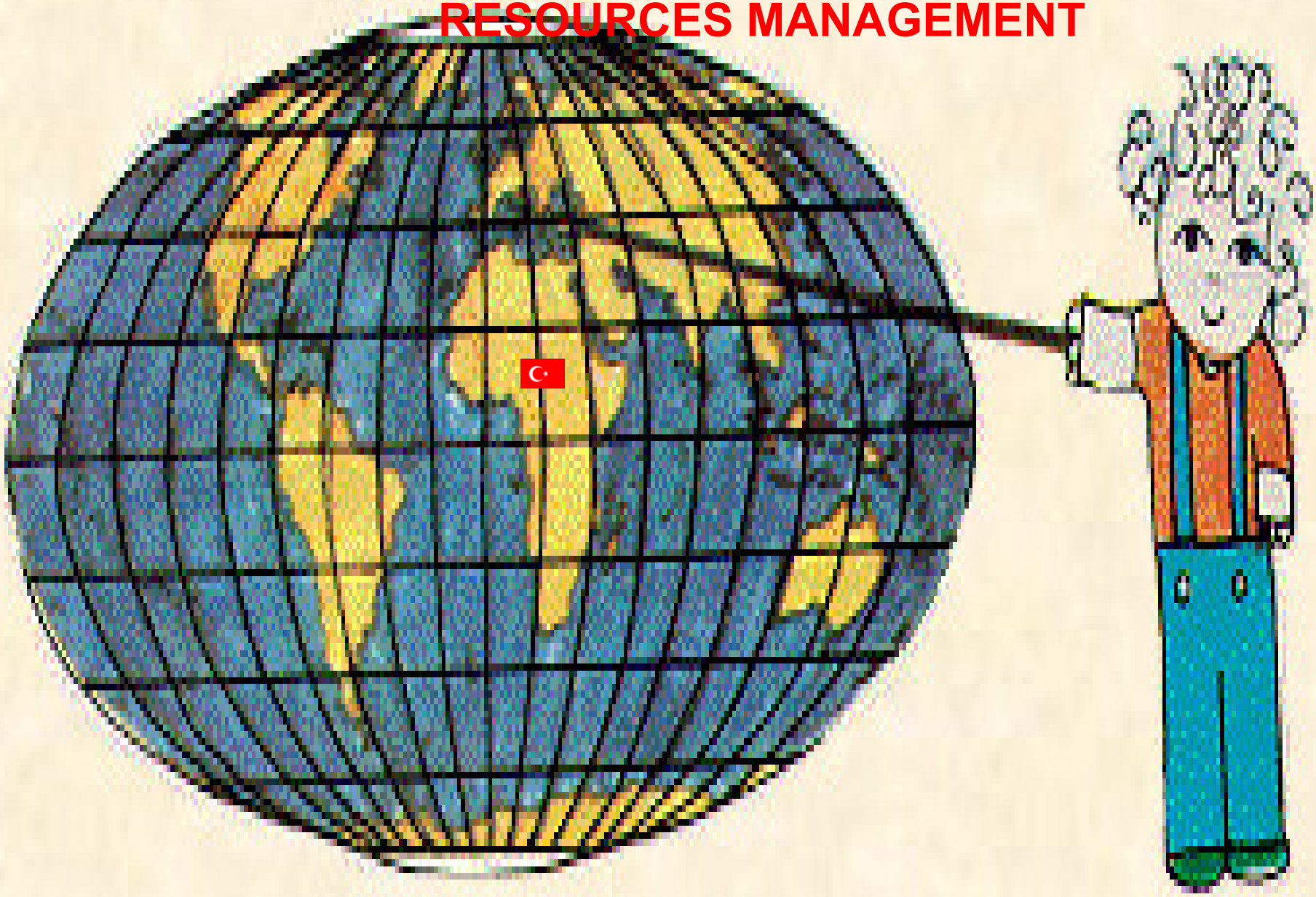
PARTICIPATORY INTEGRATED WATER RESOURCES MANAGEMENT



INWRDAM-TURKEY COUNTRY REPORT


INWRDAM-TURKEY COUNTRY REPORT
Black Sea
Bulgaria
Georgia
Armenia
Azerbaijan
Greece
T U R K E Y
Iran
Iraq
Syria
Lebanon
Mediterranean Sea

DEMOGRAPHICAL STRUCTURE

- **POPULATION (2000) (MILLION) :67,8**
- **POPULATION GROWTH RATE PER ANNUM :1,8**

LAND RESOURCES

- **TOTAL AREA :78 mha**
- **ARABLE LAND :28 mha**
- **ECONOMİCALLY IRRIGABALE LAND :8.5 mha**
- **AREA UNDER IRRIGATION 4.5mha**

WATER RESOURCES

ANNUAL PRECIPATION :643 mm

AVARAGE ANNUAL RUNOFF:186 Billion m³/year

USED SURFACE WATER :29.6 Billion m³ per year

USED GROUND WATER :6 Billion m³ per year

ACTUAL WATER CONSUMPTION IN TURKEY, 1990-2000

Year	Total water consumption 10^6 m^3	Potential use (%)	Water consumption by sectors					
			Irrigation		Drinking-Use		Industrial	
			10^6 m^3	(%)	10^6 m^3	(%)	10^6 m^3	(%)
1990	30,600	28	22,016	72	5,141	17	3,443	11
1992	31,600	29	22,939	73	5,195	16	3,466	11
1998	38,900	35	29,200	75	5,700	15	4,000	10
2000	42,000	38	31,500	75	6,400	15	4,100	10

Source: SPO

WATER CONSUMPTION TRENDS IN TURKEY, 1990-2030

Year	Total water consumption 10^6 m^3	Potential use (%)	Water consumption by sectors					
			Irrigation		Drinking-Use		Industrial	
			10^6 m^3	(%)	10^6 m^3	(%)	10^6 m^3	(%)
1990	30,600	28	22,016	72	5,141	17	3,443	11
1997	35,645	32	26,415	74	5,520	15	3,710	11
2000	42,000	38	31,500	75	6,400	15	4,100	10
2030	110,000	100	71,500	65	25,300	23	13,200	10

Source :SPO

ORGANIZATIONS INVOLVED IN THE IRRIGATION DEVELOPMENT AND MANAGEMENT

- GENERAL DIRECTORATE OF STATE HYDRALIC WORKS (DSI)
- GENERAL DIRECTORATE OF RURAL SERVICES (GDRS)

STATE HYDRAULIC WORK (DSI)

- The General Directorate of State Hydraulic Works (DSI) is within the Ministry of Energy and Natural Resources (MENR) and responsible for planning, designing, constructing, operating and maintaining dams, pumping stations and canals for large scale irrigation systems, defined as those with a supply capacity greater than 500 litres/sec.

STATE HYDRAULIC WORK (DSI)

DSI is also responsible for support activities related to these water projects, including research, expropriation and the construction of buildings, workshops and other facilities, and is one of the largest investing agencies utilizing national budget funds.

GENERAL DIRECTORATE OF RURAL SERVICES (GDRS)

GDRS is responsible for planning, designing, construction, operating and maintenance small lake and small scale irrigation system defined as those with supply capacity smaller than 500 liters/sec.

IRRIGATION DEVELOPMENT

- Developed by DSI 1 894 000 ha
- Developed by GDRS 1 230 129 ha
- Developed by DSI and GDRS 361 000 ha
- Developed by farmers and others 1 100 000 ha
- TOTAL IRRIGATED AREA 4 585 129 ha

IRRIGATION MANAGEMENT IN TURKEY

TWO TYPES OF MANAGEMENT

- **Government**

-State Hydraulic Works (DSI)

- **Non Government**

- Local authorities (Villagers, Municipalities)

-Cooperatives

-Water Users Unions

TRANSFERING

OPERATION AND MAINTENANCE SERVICES OF THE STRUCTURES (IRRIGATION SCHEMES, FLOOD CONTROL STRUCTURE etc.) CONSTRUCTED BY DSI CAN BE TRANSFERRED TO ORGANIZATIONS SUCH AS ;

VILLAGE BODY, MUNICIPALITY,WATER USERS ASSOCIATION AND COOPERATIVE IN ACCORDANCE WITH THE CONTRACT SIGNED BY BOTH DSI AND ORGANIZATION. AFTER THAT THIS CONTRACT IS RATIFIED BY THE " MINISTRY OF ENERGY AND NATURAL RESOURCES "

MANAGEMENT TYPE	IRRIGATED AREA 2002
DSI	258 966
IA	1 677 633
COOPERATIVES	1 611 779
OTHERS	15 746
TOTAL	3 564 124

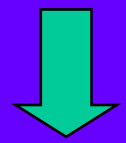
Last Update : 13.09.2002

THE NUMBER OF TRANSFERED IRRIGATION WATER USERS ORGANIZATIONS (31.12.2001)

- Village Bodies 6573
- Cooperative 2226
- Municipality 649
- Irrigation Association 336
- others 4

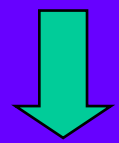
ORGANIZATION SCHEME BODIE STRUCTURE OF IRRIGATION ASSOCIATION

LOCAL GOVERNOR



IRRIGATION ASSOCIATION COUNCIL

(30-50 Members-Mayors, Village Administration)



MANAGEMENT BOARD

(Chairman+General Secretary+Accountant+4 Selected members)

TRANSFER PLAN AND ITS REALIZATION (hectares)

YEARS	PLANNED		REALIZATION		MODIFIED PLAN	
	Annual (ha)	Total (ha)	Annual (ha)	Total (ha)	Annual (ha)	Total (ha)
1988	-	-	1 789	55 034		
1989	-	-	3 386	58 420		
1990	-	-	2 391	60 811		
1991	-	-	257	61 068		
1992	-	-	1 552	62 620		
1993	-	-	9 422	72 042		
1994	103 958	176 000	195 320	267 362		
1995	140 000	316 000	711 214	978 576		
1996	120 000	436 000	211 758	1 190 334		
1997	120 000	556 000	88 705	1 279 039		
1998	120 000	676 000	204 892	1 483 931		
1999	120 000	796 000	45 523	1 529 454		
2000	120 000	916 000	89 215	1 618 669		
2001	84 000	1 000 000	45 061	1 663 730		
2002	50 000	1 050 000	31 006	1 694 736		
1 January – 15 September 2003		50 000	77 147	1 771 883		
16 September-31 December 2003		1 050 000	- 21 883	1 750 000	55 264	1 750 000
2004	50 000	1 150 000			50 000	1 800 000

COMPERATIVE RATIOS RELATED TO IRRIGATION EFFICIENCY

Years	Irrigation schemes operated by DSI (m3 /ha)	Irrigation Efficiency (%)	Transferred Irrigation (m3/ha)	Irrigation Efficiency (%)
1999	13 000	31	11 000	41
2000	12 000	33	11 000	42
2001	9 200	38	9 900	48

Irrigation Efficiency : Net water requirement (m3/ha)/Water diverted from the source of supply (m3/ha)X100

O&M Cost Recovery for DSI -Operated Systems, in thousand TURKISH LIRA

YEAR	COLLECTABLE	COLLECTED	COLLECTİON RATE (%)
	(1)	(2)	(2/1)
1989	44.181.651	16.964.181	38,4
1990	65.786.896	24.276.843	36,9
1991	109.408.941	35.860.343	32,8
1992	175.676.514	58.319.017	32,8
1993	255.342.818	107.295.687	42
1994	435.598.165	183.280.193	42,1
AVERAGE			37,6

Source:DSI

Energy consumption in DSI managed and transferred irrigation

Irrigation Method	Operated by	Consumed Energy (kWh/ha)		
		Year 1999	2000	2001
Surface water pumped irrigation	DSI	3 533	2 858	3 060
	Transferred	1 380	1 278	1 308
Groundwater pumped irrigation	DSI	1 297	1 088	1 386
	Transferred	1 120	809	924

Source: Döker, et. al., (2003).

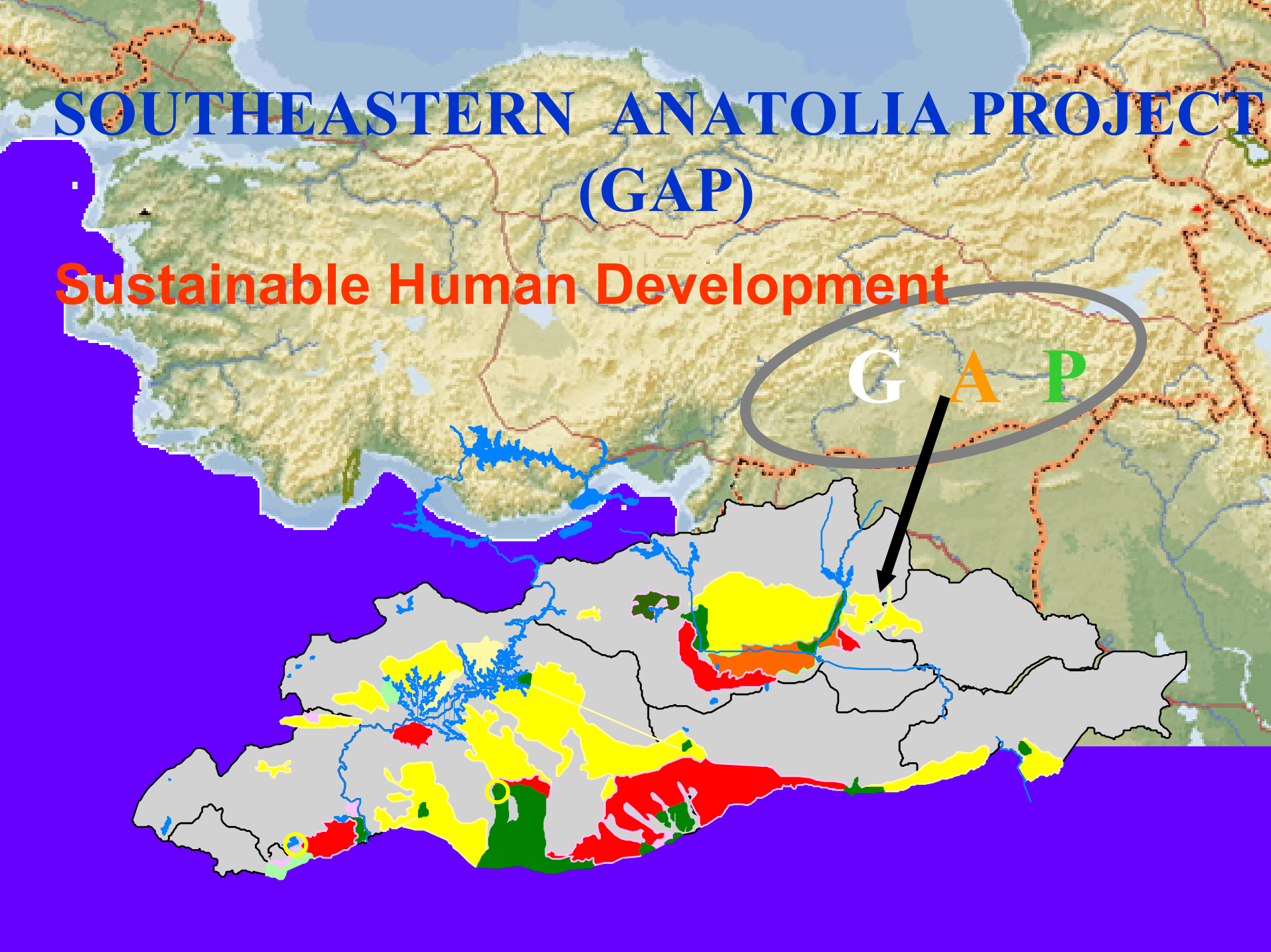
TOTAL FEE COLLECTION RATES

Irrigation Associations	YEARS				
	1999	2000	2001	2002	average total collection rate (4years)
	Total Collection Rate				
Söke	61,1	110	96,7	88,1	88,98
Plain of Çumra	53,1	36,2	344,01	83,4	129,18
Tektek	100	100	100,1	102,1	100,55
Kösreli	185,5	194,8	219,5	35,5	158,83

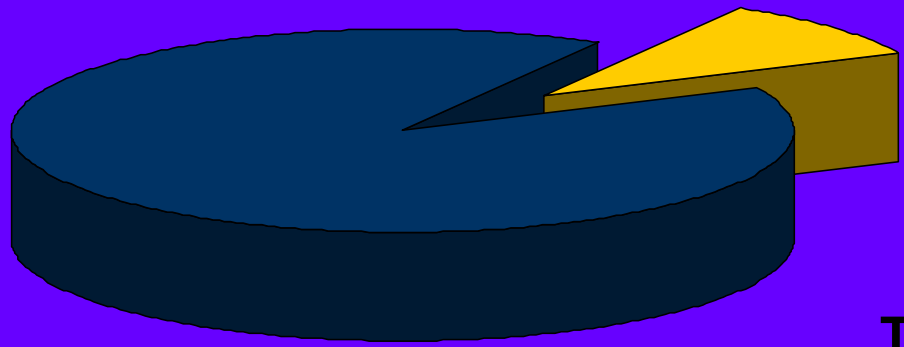
Source:Annual Reports of Irrigation Associations

SOUTHEASTERN ANATOLIA PROJECT (GAP)

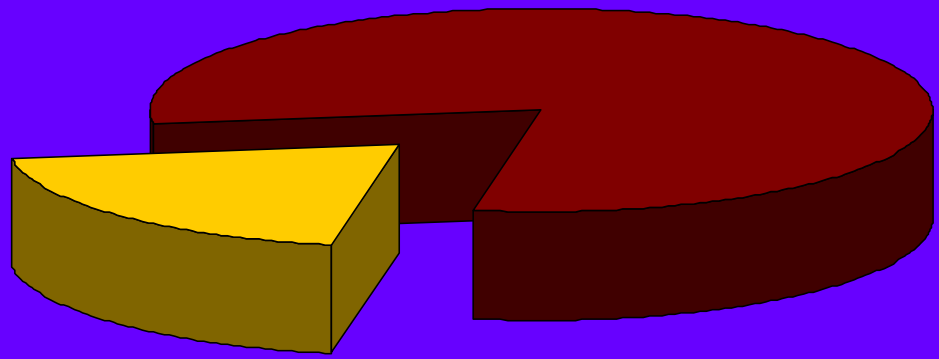
Sustainable Human Development



Resources of GAP
Land Potential of the GAP



TOTAL AREA*



ECONOMICALLY IRRIGABLE LAND*

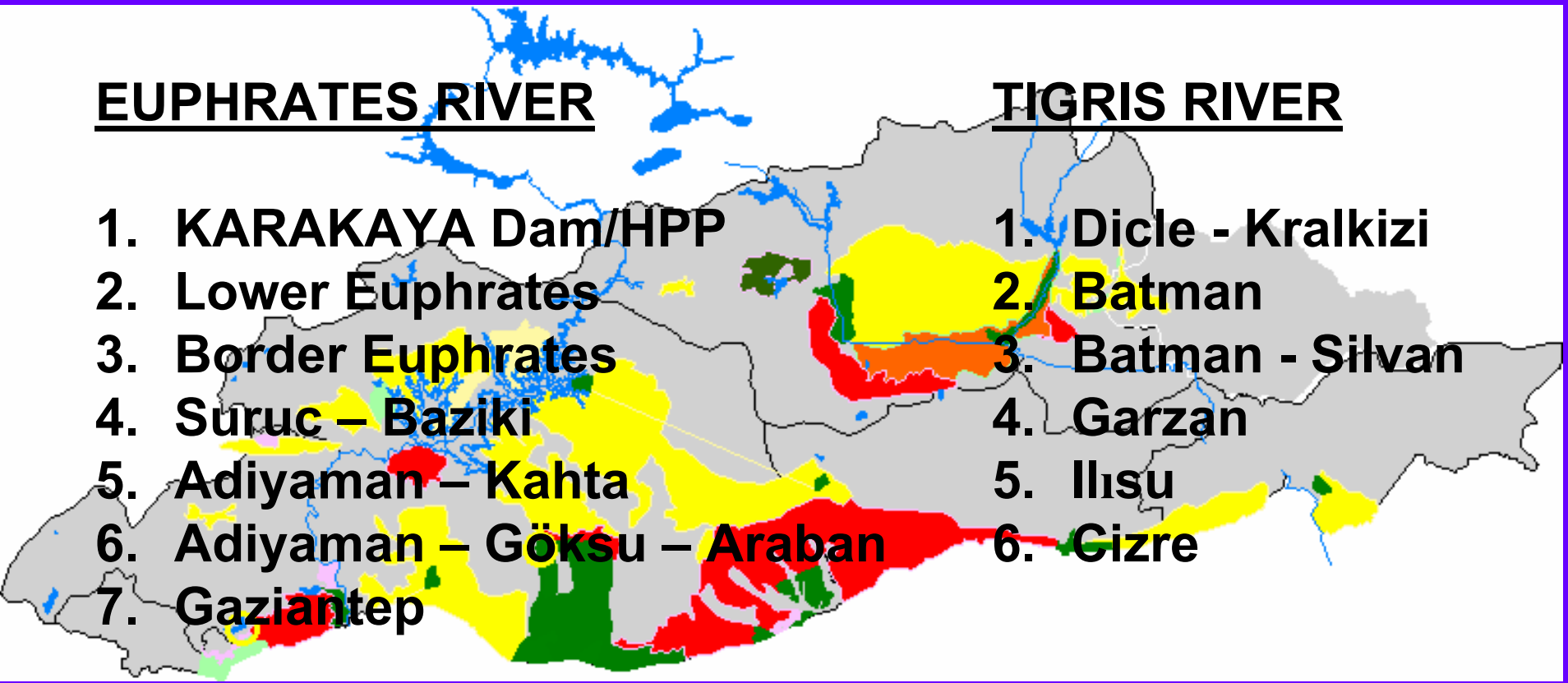
*PERCENT IN NATIONAL TOTAL

Resources of GAP
Water Supply by Drainage Basin

Average Annual Flow in Billion m^3

Other	86.2	E. BLACK SEA	14.9		
EUPHRATES	31.6	ANTALYA	11.1	W. BLACK SEA	9.9
TIGRIS	21.3	E. MEDITERRA.	11.1		

GAP Water Resources Development Projects



EUPHRATES RIVER

1. KARAKAYA Dam/HPP
2. Lower Euphrates
3. Border Euphrates
4. Suruc – Baziki
5. Adiyaman – Kahta
6. Adiyaman – Göksu – Araban
7. Gaziantep

TIGRIS RIVER

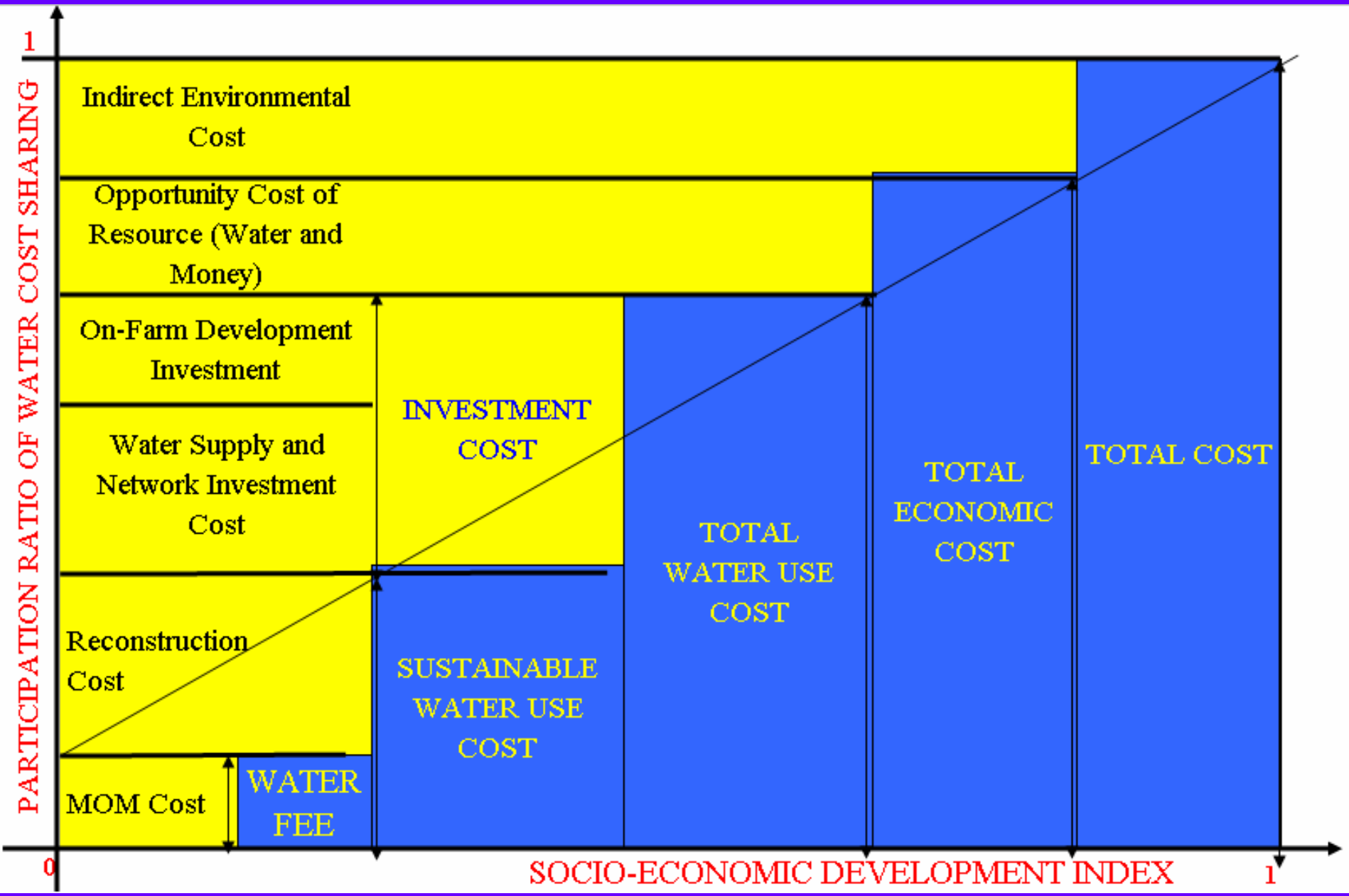
1. Dicle - Kralkizi
2. Batman
3. Batman - Silvan
4. Garzan
5. Ilısu
6. Cizre

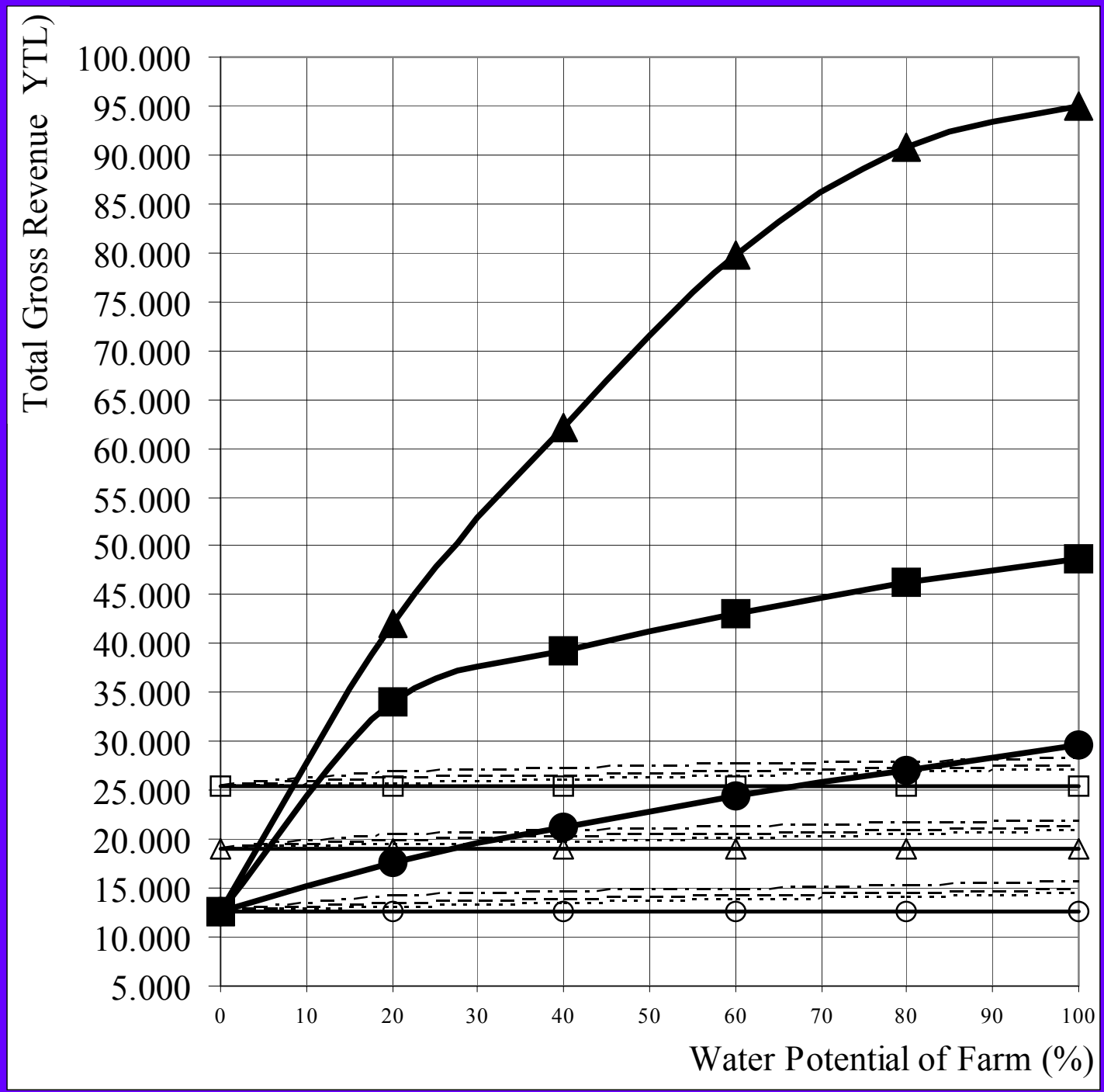
Total of 22 dams, 19 HPP

1.7 million ha, 7474 MW, 27 billion kWh

Irrigation Module and the Volume of Water Needs in GAP Irrigation Project

		EUPHRATES BASIN	TIGRIS BASIN	GAP	HARRAN PLAIN
	NET IRRIGATED AREA ha	1.066.657	616.014	1.682.671	141.688
BEGINING of IRRIGATION	Total Volume of Water billion m3/y	13,55	9,32	22,87	2,32
	Total Volume of Water m3/ha/y	12.703	15.130	13.591	16.374
	Irrigation module l/sec/ha				1,45
DEVELOPMENT STAGE	Total Volume of Water billion m3/y	11,91	7,13	19,04	1,68
	Total Volume of Water m3/ha/y	11.166	11.574	11.315	11.857
	Irrigation module l/sec/ha				1,05
WATER SAVING (%)		12	23	17	28


1
PARTICIPATION RATIO OF WATER COST SHARING
Indirect Environmental Cost
Opportunity Cost of Resource (Water and Money)
On-Farm Development Investment
Water Supply and Network Investment Cost
Reconstruction Cost
MOM Cost
WATER FEE
INVESTMENT COST
SUSTAINABLE WATER USE COST
TOTAL WATER USE COST
TOTAL ECONOMIC COST
TOTAL COST
0
SOCIO-ECONOMIC DEVELOPMENT INDEX
1


Total Gross Revenue YTL)
100.000
95.000
90.000
85.000
80.000
75.000
70.000
65.000
60.000
55.000
50.000
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.000
0
10
20
30
40
50
60
70
80
90
100
Water Potential of Farm (%)

Basınçlı sulama koşullarında Gedikli ve
Yaylak Sulamalarının farklı ürün deseni seçenekleri
ve yaşam standartlarında geri ödeme süreleri (yıl)

YS	Ürün Deseni Seçeneği	G1		G2		G3		G4		G5		**Gort**	
		Ged.	Yay.	Ged.	Yay.	Ged.	Yay.	Ged.	Yay.	Ged.	Yay.	**Gedikli**	**Yaylak**
150 %	ÜD1	-	-	5	37	7	63	5	37	7	63	**6**	**47**
	ÜD2	26	52	3	10	3	11	3	13	4	23	**3**	**11**
	ÜD3	2	4	1	3	2	4	2	6	3	10	**1**	**4**
	ÜD4	1	2	1	2	1	2	1	2	1	3	**1**	**2**
200 %	ÜD1	-	-	-	-	-	-	-	-	-	-	**-**	**-**
	ÜD2	26	52	5	17	7	23	7	29	15	-	**6**	**20**
	ÜD3	2	4	2	4	2	5	3	8	4	16	**2**	**4**
	ÜD4	1	2	1	2	1	2	1	2	1	4	**1**	**2**