TURKISH REVIEW

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cell and the door of the museum
really majestic. The pool, known
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Water-Products Capacity in Turkey and the Contribution of GAP (x)

Sevinç TÜRKER

Ensuring adequate public nutrition in the face of population increase and limited natural resources is perhaps the most important problem of our country, as elsewhere in the World. Daily animal-protein consumption is the criterion of the physical and mental development of individuals in societies today and thus of the level of development of countries. What are the characteristics of animal-proteins? The importance of animal-proteins lies in the fact that they contain essential amino acids which cannot be synthesized which are a must for the human body. Animal-proteins are contained in meat and meat products, milk and milk products, poultry and water products. The nutritional value of water-products as compared with that of other animal-based food stuffs is shown in Table I: Turkey is rich enough from the point of view of natural resources to meet the animal foodstuff demand of her total population. Water products play a major role in this. Turkey is surrounded by a sea coast of 8,272 Km, and has more than a million and a half hectares of inland water surface. Six hundred and five

GAP-South East Anatolia Project

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Table1

Amino acid content per 100 g

Amino acids	Foods					
	Fish	Beef	Milk	Cheese	Wheat flour	Eggs
Lysine	9.0	10.0	8.7	8.5	1.9	7.0
Tryptophan	1.2	1.4	1.5	1.6	0.8	1.5
Fenilalanin	4.4	5.0	5.5	6.4	5.5	6.3
Methyonin	3.2	3.2	3.2	3.5	2.0	4.0
Treonin	4.7	5.0	4.7	3.7	2.7	4.3
Leucin	5.5	8.0	11.2	9.0	7.0	7.2
Isoleucin	6.5	6.0	7.5	7.3	4.2	7.7
Valin	6.0	5.5	7.0	7.7	4.1	7.2

coastal villages with a total population of 624,075 and 373,754 people living in villages adjacent to lakes, not to mention the people living by the rivers, provide the necessary labour supply. A recent improvement in the water-products capacity is the new resources provided by GAP (The South-East Anatolia Project), which have led to an increase in production.

Tables 2 and 3 show the production of various water products from 1979 to 1986.

Table 2

Sea Fish Production (Tons)

Fish	1979	1980	1981	1982	1983	1984	1985	1986
Striped Mullet	1568	3043	3337	3971	3669	3442	3860	5403
Anchovy	139515	251870	273020	275350	300372	330967	284576	288105
Atlantic Horse Mackerel	82325	59590	60599	68616	73273	95503	116585	114912
Turbot	5315	2771	3785	4723	5398	2920	435	449
Mullet	5067	4880	4556	4589	5790	3549	2748	3084
Chub Mackerel	3086	4338	4972	9011	4055	3009	22270	27410
Blue Fish	15129	10306	18430	32184	30854	11737	8383	12251
Atlantic Bonito	8639	14292	23174	23397	29034	7220	12281	10756
Pilchard	10493	9651	9133	8934	11241	13758	17693	14013
Atlantic Mackerel	814	92	200	206	445	441	1453	523
Others	52519	30745	31912	31169	46944	35525	49099	47805
Crustaceans, molluscs, etc.	4354	5125	5062	5440	7067	1767	12691	14184

Source: 1987 Economic Report Union of Trade Chambers

Fish	1979	1
Trout	290	
Cyprinoids	328	
Mullet	684	1
Common Carp	8489	9
Northern Pike	395	
Eels	536	1
European Eel	396	
Others	10684	16

Source: 1987 Statistics Year

The economic valu

Items	Total W 1984 Realiza Amount	V
Production	566.9	17
Export	12.5	1
Domestic demand	554.4	16
Per capita cons. demand	11.3	

Source: 1987 Economic Repo

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available resources are c

GAP covers an a
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hectares of land and 7,9

g		
	Wheat flour	Eggs
	1.9	7.0
	0.8	1.5
	5.5	6.3
	2.0	4.0
	2.7	4.3
	7.0	7.2
	4.2	7.7
	4.1	7.2

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East Anatolia Project), which

is water products from 1979

83	1984	1985	1986
69	3442	3860	5403
72	330967	284576	288105
73	95503	116585	114912
98	2920	435	449
90	3549	2748	3084
55	3009	22270	27410
54	11737	8383	12251
34	7220	12281	10756
41	13758	17693	14013
45	441	1453	523
44	35525	49099	47805
67	1767	12691	14184

Table 3

Fresh Water Fish Production (Tons)

Fish	YEARS 1979	1980	1981	1982	1983	1984	1985	1986
Trout	290	798	527	602	769	1200	1102	1263
Cyprinoids	328	335	245	213	100	254	278	203
Mullet	684	1767	1846	1521	1408	1553	1517	1277
Common Carp	8489	9413	9886	11658	14875	18655	16967	17290
Northern Pike	395	625	796	667	463	642	927	608
Eels	536	1663	588	410	347	523	581	424
European Eel	396	224	374	424	588	616	583	517
Others	10684	16698	16046	16822	18608	21391	22205	18060

Source: 1987 Statistics Year Book (DIE)

The economic value of the water-products is shown in Table 4.

Table 4

Total Water Product Output by Amount and Value

Amount: 1000 Tons
Value: Million TL.

Items	1984 Realization Amount	Value	1985 Estimate Amount	Value	1986 Program Amount	Value	Increase per year % 1985/84	1985/86
Production	566.9	173471	610.5	186813	658.1	201.379	7.7	7.8
Export	12.5	10.500	14.5	12.180	16.9	14.196	16.0	16.6
Domestic demand	554.4	169.646	599.0	182.376	641.2	196207	7.5	7.6
Per capita cons. demand	11.3	-	11.9	-	12.5	-	-	-

Source: 1987 Economic Report Union of Trade Chambers

As to the GAP's contributions to the water-products potential in Turkey, it is known that the main targets of projects are energy production and irrigation. Agricultural production will be increased under this project as the newly available resources are evaluated from the point of view of water-products.

GAP covers an area of 74.000 km^2. and six provinces: Gaziantep, Adıyaman, Şanlıurfa, Diyarbakır, Mardin and Siirt. The area is made up of 6,481 hectares of land and 7,951 hectares of man-made lakes. The main fresh water

Table 5

The Main Fish Types in the Project Area

Fish	Adıyaman	Diyarbakır	Gaziantep	Mardin	Siirt	Şanlıurfa
(Lucioperca)	2.4			1.528		2
(Trout)				1.062		2.450
(Bream)		0.8		0.1		
(Black sheatfish)	9		55.1		55	2.65
Black Goby)			3			
(Grey Mullet)		0.1	1.75	1.645	5.3	3.5
(Roach)		12				1.1
(Carp)	110.6	47.275	1045.15	7.5	48.5	9.1
(Pike)			57.85			
(Sheatfish)	10.25	1.35		0.99		2.5
(Eel)			7.35	1.975		
(Others)	0.75			2.5		
Total	133.35	61.525	1170.2	17.3	108.8	23.3

Source: Atay, D.(1987) The Water-Products capacity of GAP.

Table 6

Fresh Water Fish Production and Consumption according to the Regions

Regions	Production (Ton)	%	Per capita fish cons. demand (Kg)
Black Sea	2702	8.37	21.75
Sea of Marmara	3780	11.72	4.38
Aegean	4008	12.43	2.29
Mediterranean	6836	21.35	1.95
Southeast Anatolia	805	2.50	0.20
Central Anatolia	10733	33.27	0.61
	3344	10.36	1.08
Total	32255	100	

Source: ATAY,D (1987) The water-products capacity of GAP

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Table 7 shows the mar
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The name of the lake
Dirsekli
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B. Kozanlı
Pınarbaşı
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Üçpınar
Sapkanlı
Gözebaşı
Kınık
Garzan
Ortaviran
Beşpınar
Gözegöl
Halilan
Kurtkayası
Kunreş
Kabaklı

Source: ATAY.D (1987) Th

fish types to be found in the project area are given in Table 5, while Table 6 gives figures for the various regions of Turkey.

Reconstruction activities under GAP are taking place on the rivers of the Fırat and Dicle system, so the individual resources in question are the reservoirs on the Fırat and on the Dicle. The Fırat is the longest river of Turkey and its level varies enormously from season to season, with 70% of the flow occurring between March and June, when snow melts in the high lands. The river has a number of species including eels and common carp. Unlike the Fırat, whose water has a neutral value, the Dicle is neütral-alchali. It contains common carp, black eels and other less valuable species.

Table 7 shows the man-made lakes, existing and planned, on the Fırat and the Dicle.

Table 7

Man Made Lakes on the Fırat and Dicle

The name of the lake	City	Capacity of storage ($100\ m^3$)
Dirsekli	Mardin	2522
Şerifbaba	Mardin	1650
Kırkat	Mardin	2159
Deşan	Mardin	250
Yıldıztepe	Mardin	2800
B. Kozanlı	Şanlıurfa	4.2
Pınarbaşı	Şanlıurfa	2660
Balıklı	Gaziantep	2531
Üçpınar	Gaziantep	3663
Sapkanlı	Gaziantep	3451
Gözebaşı	Adıyaman	910
Kınık	Adıyaman	1780
Garzan	Siirt	542
Ortaviran	Diyarbakır	3100
Beşpınar	Diyarbakır	1200
Gözegöl	Diyarbakır	16771
Halilan	Diyarbakır	7500
Kurtkayası	Diyarbakır	172
Künreş	Diyarbakır	792
Kabaklı	Diyarbakır	7500

Source: ATAY.D (1987) The water-products capacity of GAP

In the reservoirs of the Fırat and Dicle, when the dam-lakes and man-made lakes are constructed under GAP a lake area of 212,511 ha will be ready to be utilised. In the Keban Dam lake on the Fırat research activities show that Cyprinidae, Cobitidae, Bagridae, Sisoridae and other families are represented by twenty species, some of which are marketed regionally. The fishable stock-levels of these species are thought to total around 1000 tons/year. The fish types in the Dam Lake on the Dicle are gümüşbalığı (Atherina), bıyıklı balık and karagöz.

Cultivation is the main way of increasing production in the fields of water-products under GAP. This will be carried out in 42 artificial lakes with anticipated fishable stock-levels of 37 Kg/ha on average. Estimates show that the by the end of the project production will amount to approximately 8,157 tons, a figure equivalent to one-sixth of the production in inland waters. During fishery cultivation in the dam-lake, it is necessary to release 300 common carp fry, 8-10 cm. long, per hectare. The figure is 100 for carnivorous types. The problem today is that trout and common carp fry production in Turkey does not meet the demand of the GAP area. Production in nets is another way of improving the water-products capacity.

This can be done extensively, semi-intensively or intensively, according to the feeding and stocking methods used. Stationary or floating nets are used in this type of production in lakes with controlled watering channels. In extensive net production covering 240 m^2, 25 fishes of 25 g each are used per square metre and 1.2 tons of fish can be obtained per year from one hectare. In semi-intensive and intensive production, these figures are higher.

Another way of increasing production under the project may be breeding in channels. Nets are set at either end of a channel and intensive, semi-intensive or extensive breeding is carried out in the newly-acquired net fields. Yields of 5-10 tons per hectare (extensive), 15-20 tons per hectare (semi-intensive) and 40 tons per hectare (intensive) can be obtained.

In conclusion, Turkey will have substantially expanded her water products capacity when the dam-lakes and man-made lakes in the GAP area are ready to be utilized in addition to her present natural water-products resources. This is important from the points of view of both filling the animal protein gap in nutrition and providing an important employment field.

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