-65						BÖLGE	EGE			
İL VE İLÇESİ			MANİSA-GÖRDES						ENLM-BYLAM	**° **' - **° **'			
RASAT TÜRÜ			AYLIK AKIM (hm^3)										
YIL	EKİM	KASIM	ARALK	OCAK	ŞUBAT	MART	NİSAN	MAYIS	HAZRN	TEMMZ	AĞSTS	EYLÜL	YILLIK
1970	0.544	0.581	8.271	2.639	6.185	3.304	1.495	0.719	0.603	0.519	0.506	0.515	25.881
1971	0.625	0.723	1.415	2.156	5.548	6.947	1.625	0.650	0.556	0.522	0.529	0.665	21.961
1972	0.577	1.629	2.872	0.741	2.488	1.235	0.923	0.591	0.509	0.487	0.547	0.495	13.093
1973	0.668	0.586	0.578	0.946	3.918	1.890	1.353	0.648	0.531	0.501	0.513	0.528	12.659
1974	0.533	0.579	1.405	0.636	3.427	4.434	0.911	0.681	0.494	0.477	0.489	0.563	14.629
1975	0.524	0.964	3.533	3.568	2.848	1.115	0.880	0.783	0.540	0.493	0.493	0.494	16.236
1976	0.520	0.711	1.709	0.814	2.379	0.699	2.633	0.660	0.519	0.487	0.482	0.486	12.100
1977	0.945	1.399	3.141	2.344	1.440	1.056	0.694	0.545	0.492	0.477	0.477	0.490	13.501
1978	1.019	0.601	1.389	7.349	5.904	2.405	2.321	1.867	0.477	0.474	0.473	0.529	24.810
1979	0.547	0.760	0.642	3.233	1.252	0.659	0.589	0.638	0.533	0.502	0.501	0.507	10.362
1980	0.536	0.609	1.358	5.455	1.062	2.848	0.825	0.683	0.594	0.512	0.512	0.530	15.524
1981	0.537	0.672	3.064	11.861	1.604	1.753	0.564	0.531	0.485	0.476	0.481	0.502	22.531
1982	0.515	1.488	13.538	1.534	1.434	1.825	1.892	1.909	0.553	0.529	0.490	0.486	26.194
1983	0.543	0.599	1.544	1.019	2.643	0.753	0.649	0.587	0.523	0.519	0.503	0.504	10.387
1984	0.275	1.612	1.365	4.376	11.402	7.262	6.306	2.016	0.633	0.280	0.216	0.209	35.952
1985	0.216	0.732	0.623	4.290	2.212	2.849	1.250	0.579	0.234	0.058	0.025	0.044	13.112
1986	0.520	1.753	0.784	6.922	3.196	1.990	0.688	0.578	0.510	0.478	0.472	0.499	18.390
1987	0.537	0.575	1.218	4.781	2.027	1.045	0.954	0.786	0.602	0.518	0.472	0.502	14.017
1988	0.556	1.445	2.166	1.136	1.308	7.649	1.287	0.843	0.725	0.575	0.562	0.620	18.872
1989	0.153	0.722	2.643	1.209	0.729	1.364	0.659	0.605	0.126	0.027	0.019	0.046	8.301
1990	0.197	0.828	1.920	1.008	2.647	1.453	0.719	0.374	0.115	0.020	0.019	0.028	9.329
1991	0.039	0.107	2.858	0.925	1.004	0.826	1.940	2.355	0.894	0.264	0.137	0.178	11.527
1992	0.217	0.240	0.680	0.968	0.781	5.102	3.293	0.703	0.251	0.070	0.023	0.027	12.354
1993	0.134	0.659	0.888	0.992	4.355	6.701	3.866	1.101	0.303	0.440	0.063	0.032	19.531
1994	0.085	0.356	1.875	1.398	3.013	2.519	1.949	1.494	0.266	0.030	0.022	0.020	13.028
1995	0.159	0.384	1.361	6.024	2.002	7.183	6.304	1.222	0.251	0.101	0.022	0.100	25.111
1996	0.125	1.131	1.846	1.555	6.669	3.794	3.904	1.274	0.425	0.075	0.036	0.088	20.922
1997	0.188	0.876	1.084	2.935	0.873	2.161	10.475	1.104	0.158	0.019	0.019	0.019	19.911
1998	0.840	0.885	6.798	5.270	5.337	7.982	3.863	4.634	1.117	0.386	0.123	0.083	37.319
1999	0.335	3.027	4.944	4.964	15.589	7.290	3.365	0.787	0.566	0.090	0.039	0.048	41.045
2000	0.125	0.454	1.072	2.329	6.285	5.090	3.339	1.104	0.177	0.019	0.019	0.019	20.032
2001	0.230	0.243	0.557	0.330	0.461	0.462	0.985	0.723	0.158	0.019	0.019	0.022	4.209
2002	0.019	0.666	10.610	6.723	2.228	3.810	7.294	1.586	0.594	0.060	0.019	0.019	33.628

Table 6 Continued:

2003	**0.371**	**1.046**	**1.427**	**2.491**	**8.296**	**7.164**	**6.434**	**1.517**	**0.534**	**0.094**	**0.025**	**0.222**	29.622
2004	**0.251**	**0.616**	**1.192**	**4.060**	**5.002**	**6.188**	**1.086**	**0.583**	**0.218**	**0.070**	**0.022**	**0.019**	19.308
2005	0.000	0.000	0.000	0.335	4.767	7.789	1.218	0.770	1.231	2.177	2.556	0.942	21.786
2006	0.071	0.266	1.233	2.781	7.254	8.975	1.226	0.344	0.449	0.058	0.044	0.043	22.744
Ort	**0.386**	**0.825**	**2.530**	**3.030**	**3.772**	**3.718**	**2.426**	**1.043**	**0.485**	**0.349**	**0.324**	**0.301**	**19.187**

Not: 1970 - 2004 yılları aylık akımları (5-65) AGİ ile (5-35) AGİ aylık akımları lineer korelasyonundan; (y = 1.1117 X + 0.0193: R= 0.991)

Table 7: Characteristic Values of SGSs Located within Project Area and Surrounding Area

İSTASYON NO	İSTASYON ADI	İŞLETEN	AÇILIŞ TARİHİ	KAPANIŞ TARİHİ	YAĞIŞ ALANI (km^2)	İSTASYON KOTU	SEVİYE ÖLÇEĞİ		Değerlendirilen Yıllar
							Eşel	Lim	
5 - 65	Geçtindere - Doğanpınar	DSİ	(14.05.2004' te Münferit) 15.01.2005		59.9	786	X	X	2005 - 2006
5 - 35*	İn Deresi - Güneşli	DSİ	10.01.1983		88.0	598	X	X	1984 - 85, 1989 - 96, 1998 - 99, 2001, 2003 - 2006
5 - 43*	Cemaldere - Kayganlı								1991-2003
5 - 26	Sarma Ç. - Sarma	DSİ	1969		52.3	117	X	X	1970-94, 1996-2005
5 - 28*	Gördes Ç. - Hacıhıdır								
									1980 - 2004
520*	Gördes Ç. - Çömlekçi	EİE							1969 - 1978
5 - 04 (512)	Kum Ç. - Çömlekçi	DSİ							1952-1960
5 - 34*	Gördes Ç. - Maden Çeşmesi	DSİ							1983-1998
5 - 44	Demirbüken - Başlamış								1996-2001
5 - 15*	Medar Ç. - Medar Köprüsü	DSİ							1967-1997
509 (5 - 14)*	Medar Ç. - Kayalıoğlu								1952-54, 1962-2004

Table 8: Monthly Flows at SGS No: 5 - 35

DSİ ETÜD VE PLAN DAİRESİ BAŞKANLIĞI RASATLAR ŞUBE MÜDÜRLÜĞÜ													
RASAT TABLOSU													
İSTASYON İSMİ	İN DERESİ-GÜNEŞLİ							İŞLT. İDARE	DSİ	RAKIM	598		
İSTASYON NO	5-35							BÖLGE	EGE				
İL VE İLÇESİ	MANİSA-GÖRDES							ENLM-BYLAM	39° 03' - 28° 22'				
RASAT TÜRÜ	AYLIK AKIM (hm^3)												
YIL	EKİM	KASIM	ARALK	OCAK	ŞUBAT	MART	NİSAN	MAYIS	HAZRN	TEMMZ	AĞSTS	EYLÜL	YILLIK
1970	0.472	0.505	7.423	2.356	5.546	2.955	1.327	0.629	0.525	0.450	0.438	0.446	23.072
1971	0.545	0.633	1.255	1.922	4.973	6.232	1.445	0.567	0.482	0.453	0.458	0.581	19.546
1972	0.502	1.448	2.566	0.649	2.221	1.093	0.813	0.514	0.441	0.421	0.475	0.428	11.570
1973	0.583	0.509	0.503	0.834	3.507	1.682	1.199	0.565	0.461	0.433	0.444	0.458	11.179
1974	0.462	0.503	1.246	0.555	3.065	3.972	0.802	0.595	0.427	0.412	0.423	0.489	12.951
1975	0.454	0.850	3.161	3.192	2.545	0.985	0.774	0.687	0.469	0.426	0.426	0.427	14.396
1976	0.450	0.622	1.520	0.715	2.123	0.612	2.351	0.576	0.449	0.421	0.416	0.420	10.676
1977	0.832	1.241	2.808	2.091	1.278	0.933	0.607	0.473	0.426	0.412	0.412	0.424	11.936
1978	0.899	0.523	1.232	6.594	5.294	2.146	2.070	1.662	0.412	0.409	0.408	0.459	22.109
1979	0.474	0.666	0.560	2.891	1.109	0.576	0.512	0.557	0.462	0.434	0.433	0.439	9.113
1980	0.465	0.530	1.204	4.890	0.938	2.545	0.725	0.597	0.517	0.443	0.443	0.459	13.756
1981	0.466	0.587	2.739	10.651	1.425	1.559	0.490	0.461	0.419	0.411	0.416	0.435	20.058
1982	0.446	1.321	12.160	1.362	1.272	1.624	1.685	1.700	0.480	0.459	0.424	0.420	23.354
1983	0.471	0.522	1.372	0.899	2.361	0.660	0.566	0.511	0.453	0.450	0.435	0.436	9.135
1984	0.230	1.433	1.210	3.919	10.239	6.515	5.655	1.796	0.552	0.234	0.177	0.171	32.131
1985	0.177	0.641	0.543	3.841	1.973	2.545	1.107	0.503	0.193	0.035	0.005	0.022	11.586
1986	0.450	1.559	0.688	6.209	2.858	1.773	0.601	0.503	0.442	0.413	0.408	0.431	16.334
1987	0.466	0.500	1.078	4.283	1.806	0.923	0.841	0.690	0.524	0.449	0.407	0.434	12.400
1988	0.483	1.283	1.931	1.004	1.160	6.863	1.140	0.741	0.634	0.500	0.488	0.540	16.768
1989	0.120	0.632	2.360	1.070	0.638	1.210	0.575	0.527	0.096	0.007	0.000	0.024	7.259
1990	0.159	0.728	1.710	0.889	2.364	1.290	0.629	0.319	0.086	0.001	0.000	0.007	8.183
1991	0.018	0.079	2.553	0.815	0.886	0.726	1.728	2.101	0.786	0.220	0.106	0.142	10.160
1992	0.178	0.198	0.594	0.853	0.685	4.572	2.945	0.615	0.209	0.046	0.003	0.007	10.905
1993	0.103	0.575	0.781	0.875	3.900	6.010	3.460	0.973	0.255	0.378	0.039	0.011	17.360
1994	0.059	0.303	1.670	1.240	2.693	2.248	1.736	1.327	0.222	0.010	0.002	0.001	11.511
1995	0.125	0.328	1.207	5.402	1.783	6.444	5.653	1.082	0.208	0.073	0.002	0.072	22.380
1996	0.095	1.000	1.644	1.381	5.982	3.396	3.494	1.128	0.365	0.050	0.015	0.062	18.612
1997	0.152	0.771	0.958	2.623	0.768	1.927	9.406	0.976	0.125	0.000	0.000	0.000	17.705
1998	0.738	0.779	6.098	4.723	4.783	7.163	3.457	4.151	0.988	0.330	0.093	0.057	33.361
1999	0.284	2.705	4.430	4.448	14.005	6.540	3.009	0.691	0.491	0.064	0.018	0.026	36.712
2000	0.095	0.391	0.947	2.078	5.636	4.561	2.986	0.976	0.142	0.000	0.000	0.000	17.811
2001	0.189	0.201	0.484	0.280	0.397	0.399	0.868	0.633	0.125	0.000	0.000	0.002	3.578

Table 8 Continued :

2002	**0.000**	**0.582**	**9.527**	**6.030**	**1.987**	**3.410**	**6.544**	**1.410**	**0.517**	**0.060**	**0.000**	**0.000**	30.067
2003	0.317	0.924	1.266	2.223	7.445	6.427	5.770	1.347	0.463	0.067	0.005	0.182	26.437
2004	0.208	0.537	1.055	3.635	4.482	5.549	0.960	0.507	0.179	0.046	0.003	0.000	17.160
2005	0.000	0.204	0.191	1.212	4.880	6.462	1.280	0.887	0.419	0.293	0.168	0.000	15.996
2006	0.051	0.390	0.840	1.236	6.448	8.061	1.329	0.752	0.228	0.228	0.000	0.000	19.561
Ort.	**0.330**	**0.735**	**2.257**	**2.699**	**3.391**	**3.313**	**2.177**	**0.939**	**0.397**	**0.258**	**0.216**	**0.230**	**16.941**

Not: 1970 - 1983, 1986 - 1988, yılları aylık akımları; (5-35) AGİ ile (5-26) AGİ aylık akımları lineer korelasyonundan

Table 9: Monthly flows at SGS No : 5 - 43

DSİ ETÜD VE PLAN DAİRESİ BAŞKANLIĞI
RASATLAR ŞUBE MÜDÜRLÜĞÜ

RASAT TABLOSU

İSTASYON İSMİ	**CEMAL D.-KAYGANLI**	**İŞLT. İDARE**	**DSİ**	**RAKIM**	**290**
İSTASYON NO	**5-43**	**BÖLGE**	**EGE**		
İL VE İLÇESİ		**ENLM-BYLAM**	**39° 07' - 28° 00'**		
RASAT TÜRÜ	**AYLIK AKIM (hm^3)**				

YIL	EKİM	KASIM	ARALK	OCAK	ŞUBAT	MART	NİSAN	MAYIS	HAZRN	TEMMZ	AĞSTS	EYLÜL	YILLIK
1991	0.163	0.354	4.480	1.640	1.370	0.962	2.340	1.700	0.650	0.126	0.001	0.019	**13.805**
1992	0.123	0.290	0.923	0.961	0.560	2.670	1.620	0.329	0.133	0.052	0.018	0.000	**7.679**
1993	1.142	0.631	1.160	1.238	2.960	2.910	1.730	0.877	0.315	0.083	0.001	0.011	**13.058**
1994	0.039	0.069	0.996	0.676	1.760	0.639	0.377	0.185	0.041	0.001	0.000	0.000	**4.783**
1995	0.015	0.047	0.579	3.430	1.510	4.440	4.010	0.705	0.083	0.011	0.000	0.022	**14.852**
1996	0.039	0.613	0.968	0.851	3.990	3.316	2.662	0.492	0.154	0.018	0.000	0.148	**13.252**
1997	0.118	0.527	0.650	1.750	0.525	1.290	6.230	0.662	0.100	0.016	0.009	0.016	**11.893**
1998	0.903	0.294	4.750	3.790	3.120	2.310	1.490	2.840	0.268	0.052	0.021	0.027	**19.865**
1999	0.125	1.640	2.660	2.460	7.900	3.590	1.930	0.506	0.251	0.107	0.029	0.029	**21.227**
2000	0.080	0.276	0.643	1.390	3.740	3.030	1.990	0.662	0.111	0.005	0.000	0.000	**11.927**
2001	0.042	0.078	0.189	0.311	0.647	0.183	0.501	0.676	0.045	0.006	0.000	0.002	**2.680**
2002	0.015	0.402	6.310	4.000	1.330	2.270	4.340	0.949	0.359	0.057	0.014	0.049	**20.095**
2003	0.203	0.597	0.860	1.536	4.791	4.736	3.379	1.055	0.219	0.021	0.001	0.007	**17.405**
Ort.	**0.231**	**0.448**	**1.936**	**1.849**	**2.631**	**2.488**	**2.508**	**0.895**	**0.210**	**0.043**	**0.007**	**0.025**	**13.271**

Table 10: Monthly Flows at SGS No : 5 - 26

DSİ ETÜD VE PLAN DAİRESİ BAŞKANLIĞI RASATLAR ŞUBE MÜDÜRLÜĞÜ													
RASAT TABLOSU													
İSTASYON İSMİ	SARMA Ç.-SARMA							İŞLT. İDARE	DSİ	RAKIM	117		
İSTASYON NO	5-26							BÖLGE	EGE				
İL VE İLÇESİ	MANİSA							ENLM-BYLAM	38° 46' - 27° 24'				
RASAT TÜRÜ	AYLIK AKIM (hm^3)												
YIL	EKİM	KASIM	ARALK	OCAK	ŞUBAT	MART	NİSAN	MAYIS	HAZRN	TEMMZ	AĞSTS	EYLÜL	YILLIK
1970	0.062	0.093	6.532	1.816	4.785	2.373	0.858	0.209	0.111	0.041	0.031	0.038	16.950
1971	0.130	0.212	0.791	1.412	4.252	5.423	0.968	0.151	0.072	0.044	0.050	0.164	13.668
1972	0.090	0.971	2.011	0.227	1.690	0.641	0.380	0.101	0.033	0.014	0.065	0.021	6.244
1973	0.166	0.097	0.091	0.399	2.887	1.189	0.739	0.149	0.052	0.026	0.036	0.049	5.880
1974	0.053	0.091	0.783	0.139	2.476	3.319	0.370	0.177	0.020	0.006	0.016	0.078	7.529
1975	0.045	0.414	2.565	2.594	1.992	0.540	0.343	0.262	0.059	0.020	0.019	0.021	8.874
1976	0.042	0.202	1.038	0.289	1.599	0.192	1.811	0.159	0.041	0.015	0.010	0.014	5.412
1977	0.398	0.778	2.237	1.569	0.812	0.491	0.188	0.063	0.019	0.006	0.006	0.017	6.585
1978	0.460	0.110	0.770	5.760	4.550	1.620	1.550	1.170	0.006	0.004	0.003	0.050	16.053
1979	0.064	0.243	0.144	2.314	0.655	0.159	0.100	0.141	0.053	0.027	0.026	0.032	3.957
1980	0.056	0.116	0.744	4.174	0.496	1.991	0.298	0.179	0.104	0.036	0.035	0.050	8.279
1981	0.057	0.170	2.172	9.537	0.950	1.074	0.079	0.052	0.013	0.005	0.010	0.027	14.145
1982	0.038	0.853	10.941	0.891	0.807	1.135	1.191	1.205	0.070	0.050	0.017	0.014	17.212
1983	0.061	0.109	0.900	0.460	1.820	0.237	0.150	0.098	0.045	0.041	0.028	0.029	3.978
1984	0.068	2.889	2.813	6.571	2.503	2.412	3.222	0.236	0.089	0.072	0.030	0.029	20.934
1985	0.067	0.112	0.148	0.806	0.269	0.523	0.258	0.097	0.034	0.024	0.013	0.024	2.376
1986	0.042	1.074	0.263	5.402	2.283	1.273	0.182	0.091	0.034	0.007	0.002	0.024	10.678
1987	0.056	0.088	0.627	3.610	1.304	0.482	0.405	0.265	0.111	0.041	0.002	0.027	7.017
1988	0.072	0.817	1.420	0.558	0.702	6.011	0.684	0.313	0.213	0.088	0.078	0.126	11.082
1989	0.209	1.030	2.650	0.216	0.143	1.970	0.099	0.082	0.042	0.029	0.022	0.024	6.516
1990	0.074	0.193	2.045	0.215	1.018	0.194	0.569	0.077	0.063	0.039	0.039	0.061	4.586
1991	0.060	0.079	2.799	0.733	0.171	0.209	0.148	0.907	0.104	0.028	0.018	0.029	5.285
1992	0.061	0.089	0.423	0.107	0.111	0.312	0.153	0.064	0.033	0.032	0.013	0.024	1.420
1993	0.062	0.391	1.700	0.733	1.990	3.030	1.800	0.284	0.057	0.006	0.003	0.010	10.066
1994	0.036	0.102	2.277	0.658	1.701	0.387	0.141	0.079	0.025	0.009	0.000	0.004	5.420
1995	**0.000**	**0.102**	**0.733**	**3.743**	**1.146**	**4.491**	**3.924**	**0.643**	**0.016**	**0.000**	**0.000**	**0.000**	**14.799**
1996	0.038	1.968	0.969	0.233	6.520	0.738	1.327	0.104	0.028	0.008	0.022	0.114	12.070
1997	0.069	0.227	0.133	2.077	0.056	1.699	3.231	0.345	0.159	0.067	0.068	0.078	8.209
1998	0.234	0.460	7.003	5.075	2.111	2.833	0.236	1.385	0.095	0.027	0.015	0.036	19.511
1999	0.116	3.221	3.194	3.701	11.416	1.484	0.758	0.109	0.037	0.015	0.022	0.036	24.109
2000	0.158	1.131	1.601	1.610	3.546	1.256	1.861	0.223	0.050	0.018	0.023	0.043	11.522
2001	0.066	0.126	0.128	0.307	1.725	0.150	0.194	1.096	0.042	0.015	0.059	0.045	3.953
2002	0.042	0.053	4.560	1.280	0.217	1.340	1.060	0.150	0.086	0.031	0.000	0.122	8.941

Table 10 Continued:

2003	0.090	0.802	0.273	1.988	4.904	0.434	0.905	0.311	0.077	0.005	0.010	0.038	9.837
2004	0.055	0.142	0.235	3.336	0.725	0.254	0.145	0.095	0.053	0.017	0.022	0.047	5.126
2005	0.070	0.103	0.085	0.305	2.534	1.469	0.099	0.051	0.125	0.011	0.013	0.041	4.906
Ort.	**0.096**	**0.546**	**1.883**	**2.079**	**2.135**	**1.482**	**0.845**	**0.309**	**0.063**	**0.026**	**0.023**	**0.044**	**9.531**

Not: 1995 yılı aylık akım değerleri; (5-26) - (5-35) AGİ'lerin Aylık Akımları lineer Korelasyonundan (y = 0.7177 X - 0.1334, R= 0.878)

Table 11 Crop Pattern Data

Bitki Cinsi	Büyüme Süreci	Bitki Deseni	Sulama Sistemi
Hububat	25-10/15-7	19	Yağmurlama
Mısır (1. ürün)	10-05/20-09	8	Yağmurlama
Hasıl Mısır (1. ürün)	15-04/20-07	11	Yağmurlama
Haşhaş	15-10/20-07	8	Damlatmalı
Fasulye ve Bakliyat	15-04/20-08	6	Damlatmalı
Sebze	15-04/20-08	19	Damlatmalı
Bostan	01-04/31-07	5	Damlatmalı
Yonca	30-03/25-11	10	Yağmurlama
Meyve	30-03/25-11	8	Damlatmalı
Bağ	30-3/25-11	6	Damlatmalı
Sebze 2. ürün	20-07/15-11	6	Damlatmalı
Hasıl Mısır 2. ürün	20-07/15-10	6	Yağmurlama
		112	

Tablo 12: Operation Studies of Doğanpınar Pond

					a1= 0.1756		Hmax	25.00 m
Max.Dep	2.516	Unit=hm3			b1= 0.5528		Hmin	17.55 m
Min. Dep	0.838	Alan(km2)=a1*(V)^b1			a2= 19.6010		Sulama Al	493.0 ha
Aktif Dep	1.678	H(m)=a2*(V)^b2			b2= 0.2882		Sulama Su	1.887 hm³
		Havzasın-dan Gelen su	Ay başı depolama	Buharlaşma		Sızma	Dolusavak Suyu	Sulama suyu
Yıl	Ay	(hm3)	hm³	mm	hm³	hm³	hm³	hm³
2004	10	0.251	2.395	45.7	0.013	0.016	0.18	0.037
	11	0.616	2.516	0	0.000	0.017	0.60	0.000
	12	1.192	2.516	0	0.000	0.017	1.18	0.000
	1	4.060	2.516	0	0.000	0.017	4.04	0.000
	2	5.002	2.516	0	0.000	0.017	4.99	0.000
	3	6.188	2.516	0	0.000	0.017	6.17	0.000
	4	1.086	2.516	0	0.000	0.017	1.07	0.000
	5	0.583	2.516	67.9	0.020	0.017	0.44	0.109
	6	0.218	2.516	143.9	0.042	0.017	0.00	0.525
	7	0.070	2.150	183.0	0.049	0.014	0.00	0.620
	8	0.022	1.536	181.3	0.040	0.010	0.00	0.408
	9	0.019	1.099	118.8	0.022	0.007	0.00	0.187
Toplam		19.307		740.60	0.186	0.182	18.67	1.887
2005	10	0.000	0.902	45.7	0.008	0.006	0.00	0.037
	11	0.000	0.851	0	0.000	0.006	0.00	0.000
	12	0.000	0.845	0	0.000	0.006	0.00	0.000
	1	0.335	0.840	0	0.000	0.006	0.00	0.000
	2	4.767	1.169	0	0.000	0.008	4.76	0.000
	3	7.789	2.516	0	0.000	0.017	7.77	0.000
	4	1.218	2.516	0	0.000	0.017	1.20	0.000
	5	0.770	2.516	67.9	0.020	0.017	0.62	0.109
	6	1.231	2.516	143.9	0.042	0.017	0.65	0.525
	7	2.177	2.516	183	0.054	0.017	1.49	0.620
	8	2.556	2.516	181.3	0.053	0.017	2.08	0.408
	9	0.942	2.516	118.8	0.035	0.017	0.70	0.187
Toplam		21.785		740.60	0.211	0.148	19.27	1.887
2006	10	0.071	2.516	45.7	0.013	0.017	0.00	0.037
	11	0.266	2.516	0	0.000	0.017	0.25	0.000
	12	1.233	2.516	0	0.000	0.017	1.22	0.000
	1	2.781	2.516	0	0.000	0.017	2.76	0.000
	2	7.254	2.516	0	0.000	0.017	7.24	0.000
	3	8.975	2.516	0	0.000	0.017	8.96	0.000
	4	1.226	2.516	0	0.000	0.017	1.21	0.000
	5	0.344	2.516	67.9	0.020	0.017	0.20	0.109
	6	0.449	2.516	143.9	0.042	0.017	0.00	0.525
	7	0.058	2.381	183	0.052	0.016	0.00	0.620
	8	0.044	1.751	181.3	0.043	0.012	0.00	0.408
	9	0.043	1.331	118.8	0.024	0.009	0.00	0.187
Toplam		22.744		740.60	0.195	0.187	21.84	1.887

Not= Sulama suyu miktarı (hm3) = Sulama alanı(ha) *3827.24/1000000

Notice: Net evaporation values listed in above table must be replaced by the similar values in Table 5.

Table 13: Calculation of 2 hr and 2.5 hr Duration Effective Rainfall Blocks

							Günlük Yağış Yineleme Değerleri							
							2	5	10	25	50	100	500	1000
Uygulanan Yöntem	T (sa)	%	MF	YADK	PLV (Simav)	Son Çarpım	50.9	67	76.6	87.8	95.5	102.8	118.7	125.2
DSİ Sentetik Birim Hidrograf	2	1	1.13	0.92	0.48	0.499	25.4	33.4	38.2	43.8	47.7	51.3	59.2	62.5
	4	1	1.13	0.95	0.59	0.633	32.2	42.4	48.5	55.6	60.5	65.1	75.2	79.3
	6	1	1.13	0.96	0.68	0.738	37.5	49.4	56.5	64.8	70.4	75.8	87.6	92.4
	12	1	1.13	0.97	0.81	0.888	45.2	59.5	68.0	78.0	84.8	91.3	105.4	111.2
Mockus Birim Hidrograf	2.5	1	1.13	0.935	0.51	0.539	27.4	36.1	41.3	47.3	51.5	55.4	64.0	67.5

2 ve 2.5 SAAT SÜRELİ NET AKIŞ BLOKLARI

Yineleme (Yıl)	Toplam Süre 2 sa	Toplam Süre 2.5 sa	Toplam Süre 4 sa		Toplam Süre 6 sa			Toplam Süre 2 sa	Toplam Süre 2.5 sa		Toplam Süre 4 sa	Toplam Süre 6 sa
									K_1=0.208 Q_p=5.90	K_2=0.17 Q_p=4.83		
	1. Blok	1. Blok	1. Blok	2. Blok	1. Blok	2. Blok	3. Blok	Pik Debi m^3/s	Pik Debi m^3/s	Pik Debi m^3/s	Pik Debi m^3/s	Pik Debi m^3/s
2	1.78	2.37	1.37	2.69	1.15	2.80	2.37	7.2	14.0	11.4	13.7	17.5
5	4.53	5.67	3.74	4.92	3.30	5.18	4.01	18.4	33.5	27.4	27.6	32.8
10	6.61	8.11	5.57	6.37	4.97	6.72	5.05	26.8	47.8	39.2	37.3	43.0
25	9.38	11.28	8.02	8.13	7.24	8.60	6.30	38.1	66.6	54.5	49.6	55.6
50	11.50	13.68	9.88	9.38	8.96	9.94	7.17	46.7	80.7	66.2	59.3	64.8
100	13.56	16.04	11.75	10.58	10.71	11.22	8.01	55.1	94.6	77.5	68.9	73.9
500	18.44	21.61	16.17	13.25	14.84	14.08	9.85	74.9	127.5	104.4	91.0	95.5
1000	20.60	24.00	18.09	14.25	16.64	15.27	10.60	83.6	143.8	115.9	100.1	104.6

Table 14: Peak Discharges Observed at SGS No: 5 – 35 (m^3 / s)

İSTASYON NO	
1984	31.0
1985	11.00
1989	2.60
1990	6.65
1991	8.20
1992	8.89
1993	8.43
1994	8.20
1995	9.81
1996	9.35
1998	9.81
1999	9.81
2001	1.34
2003	36.5
2004	6.22
2005	11.2
2006	40.5

N =	17
QORT.=	12.912
Sx =	11.45
Q-M1 =	40.5
Q-M2 =	36.5
Cs =	3.358
Cs Log =	-0.286
UDF =	LN2

YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			10	25	50	100	500	1000
Nor. Dağ.								
Gumbel	11.25	23.73	31.99	42.44	50.18	52.87	75.64	83.28

Table 15: Peak Discharges of Different Return Period for Doğanpınar Pond Catchment (m^3/s)

Yineleme Yılı	DSİ Sentetik B.H.	Mockus BH Yöntemi (K=0.170, 2.0 m^3/s baz akım ilaveli)	Hidrolojik Benzeşim	Bölgesel Taşkın
Q_2	15.7	13.4	7.50	15.0
Q_5	29.6	29.4	14.2	27.2
Q_{10}	39.3	41.2	19.9	36.3
Q_{25}	51.6	56.5	28.4	48.8
Q_{50}	61.3	68.1	35.7	58.7
Q_{100}	70.9	79.5	44.0	69.0
Q_{500}	93.0	106.4	67.0	95.3
Q_{1000}	102.1	117.9	78.7	107.7

Table 16:Peak Discharges Observed at SGS No: 5 – 43 (m^3 / s)

İSTASYON NO	
1991	15.1
1992	4.60
1993	7.13
1994	6.13
1995	20.4
1996	8.66
1997	11.5
1998	16.0
1999	14.5
2000	14.5
2001	1.30
2002	23.0
2003	4.92
2005	66.6
2006	26.4

N =	15
QORT.=	16.049
Sx =	15.723
Q-M1 =	66.6
Q-M2 =	26.4
Cs =	-0.478
Cs Log =	-0.478
UDF =	LP3

YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			10	25	50	100	500	1000
Nor. Dağ.								

Tablo 17:Peak Discharges Observed at SGS No: 509 (m^3 / s)

İSTASYON NO	
1952	95.3
1953	45.30
1954	14.40
1962	112.00
1963	230.00
1964	120.00
1965	406.00
1966	140.00
1967	138.00
1968	262.00
1969	73.60
1970	247.00
1971	243.00
1972	130.0
1973	83.80
1974	240.0
1975	88.1
1976	87.4
1977	46.3
1978	180.0
1979	184.0
1980	98.5
1981	350.0
1982	433.0
1983	52.3
1984	135.0
1985	20.7
1986	46.1
1987	199.0
1988	69.0
1989	16.9
1990	49.0
1991	124.0
1992	19.0
1993	55.0
1994	58.0
1995	115.0
1996	88.0
1997	109.0
1998	152.0
1999	155.0
2000	152.0
2001	15.0
2002	152.0
2003	134.0
2004	131.0

N =	46
QORT.=	132.490
Sx =	96.668
Q-M1 =	433
Q-M2 =	406
Cs =	1.365
Cs Log =	-0.683
UDF =	LN3

YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			10	25	50	100	500	1000
Nor. Dağ.								

Tablo 18: Peak Discharges Observed at SGS No: 520

İSTASYON NO	
1969	86.8
1970	514.00
1971	240.00
1972	252.00
1973	294.00
1974	466.00
1975	276.00
1976	46.20
1977	213.00
1978	224.00

N =	10
QORT.=	261.200
Sx =	144.54
Q-M1 =	514
Q-M2 =	466
Cs =	0.431
Cs Log =	-1.196
UDF =	LN3

YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			10	25	50	100	500	1000
Nor. Dağ.								

Tablo 19: Peak Discharges Observed at SGS No:5 - 34

İSTASYON NO	
1983	56.0
1984	520.00
1985	125.00
1986	135.00
1987	490.0
1988	58.00
1989	71.8
1990	190.0
1991	234.0
1992	31.0
1993	119.00
1994	73.1
1995	136.00
1996	136.0
1997	126.0
1998	164.0

N =	16
QORT.=	166.556
Sx =	142.182
Q-M1 =	520
Q-M2 =	490
Cs =	3.183
Cs Log =	0.254
UDF =	LN2

YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			10	25	50	100	500	1000
Nor. Dağ.								
Gumbel	146.02	302.39	405.92	536.73	633.77	730.09	952.68	1048.36

Tablo 20 : Peak Discharges Observed at SGS No: 5 - 15

SUYUN ADI	Medar ç.
İSTASYON ADI	
1967	140.0
1971	97.00
1972	150.00
1973	46.00
1974	260.0
1975	61.00
1976	76.0
1977	60.0
1978	125.0
1979	68.0
1980	125.00
1981	200.0
1982	360.00
1983	105.0
1984	165.0
1985	25.0
1986	75.0
1987	330.0
1988	120.0
1989	44.8
1990	56.6
1991	163.0
1992	20.1
1993	72.0
1994	10.6
1995	176.0
1996	77.0
1997	117.0

N =	16
QORT.=	118.754
Sx =	86.239
Q-M1 =	360
Q-M2 =	330
Cs =	-0.686
Cs Log =	-0.686
UDF =	LP3

YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			10	25	50	100	500	1000
Nor. Dağ.								
Gumbel	105.66	194.14	252.72	326.74	381.65	436.16	562.11	616.26

Tablo 21 : Peak Discharges Observed at SGS No: 5 - 28

İSTASYON NO	
1979	175.0
1980	280.00
1981	165.00
1982	380.00
1983	49.0
1984	195.00
1985	44.0
1986	86.0
1987	270.0
1988	90.0
1989	41.00
1990	61.0
1991	72.00
1992	33.0
1993	85.1
1994	21.3
1995	93.0
1996	97.5

N =	18
QORT.=	124.378
Sx =	100.158
Q-M1 =	380
Q-M2 =	280
Cs =	0.084
Cs Log =	0.084
UDF =	LP3

YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			10	25	50	100	500	1000
Nor. Dağ.								
Gumbel	109.73	218.04	289.76	380.37	447.59	514.31	668.50	734.79

Tablo 22 : Peak Discharges Observed at SGS No: 527

İSTASYON NO	
1980	390.0
1981	653.00
1982	1555.00
1983	170.00
1984	469.00
1985	86.00
1986	129.00
1987	444.00
1988	145.00
1989	68.70
1990	176.00
1991	202.00
1992	28.30
1993	176.0
1994	60.10
1995	107.0
1996	149.0
1997	144.0
1998	268.0
1999	353.0
2000	169.0
2001	23.1
2002	209.0
2003	380.0
2004	160.0

N =	25
QORT.=	268.568
Sx =	308.886
Q-M1 =	1555
Q-M2 =	653
Cs =	4.972
Cs Log =	-0.114
UDF =	LN2

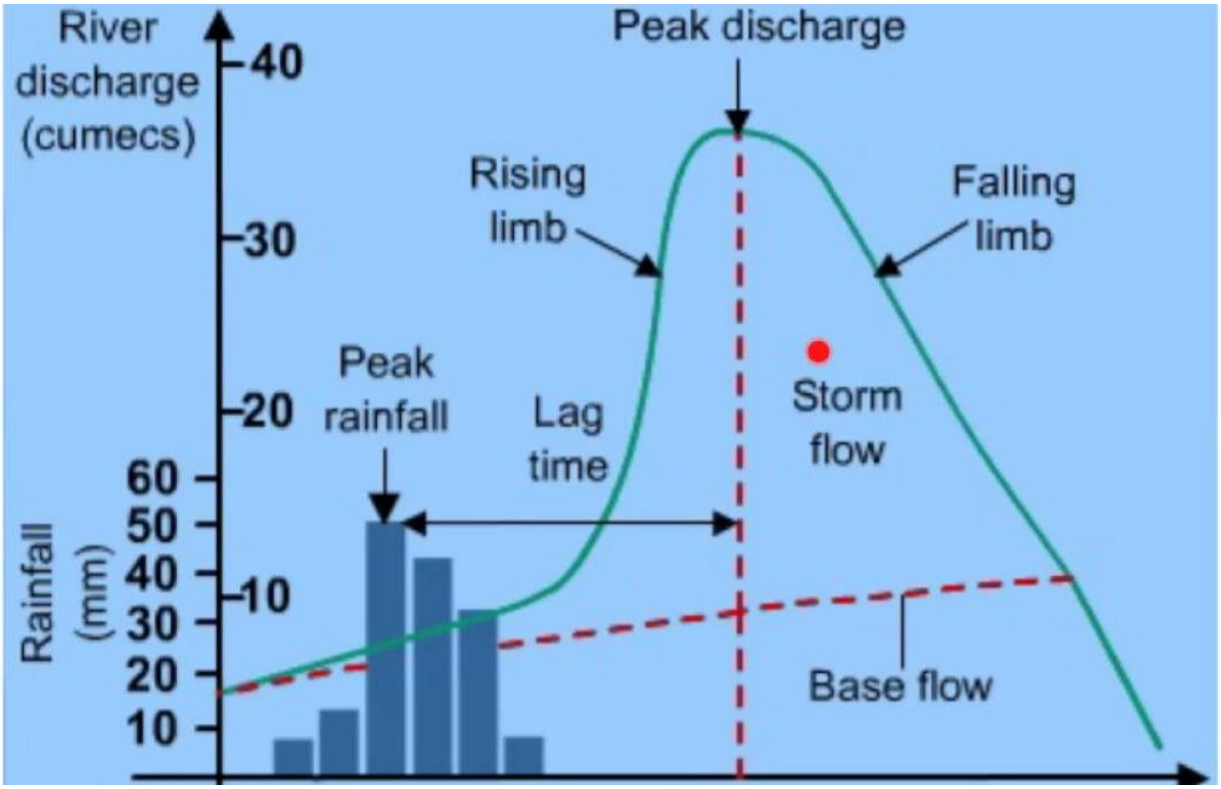
YİNELENMELİ DEĞERLER								
DAĞ. İSMİ			10	25	50	100	500	1000
Nor. Dağ.								

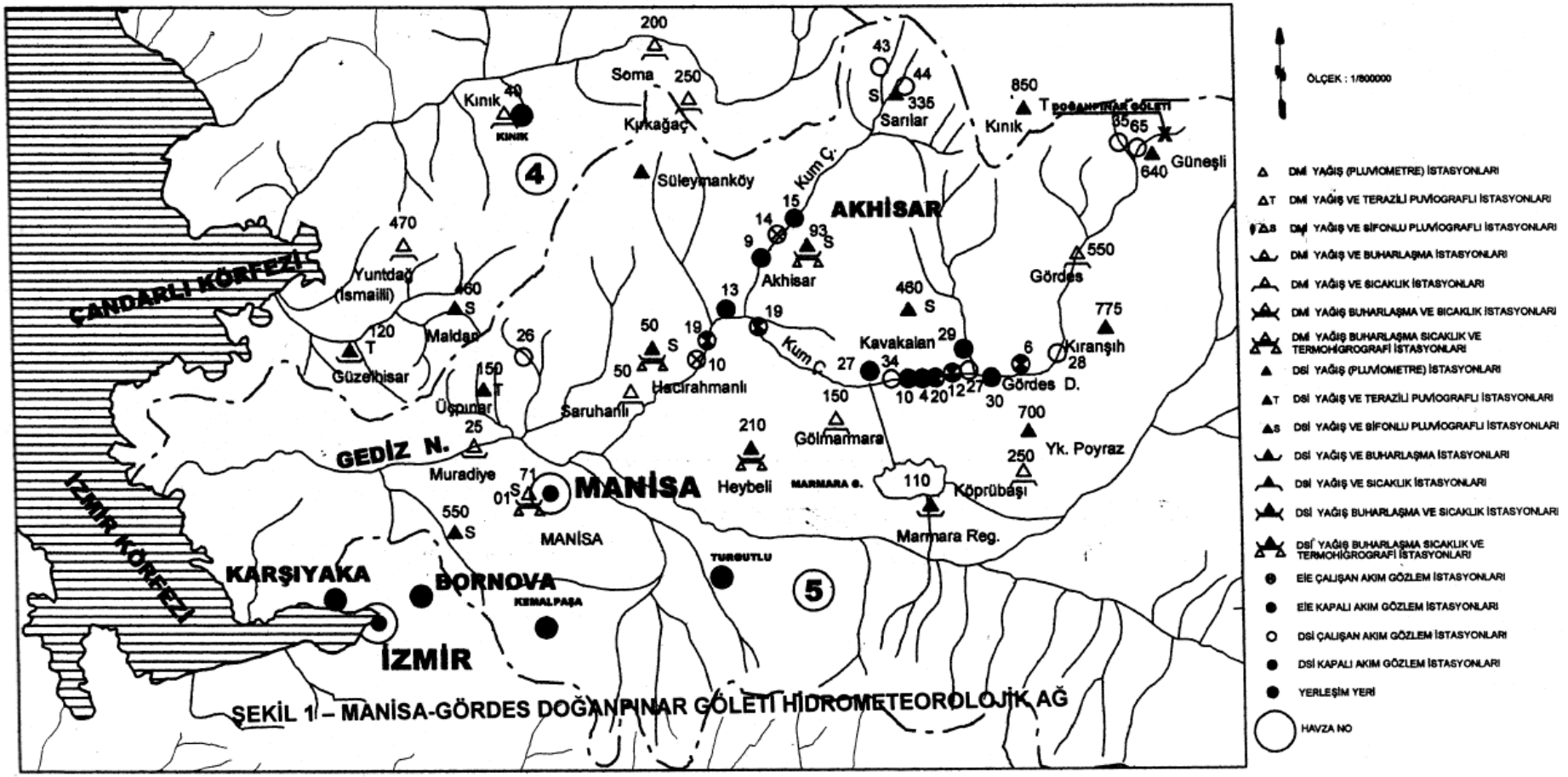
Tablo 23: Regional Floods Frequency Analysis for Doğanpınar Pond

Sıra No	AGİ No	Yağış	N (Yıl)	En Büyük $Q_{MAX.}$	UDF	Q_T (m^3/s)							
						2	5	10	25	50	100	500	1000
1	5-35	88.0	17	40.5	LN2	9.66	18.34	25.64	36.66	46.17	56.83	86.52	101.69
2	5-43	64.0	15	66.6	LP3	12.03	24.61	34.39	47.75	58.14	68.74	93.76	104.65
3	509 (5-14)	901.6	46	433.0	LN3	114.25	199.83	257.83	332.40	388.80	445.90	583.02	644.56
4	520	1470.4	10	514.0	LN3	251.05	378.32	451.15	533.99	590.52	643.46	757.17	803.29
5	5-34	1444.0	16	520.0	LN2	126.68	236.11	326.95	462.61	578.89	708.25	1065.36	1246.36
6	5-15	512.3	28	360.0	LP3	99.51	181.16	236.05	302.61	349.11	392.51	482.50	516.95

Sıra No	AGİ No	Yağış	N (Yıl)	Ölçülen En Büyük $Q_{MAX.}$ (m^3/s		Q_T / Q_2							
1	5-35	88.0	17	40.5		1.00	1.90	2.65	3.80	4.78	5.88	8.96	10.53
2	5-43	64.0	15	66.6		1.00	2.05	2.86	3.97	4.83	5.71	7.79	8.70
3	509 (5-14)	901.6	46	433.0		1.00	1.75	2.26	2.91	3.40	3.90	5.10	5.64
4	520	1470.4	10	514.0		1.00	1.51	1.80	2.13	2.35	2.56	3.02	3.20
5	5-34	1444.0	16	520.0		1.00	1.86	2.58	3.65	4.57	5.59	8.41	9.84
6	5-15	512.3	28	360.0		1.00	1.82	2.37	3.04	3.51	3.94	4.85	5.19
ORTALAMA						**1.00**	**1.81**	**2.42**	**3.25**	**3.91**	**4.60**	**6.35**	**7.18**

9.FIGURES


River discharge (cumecs)
40
30
20
10
Peak discharge
Rising limb
Falling limb
Peak rainfall
Lag time
Storm flow
Base flow
Rainfall (mm)
60
50
40
30
20
10



ŞEKİL 1 – MANİSA-GÖRDES DOĞANPINAR GÖLETİ HİDROMETEOROLOJİK AĞ

Figure 1:Hydrometeorological Network for Manisa – Gördes Doğanpınar Pond (Small Dam)

DOĞANPINAR			
KOT (m)	ARA ALAN (km²)	TOPLAM ALAN (Km²)	% ALAN
1450>	0.09	0.09	0.143
1400-1450	0.43	0.52	0.862
1350-1400	0.90	1.42	2.370
1300-1350	1.20	2.62	4.376
1250-1300	3.52	6.15	10.258
1200-1250	5.24	11.38	18.998
1150-1200	8.55	19.93	33.261
1100-1150	11.61	31.54	52.635
1050-1100	8.27	39.81	66.438
1000-1050	6.01	45.83	76.474
950-1000	4.68	50.50	84.276
900-950	4.09	54.60	91.106
850-900	3.56	58.16	97.046
<850	1.77	59.9	100.000

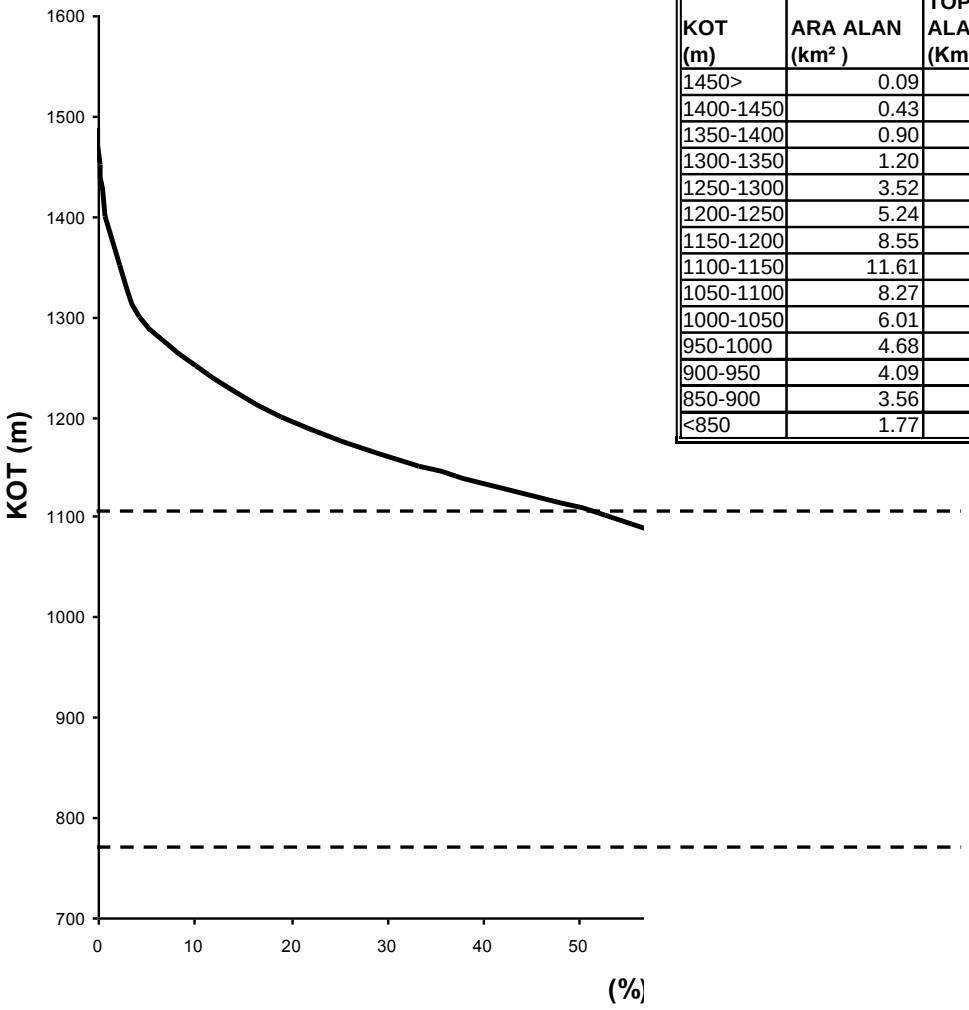
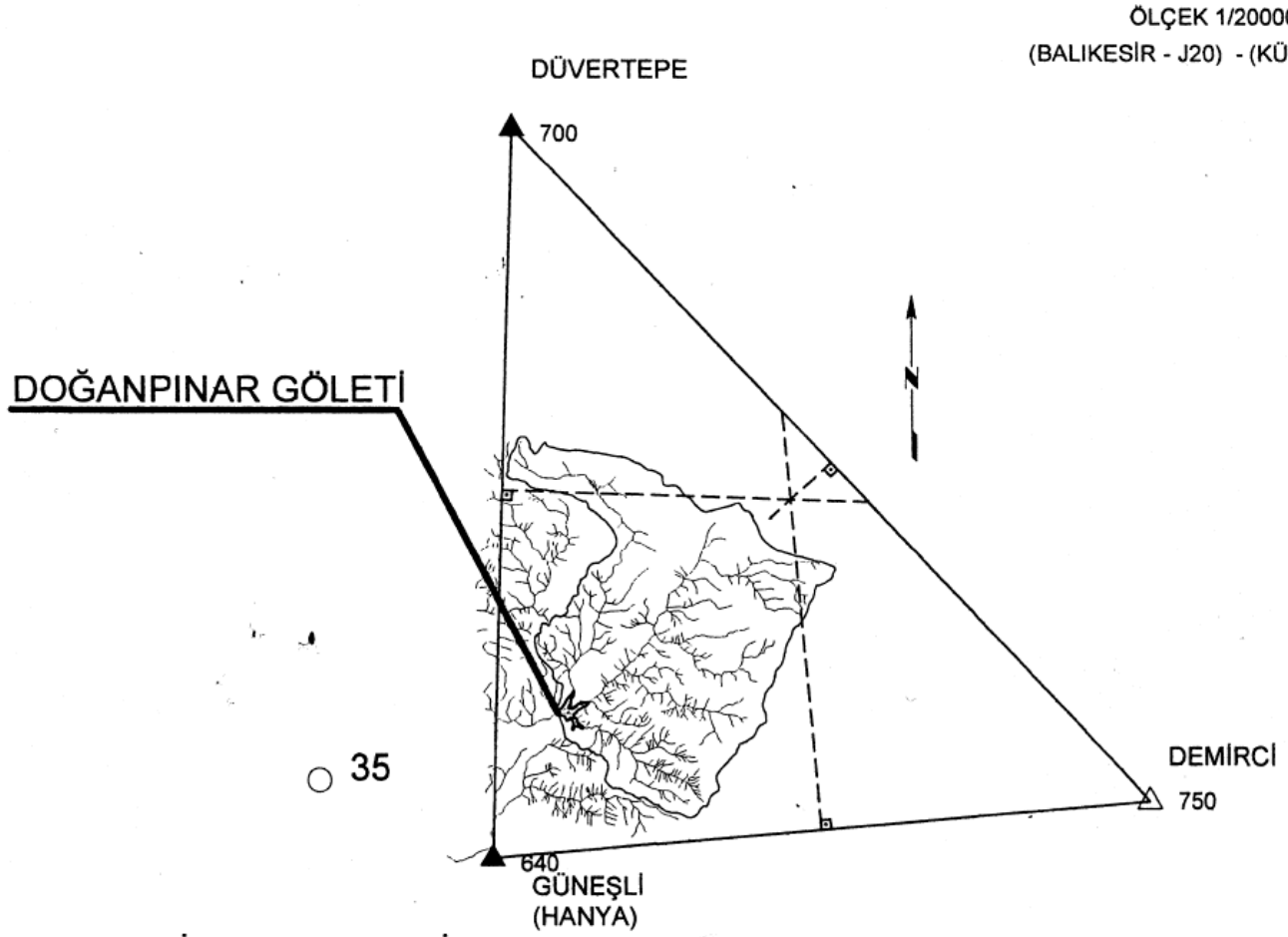


Figure 2: Hypsometric Curve for Doğanpınar Pond



ŞEKİL 3 – THIESSEN POLİGONU

Figure 3: Thiessen Polygons

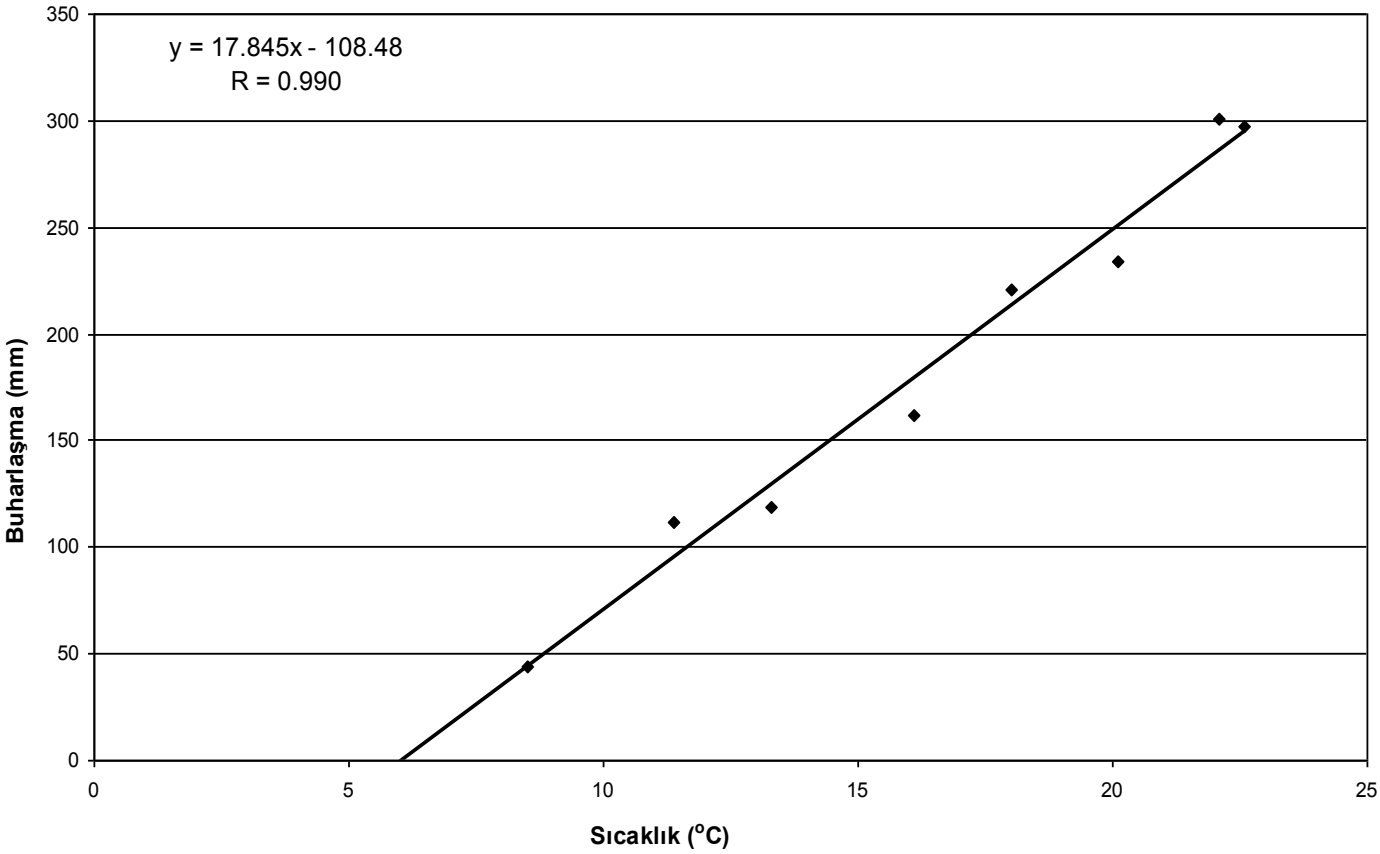


Figure 4: Correlation between Monthly Evaporation and Temperature Values at Güneşli Station

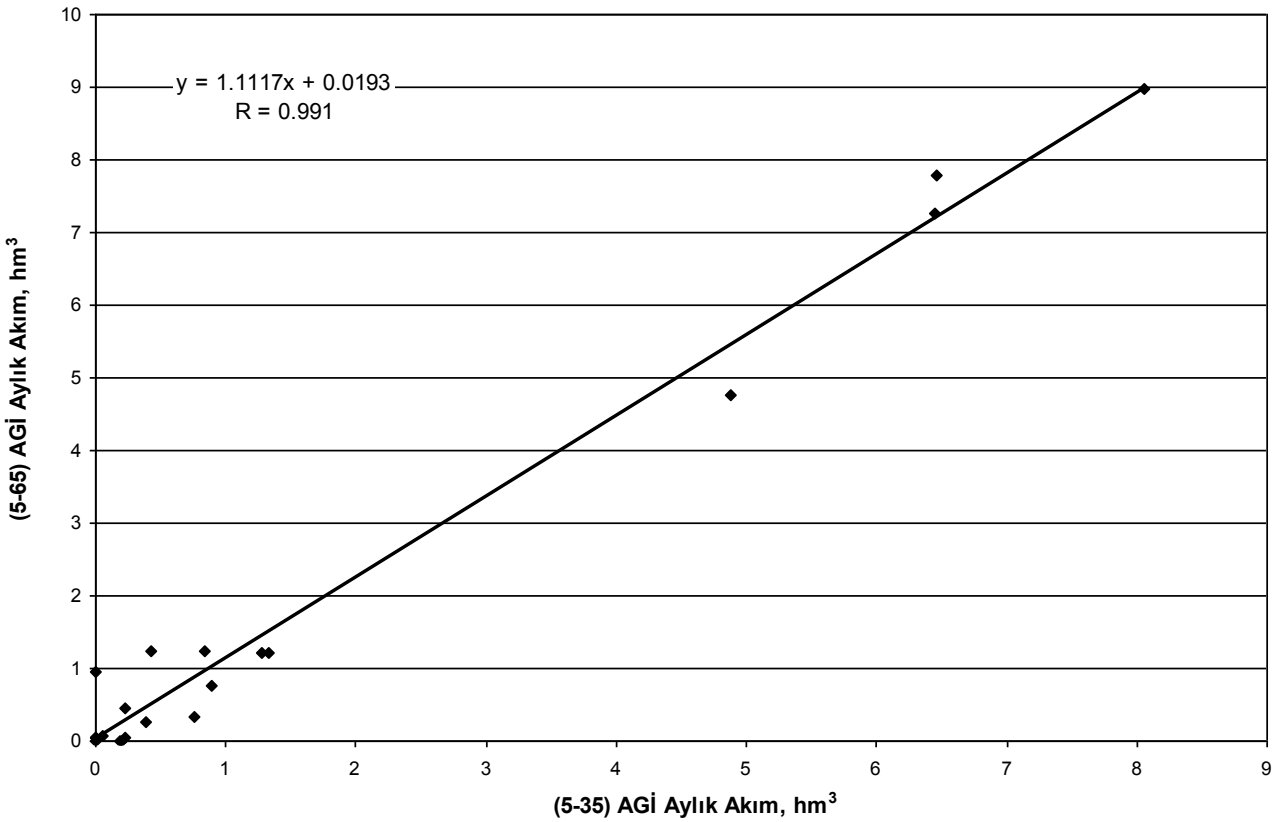


Figure 5: Correlation between Montly Flows at SGS No : 5 – 65 and 5 – 35

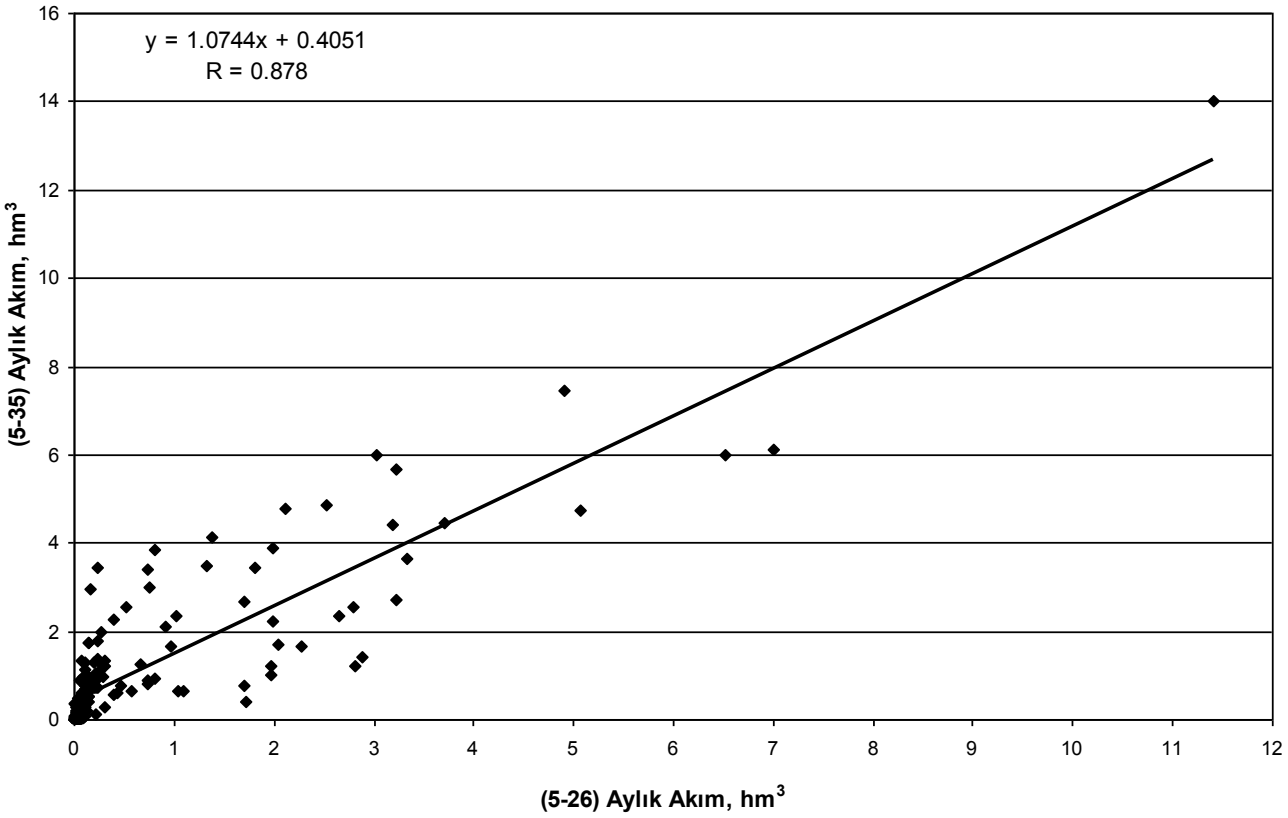


Figure 6: Correlation between Montly Flows at SGS No : 5 – 35 and 5 – 26

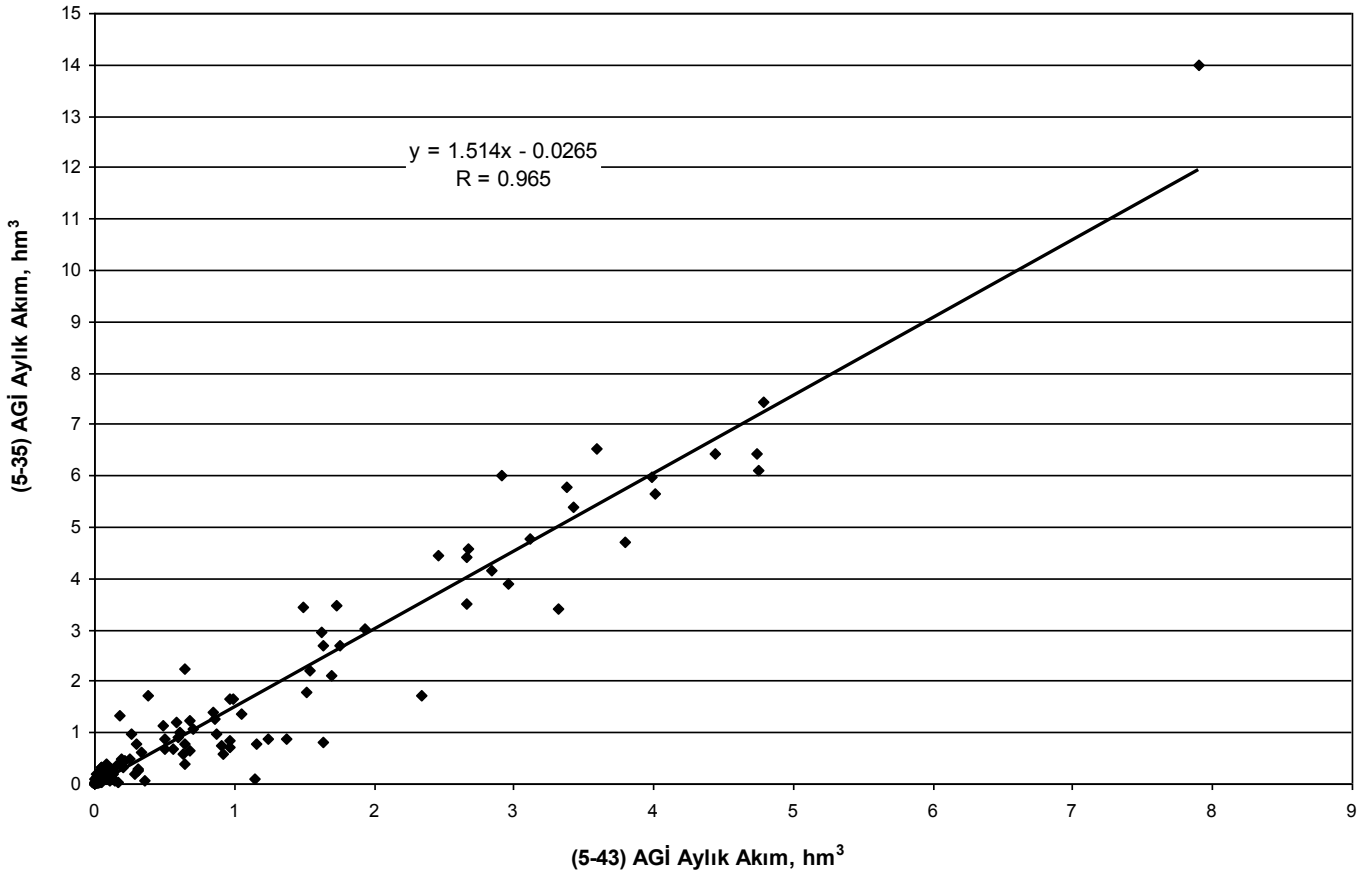


Figure 7: Correlation between Montly Flows at SGS No : 5 – 35 and 5 - 43

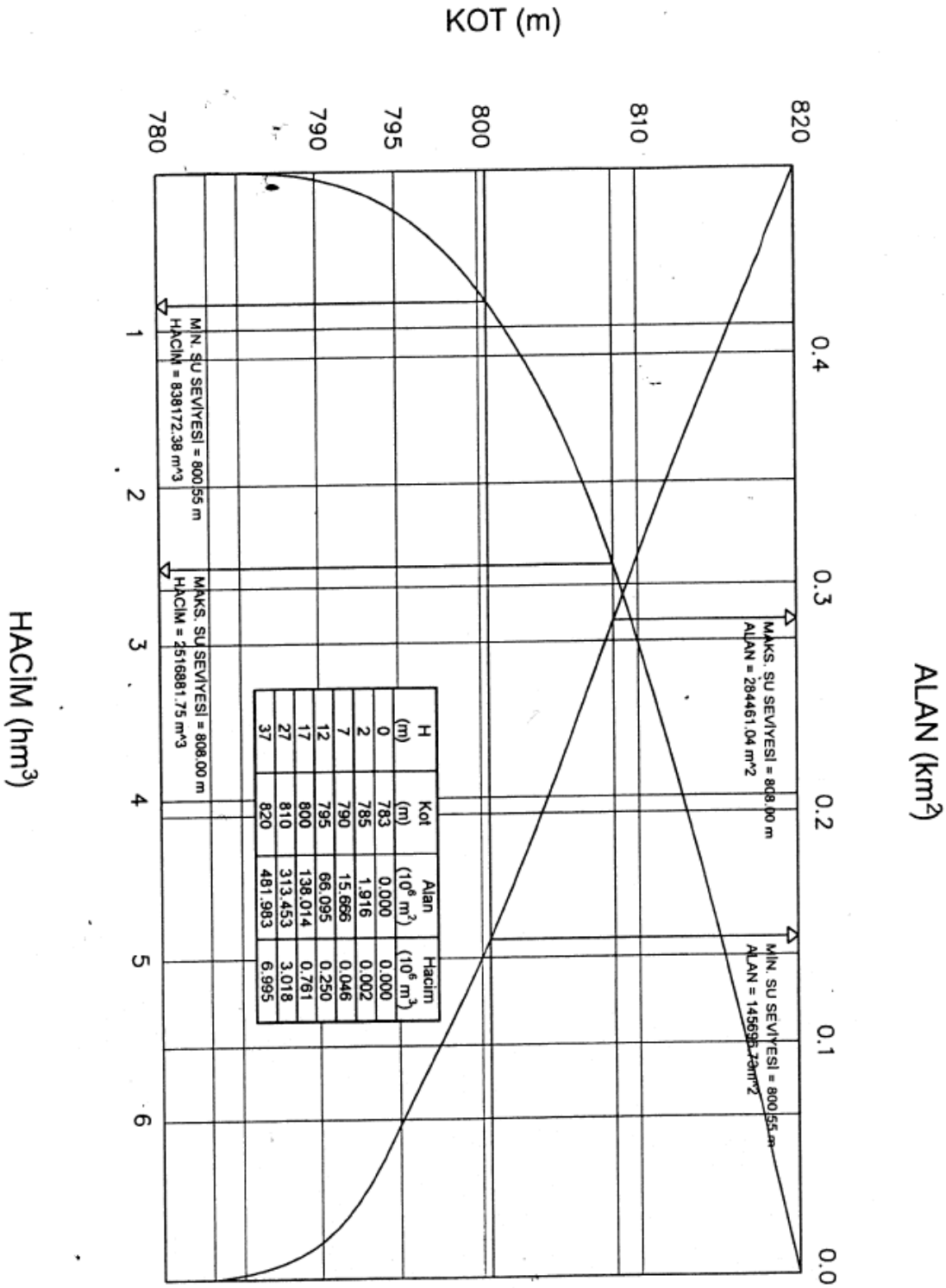


Figure 8A: Elevation – Volume - Area Curves for Doğanpınar Pond Reservoir

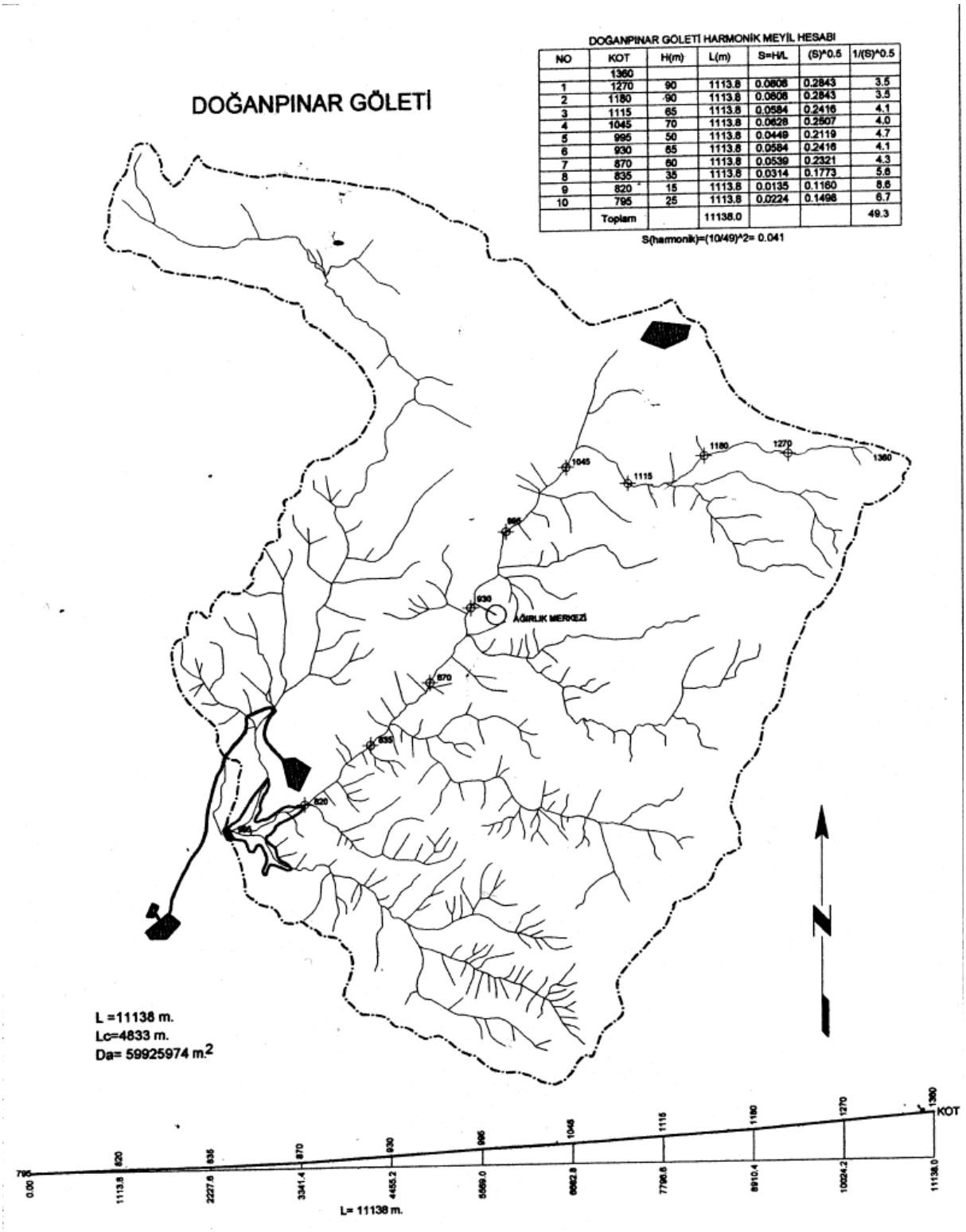
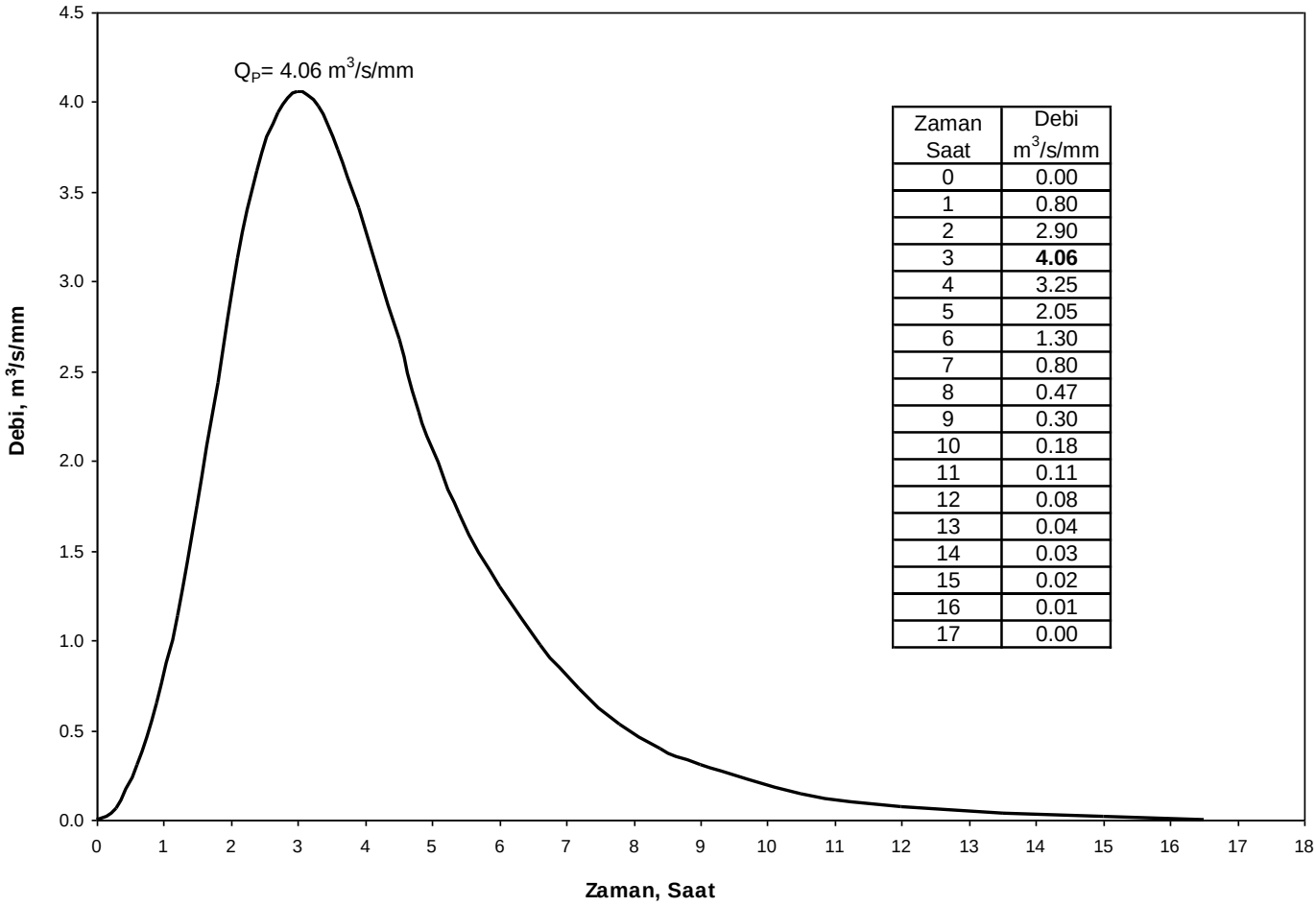
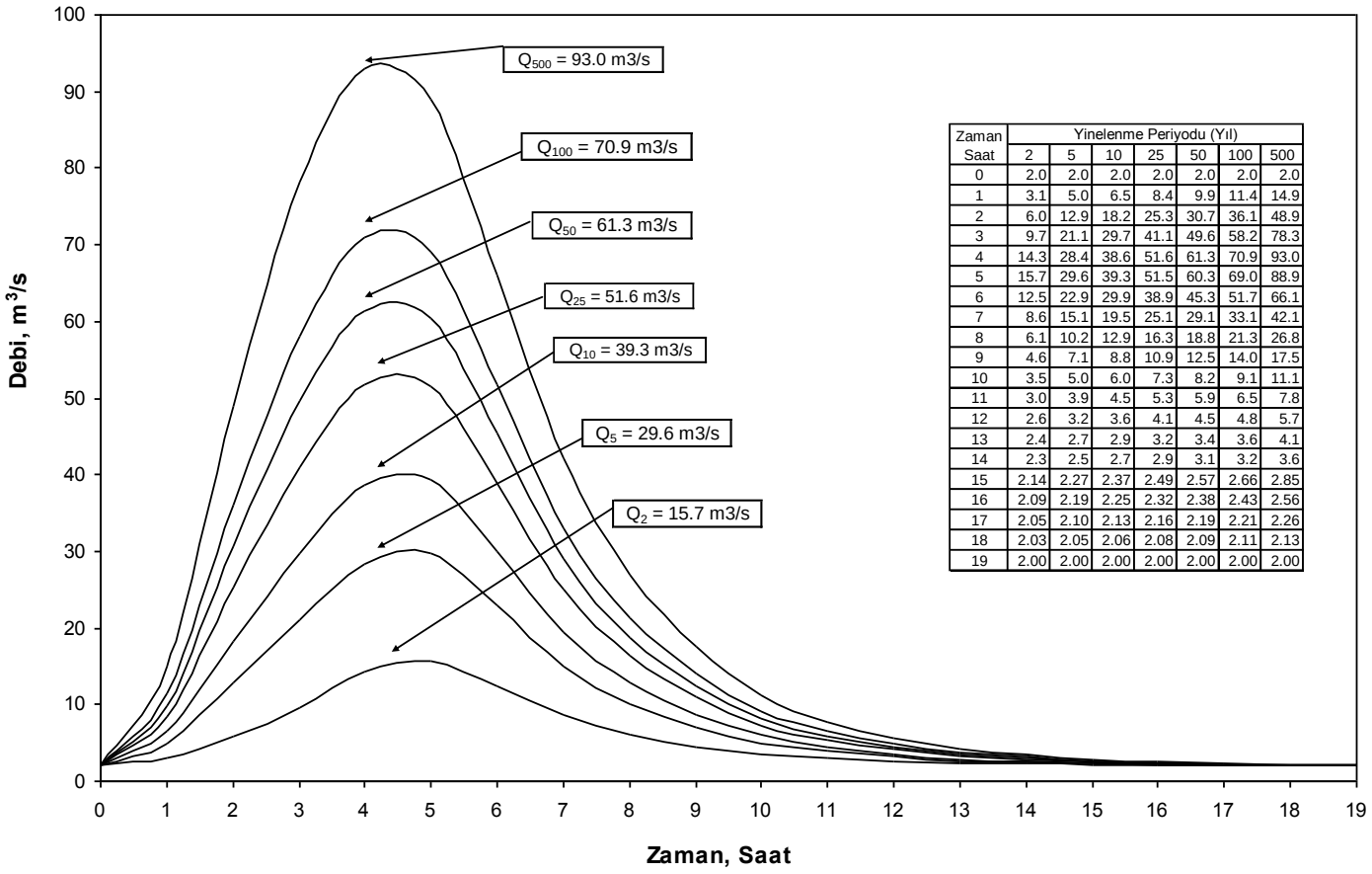


Figure 9: Harmonic Slope Calculation of Doğanpınar Pond catchment



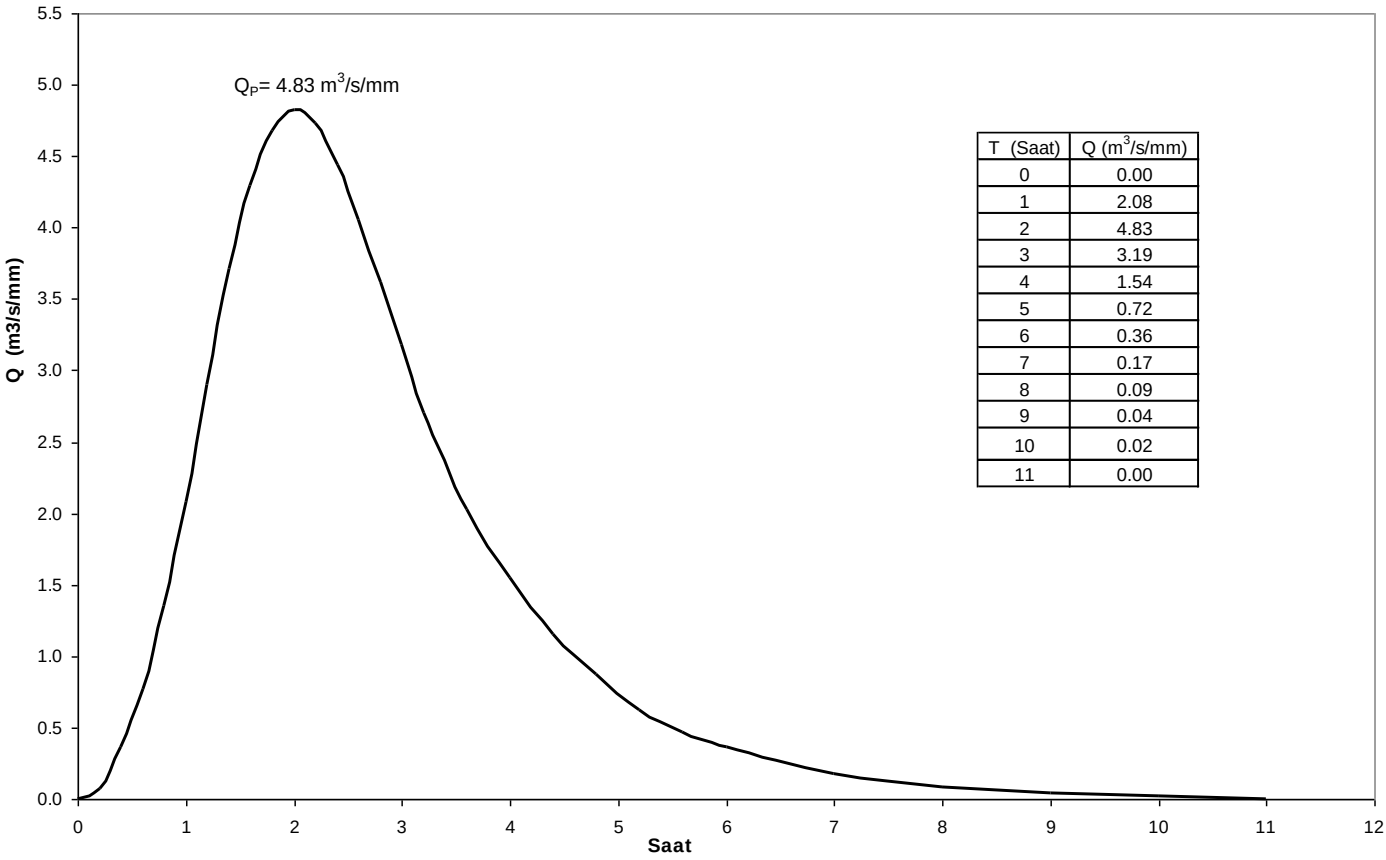
Zaman Saat	Debi m^3/s/mm
0	0.00
1	0.80
2	2.90
3	**4.06**
4	3.25
5	2.05
6	1.30
7	0.80
8	0.47
9	0.30
10	0.18
11	0.11
12	0.08
13	0.04
14	0.03
15	0.02
16	0.01
17	0.00

Figure 10: 2 hr and 1 mm UH for Doğanpınar Pond Catchment (DSİ Snythetic UH Method)



Zaman	Yinelenme Periyodu (Yıl)						
Saat	2	5	10	25	50	100	500
0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
1	3.1	5.0	6.5	8.4	9.9	11.4	14.9
2	6.0	12.9	18.2	25.3	30.7	36.1	48.9
3	9.7	21.1	29.7	41.1	49.6	58.2	78.3
4	14.3	28.4	38.6	51.6	61.3	70.9	93.0
5	15.7	29.6	39.3	51.5	60.3	69.0	88.9
6	12.5	22.9	29.9	38.9	45.3	51.7	66.1
7	8.6	15.1	19.5	25.1	29.1	33.1	42.1
8	6.1	10.2	12.9	16.3	18.8	21.3	26.8
9	4.6	7.1	8.8	10.9	12.5	14.0	17.5
10	3.5	5.0	6.0	7.3	8.2	9.1	11.1
11	3.0	3.9	4.5	5.3	5.9	6.5	7.8
12	2.6	3.2	3.6	4.1	4.5	4.8	5.7
13	2.4	2.7	2.9	3.2	3.4	3.6	4.1
14	2.3	2.5	2.7	2.9	3.1	3.2	3.6
15	2.14	2.27	2.37	2.49	2.57	2.66	2.85
16	2.09	2.19	2.25	2.32	2.38	2.43	2.56
17	2.05	2.10	2.13	2.16	2.19	2.21	2.26
18	2.03	2.05	2.06	2.08	2.09	2.11	2.13
19	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Figure 11: Flood Hydrographs of Different Recurrence Interval for Doğanpınar Pond Site



T (Saat)	Q (m^3/s/mm)
0	0.00
1	2.08
2	4.83
3	3.19
4	1.54
5	0.72
6	0.36
7	0.17
8	0.09
9	0.04
10	0.02
11	0.00

Figure 12: 2.5 hr and 1 mm UH for Doğanpınar Pond catchment (mockus UH Method

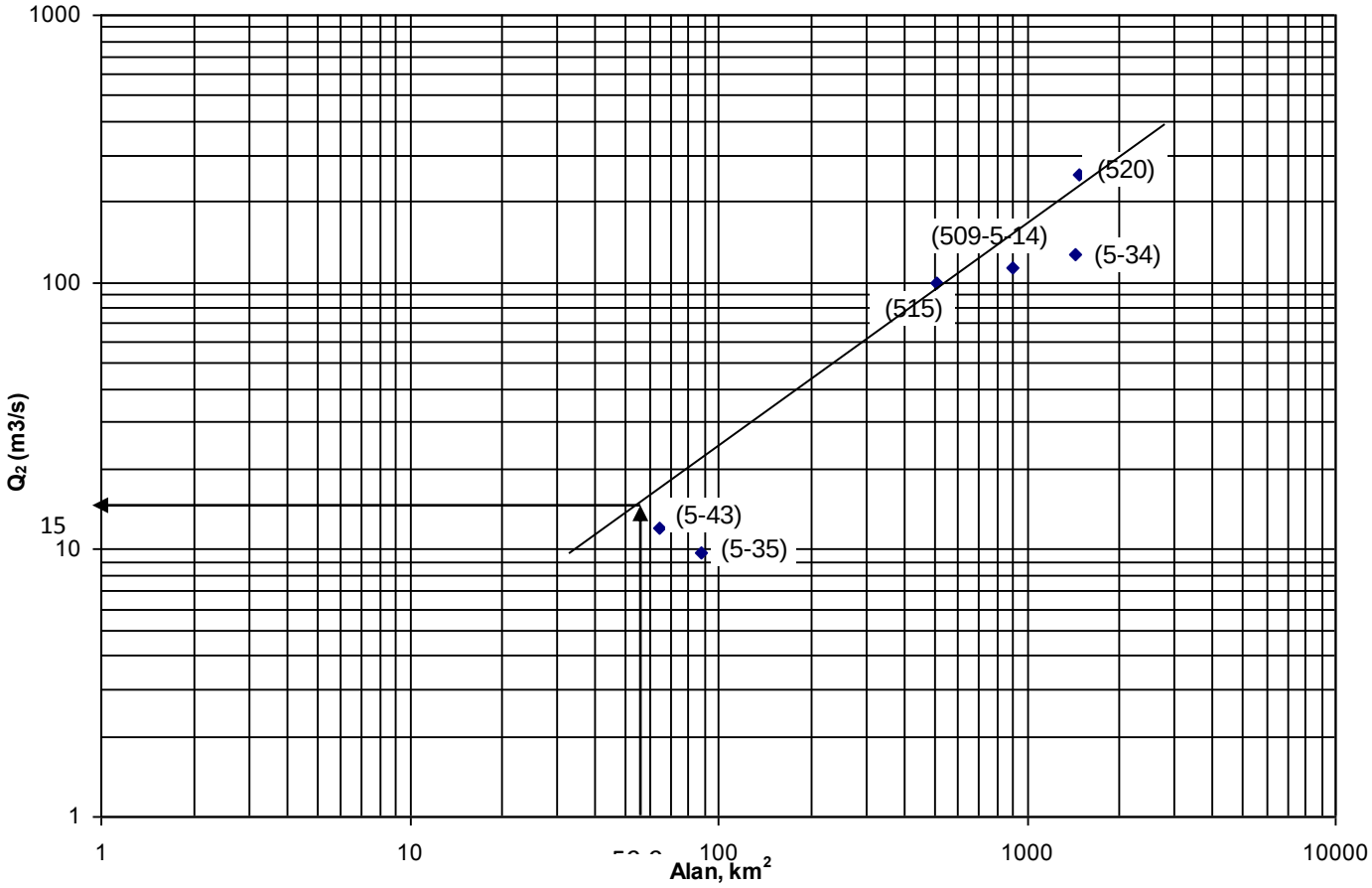
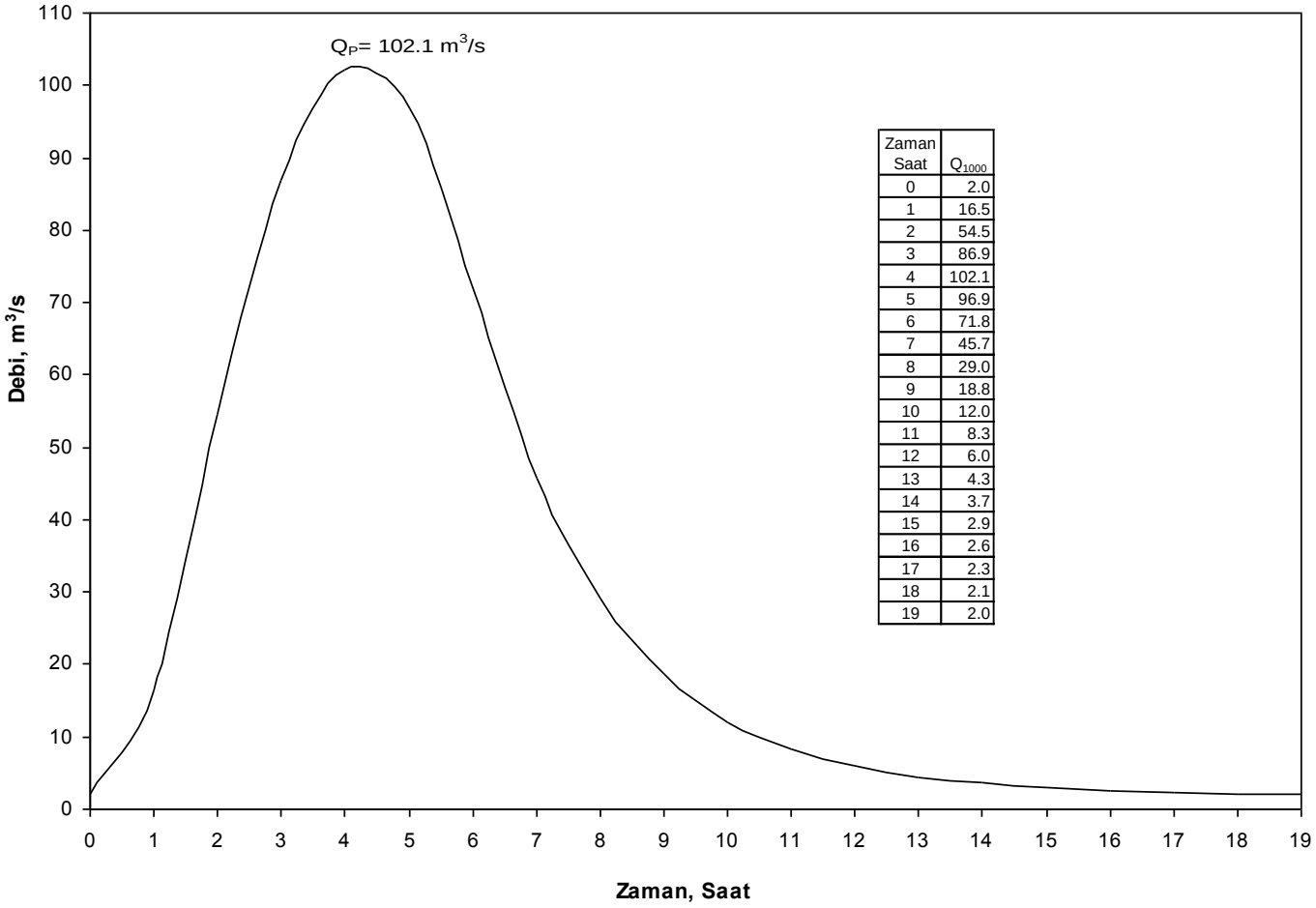


Figure 13: Area – Q2 Curve Obtained from Regional Floods Frequency Analysis for Doğanpınar pond



Zaman Saat	Q_{1000}
0	2.0
1	16.5
2	54.5
3	86.9
4	102.1
5	96.9
6	71.8
7	45.7
8	29.0
9	18.8
10	12.0
11	8.3
12	6.0
13	4.3
14	3.7
15	2.9
16	2.6
17	2.3
18	2.1
19	2.0

Figure 14: 1000 yr Flood Hydrograph for Doğanpınar Site

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