

REPUBLIC OF TURKEY  
PRIME MINISTRY



SOUTHEASTERN ANATOLIA PROJECT  
REGIONAL DEVELOPMENT ADMINISTRATION

AGRICULTURAL COMMODITIES MARKETING SURVEY  
PLANNING OF CROP PATTERN  
AND  
INTEGRATION OF MARKETING AND CROP PATTERN STUDIES

VOLUME I

Executive Summary

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*GAP Marketing and Crop Pattern Study*  
*Contents*

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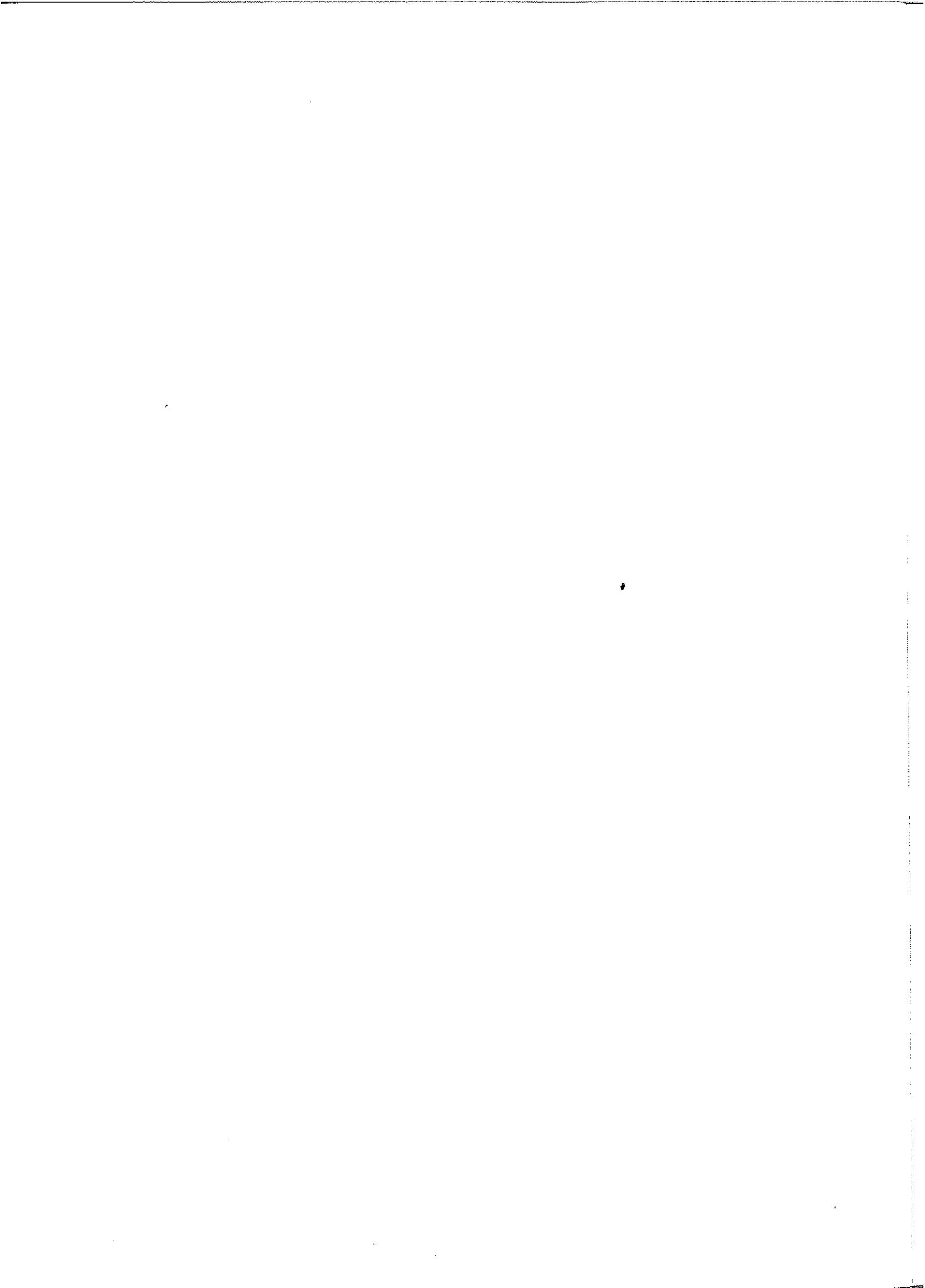
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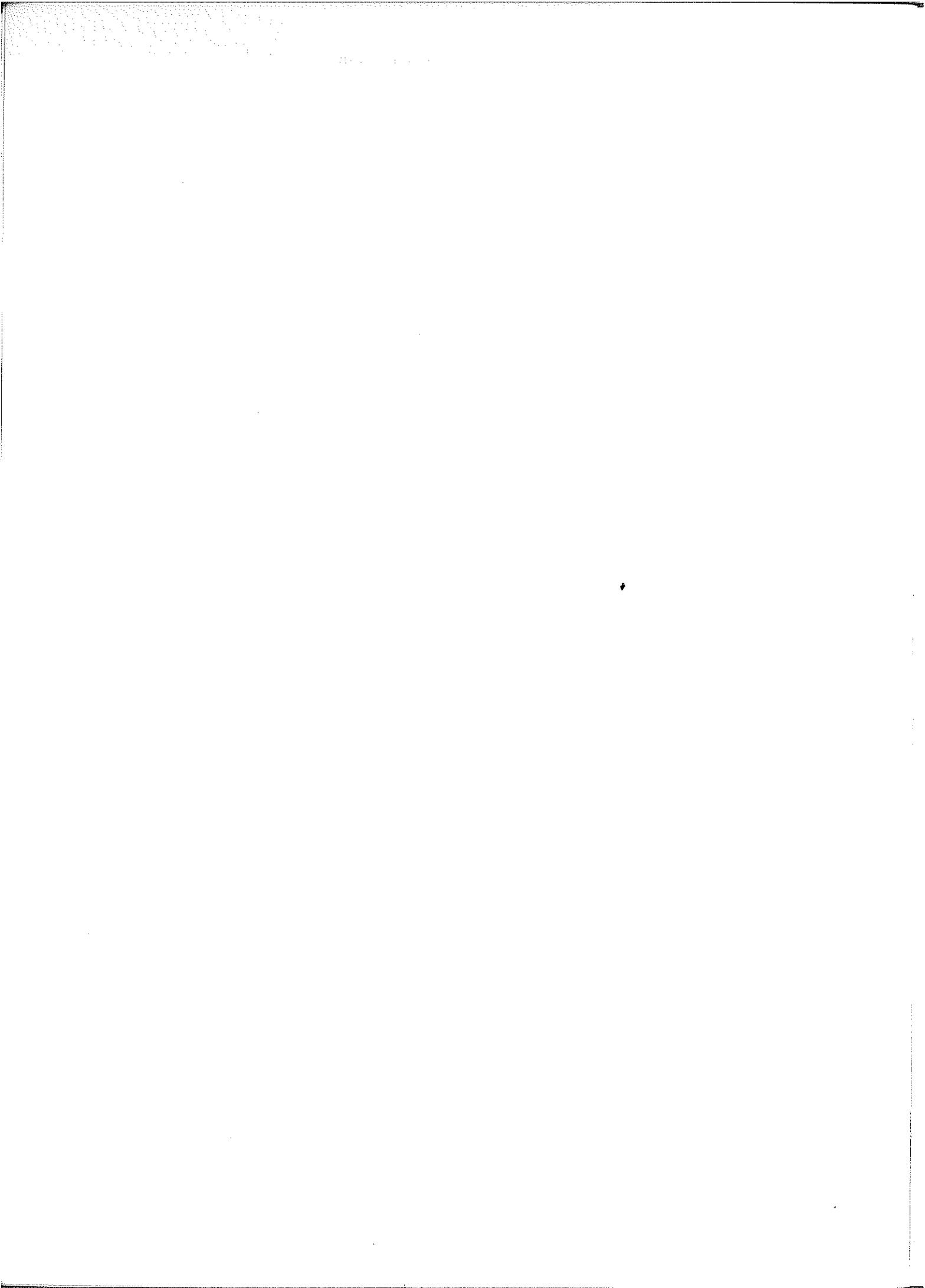
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## 1. Objectives of the Study

The GAP Project is one of the largest irrigation and development projects of its kind in the world, covering 3 million hectares of agricultural land. This is over 10% of the cultivatable land in Turkey, the land to be irrigated is more than half of the presently irrigated area in Turkey. Thus it has to be expected that with the completion of the irrigation projects, agricultural production in the GAP region will increase rapidly. Parts of the expanded production will be exported to the rest of Turkey and/or to the world market, depending on the emerging comparative advantages. To what extent this will occur depends mainly on the dynamics of general economic growth (population, income) in the GAP region and the rest of Turkey, and also on the perspectives of world market developments, which are influenced again by various economic and political factors.

All this shows that the design of a crop pattern and marketing strategy for the GAP region is a highly complex task. It requires not only to assess the production potential and comparative advantages of the GAP region, but also to consider at the same time the market interactions between the GAP region and the rest of Turkey, as well as between Turkey and other regions in the world.

Given this complex situation with many economic and political uncertainties, the objective of this study cannot be to determine *the* "optimal" crop pattern and marketing structure for the next two decades. Rather the objective has to be to provide projections and policy simulations under alternative general economic, world market and policy scenarios. The policy makers and project managers have to evaluate the impact of the various policy alternatives on their target variables. On this information they can base their decisions on policy strategies and measures for the stimulation of agricultural production and marketing in the GAP region, including possible adjustments of policies for Turkey as a whole.

Given, that we are living in a fast changing and highly interdependent world, the model scenarios and results as presented in this study can never be "final" and valid for the next two decades. Rather it is necessary to modify the scenarios and to update the models whenever newer information, knowledge and evidence becomes available. Therefore, an important concern of this study is to provide the GAP Administration with tools (computer models) which are flexible and easily updated, adjusted and employed under different policy environments.

## 2. Principal Modeling Approach

For the projections and policy simulations two types of computer models are employed:

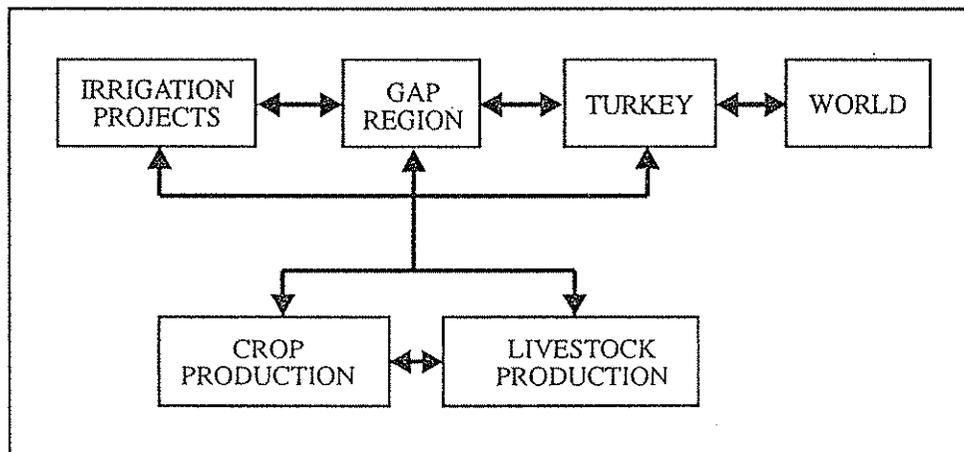
- the World Trade Model (WTM) and
- the Turkey and GAP Region Agricultural Sector Model (TURGAP)

The *World Trade Model* belongs to the type of multi-commodity trade models where each country / region is described by behavioural supply and demand functions. The main characteristic of these multiple-region models is to emphasize interrelations among countries and regions through agricultural trade. The WTM is a dynamic non-spatial partial equilibrium model, where world prices and regional market prices for goods are determined simultaneously by equating world net exports and net imports. This model is employed to determine the foreign trade conditions for Turkey under different world market scenarios, and at the same time the impact of Turkish production and demand on world markets. The WTM therefore forms the link between GAP region agriculture and the world market via Turkish agriculture.

The *TURGAP-Model* comprises the production conditions in the GAP region in a very differentiated form, and the rest of Turkey as an aggregate. On the demand side, product specific demand functions are specified, which shift in the course of time under the influence of population and income growth.

Methodologically, TURGAP is a multi-regional, partial equilibrium, quadratic programming model. The model endogenously determines output prices and factor prices, as well as input use, production, consumption, and foreign trade.

Both models, the WTM and TURGAP, have to be considered as two parts of a comprising modelling system, which captures the following interdependencies:



It has to be stressed, that both models are "positive models" in the sense that they forecast *to be expected* developments under given general economic and political scenario conditions. Thus, they can be employed to show the impact of alternative (GAP specific and general Turkish) policies on the relevant target variables. In this way, "optimal policies" from the viewpoint of policy makers and project managers can emerge, if stepwise the "best fitting" combination of target realizations in dialogue with the policy makers is being explored.

### 3. Past-Performance and Present Situation

#### 3.1 International Trade of Turkish Products

Turkey is a traditional exporter of food products, mainly of fruits and vegetables. During the last decades also food imports have increased rapidly, but Turkey is still a large net exporter of agricultural products.

Turkey's agricultural exports have increased from 1980 to 1988 heavily by about 65%, in comparison to an increase of total world exports of only 37%. The much stronger increase was due to a favourable commodity composition (29%) and increased competitiveness (54%), while an unfavourable distribution of Turkish export markets worked in the opposite direction (-20%). The complete results of this market share analysis for total Turkish agricultural exports are presented in Table 3.1.

**Table 3.1: Analysis of Changes in Turkey's Agricultural Exports 1980-1988 (In \$1000)**

Turkey's exports in 1980:	*1 834 560	
Turkey's exports in 1988:	3 028 557	
Change in exports :	1 193 997	(100%)
Due to increase in world trade:	439 958	(37%)
Due to commodity composition:	354 551	(29%)
Due to market distribution:	- 244 434	(-20%)
Due to increased competitiveness:	643 921	(54%)

The results of a corresponding differentiated analysis for commodity groups is shown in Table 3.2. It is to be seen that fruits and vegetables have contributed more than half to the total agricultural export increase (643 million US\$). Further important export commodities are cereals and live animals.

An analysis of the regional distribution of Turkish agricultural exports shows that the exports to the nearby Middle East and East European countries were stagnating, partly even decreasing, during the last decade.

The agricultural exports of the GAP region are concentrated on animal products (189 million US\$) and vegetable and fruits (24 million US\$). In total, about 10% of Turkey's agricultural exports originate from the GAP region.

**Table 3.2: Analysis of Changes in Turkey's Agricultural Exports by Commodity Classes 1980-1988 (In \$1000)**

	actual increase	due to increase in world trade	due to commodity composition	due to market distribution	due to increased competitiveness
Live Animals	150,735 100%	23,710 16%	8,414 6%	-7,936 -5%	126,547 84%
meat	24,972 100%	4,952 20%	2,673 11%	-11,028 -44%	28,374 114%
dairy products	27,400 100%	347 1.3%	364 1.3%	-370 -1.3%	27,060 98.8%
cereals	229,004 100%	24,996 11%	-36,657 -16%	15,697 7%	224,968 98%
fruit&vegetab.	643,969 100%	224,838 35%	333,605 52%	-171,691 -27%	257,215 40%
feedings	12,267 100%	15 0.1%	19 0.2%	-6 0.0%	12,239 99.8%
misc.food	98,026 100%	8,896 9%	-9,193 -9%	-2,169 -2%	100,492 102%
beverages & tobacco	38,338 100%	56,912 149%	37,304 97%	-33,982 -89%	-21,896 -57%
textile fibers	-166,860 -100%	82,645 50%	476 0%	-28,626 -17%	-221,355 -133%
crude materials	53,316 100%	9,510 18%	18,990 36%	-2,578 -5%	27,393 51%
oils & fats	82,831 100%	3,137 4%	-1,445 -2%	-1,745 -2%	82,884 100%

### 3.2 Agricultural Production in Turkey and the GAP Region

The agricultural production performance was rather successful in the last decade. Besides satisfying a rapid increasing domestic demand (high population growth, high income growth), it was possible to expand agricultural exports rapidly, as has been shown in the last section.

The GAP region has a share of about 8.5% in the agricultural production value of Turkey (Table 3.3).

**Table 3.3: Agricultural Production Value 1989 (billion TL)**

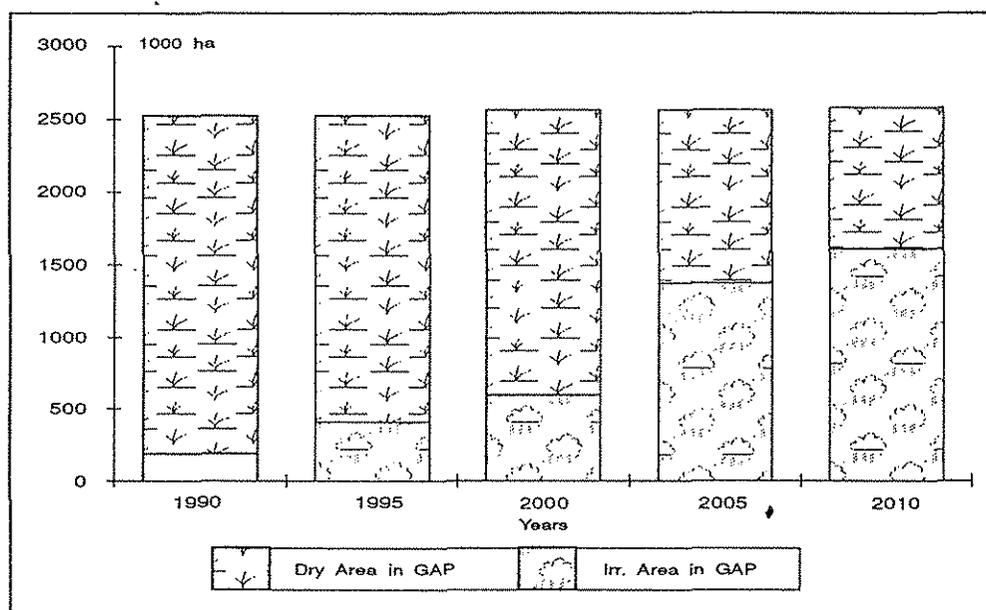
	Cereals	Pulses	Vegetables	Industrial Crops	Fruits	Total
<b>TURKEY</b>	7,483.1	1,338.1	6,681.5	8,826.8	8,540.0	32,869.5
% of crops in value	22.8%	4.1%	20.3%	26.9%	26.0%	100.0%
<b>ADIYAMAN</b>	66.4	50.6	23.7	141.0	86.3	368.1
% of crops in value	18.0%	13.8%	6.4%	38.3%	23.5%	100.0%
% in Turkey	0.9%	3.8%	0.4%	1.6%	1.0%	1.1%
% in GAP	12.1%	14.6%	5.5%	18.0%	12.7%	13.2%
<b>DIYARBAKIR</b>	139.3	67.1	135.5	163.5	71.2	576.7
% of crops in value	24.2%	11.6%	23.5%	28.3%	12.4%	100.0%
% in Turkey	1.9%	5.0%	2.0%	1.9%	0.8%	1.8%
% in GAP	25.4%	19.4%	31.4%	20.9%	10.4%	20.7%
<b>GAZIANTEP</b>	56.3	41.1	58.5	65.8	278.3	500.2
% of crops in value	11.3%	8.2%	11.7%	13.2%	55.6%	100.0%
% in Turkey	0.8%	3.1%	0.9%	0.7%	3.3%	1.5%
% in GAP	10.3%	11.9%	13.6%	8.4%	40.8%	17.9%
<b>MARDIN</b>	59.2	50.5	110.5	49.1	75.6	345.0
% of crops in value	17.2%	14.7%	32.0%	14.2%	21.9%	100.0%
% in Turkey	0.8%	3.8%	1.7%	0.6%	0.9%	1.0%
% in GAP	10.8%	14.6%	25.6%	6.3%	11.1%	12.4%
<b>SIIRT</b>	47.1	23.9	29.7	121.5	40.0	262.4
% of crops in value	18.0%	9.1%	11.3%	46.3%	15.3%	100.0%
% in Turkey	0.6%	1.8%	0.4%	1.4%	0.5%	0.8%
% in GAP	8.6%	6.9%	6.9%	15.5%	5.9%	9.4%
<b>URFA</b>	180.8	112.4	74.0	241.9	130.7	739.9
% of crops in value	24.4%	15.2%	10.0%	32.7%	17.7%	100.0%
% in Turkey	2.4%	8.4%	1.1%	2.7%	1.5%	2.3%
% in GAP	32.9%	32.5%	17.1%	30.9%	19.2%	26.5%
<b>GAP TOTAL</b>	549.3	345.9	432.1	783.1	682.3	2,792.7
% of crops in value	19.7%	12.4%	15.5%	28.0%	24.4%	100.0%
% in Turkey	7.3%	25.8%	6.5%	8.9%	8.0%	8.5%

Among the commodity groups, the share of pulses is much higher and that of cereals somewhat lower in the GAP region than in Turkey as a whole. The production composition in the provinces of the GAP region varies greatly.

#### 4. GAP Irrigation Projects

When all the projects in the GAP region will have been completed, more than half of the agricultural land in the GAP region can be irrigated (Figure 4.1).

Figure 4.1: Dry and Irrigable Areas in the GAP Region 1990-2010 (1000 ha)



In the following only some aspects of irrigation with respect to land use will be mentioned.

Table 4.1: Shares of Landclasses in Dry and Irrigable Areas in the GAP Region 1990-2010 (%)

		Land Classes			
		All	1	2	3+
1990	dry	100.0	25.9	27.9	46.2
	irr	100.0	62.3	19.7	18.0
1995	dry	100.0	22.8	28.7	48.5
	irr	100.0	60.8	18.7	20.6
2000	dry	100.0	22.3	29.3	48.4
	irr	100.0	49.2	19.9	30.9
2005	dry	100.0	23.3	29.3	47.4
	irr	100.0	34.1	23.3	42.6
2010	dry	100.0	15.7	29.2	55.2
	irr	100.0	36.5	24.9	38.5

In 1990 the main part of the irrigated land belonged to the first land use capability class. By finalization of the irrigation projects, all three land classes will have similar shares in the total irrigable land (Table 4.1).

In Table 4.2 the expansion of irrigated land in the different land classes is shown. In the first land class irrigable land will increase about 5 times from 1990 to 2010, while it will increase in second and third class much faster. This is important to have in mind for the later interpretation of model results.

Other factual aspects of the irrigation system will be discussed later within the context of model specification and interpretation of model results.

**Table 4.2: Developments of Irrigable Landclasses 1990-2010 (1990 = 1.00)**

Year	Land Classes			
	All	1	2	3+
1990	1.00	1.00	1.00	1.00
1995	2.21	2.16	2.10	2.53
2000	3.25	2.57	3.28	5.58
2005	6.13	3.36	7.25	14.50
2010	8.98	5.27	11.37	19.21

## 5. World Market Developments

The projections of world market developments under different scenario conditions are provided by the World Trade Model (WTM).

### 5.1 Characteristics of the World Trade Model

The WTM belongs to the type of multi-commodity trade models, where all regions, in the disaggregated version 55, are described by a set of behavioural supply and demand functions for agricultural commodities. The main factors which determine the market developments are:

- the *price elasticities* which describe the flexibility of supply and demand responses, taking into account linkages between commodities,
- trend factors* which shift the supply and demand functions, and
- policy parameters* (price transmission elasticities, PSE/CSEs) which determine the impact of policy scenarios on model variables.

World market prices and the prices for the single countries/regions are determined simultaneously by equating the sum of net exports and net imports of all countries. The model solution gives the world market clearing prices, as well as equilibrium quantities of supply and demand for each country/region.

The model starts from a base year equilibrium in 1987 and projects the time path of all prices and quantities over several subperiods up to the year 2010.

## 5.2 World Market Scenarios

The projections are performed under two main policy scenarios:

- *Base Scenario*: Here it is assumed that all countries continue the agricultural policies of the past, so that their level of support does not change up to 2010.
- *GATT-Scenario*: This scenario is based on the Dunkel-proposal for the GATT-negotiations of Dec. 1991. It is assumed that the proposed reduction of the support level (over the period 1993 to 1999) will continue at the same time path up to the year 2010 in all countries. The overall support will then be reduced by 50% and the border barriers by almost 90% over the whole simulation period.

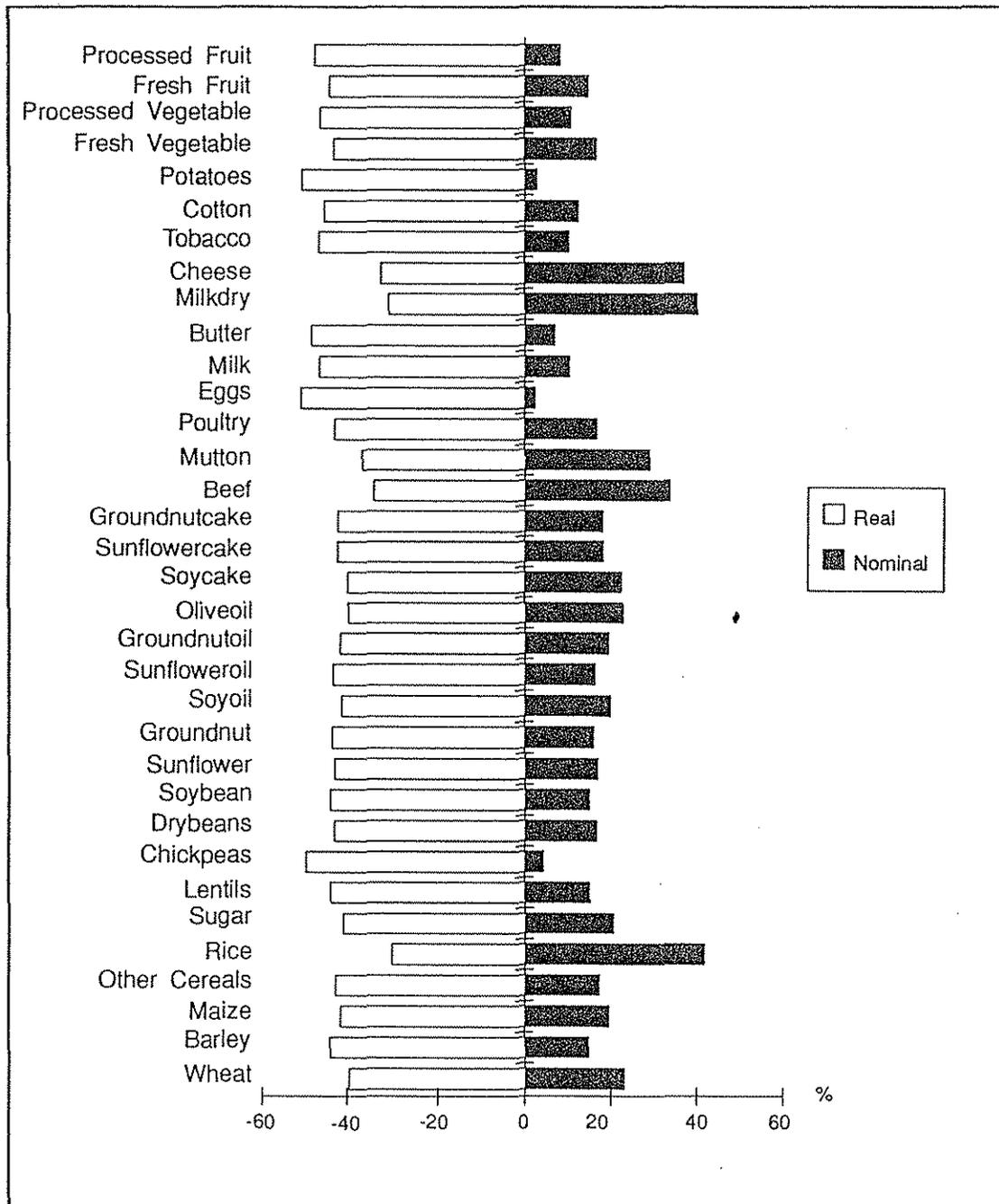
The changes of world market prices which result from these two scenarios will be presented in the following. They constitute basic scenario assumptions for the production model for the GAP and the rest of Turkey (TURGAP).

Further world market scenarios ("GATT: Partial Liberalisation" and "Radical changes in the Agricultural Sectors of former Socialist Countries") have been defined. Selected aspects of the results are presented in the following, more detailed results can be found in Volume IV.

## 5.3 Model Results

Under the *Base Run Scenario*, the projected world market prices for most commodities show similar price trends as the long-term developments in the past. Most nominal commodity prices (in US\$) increase slightly between 0.3 and 1.7% per year. This corresponds to decreases of *real* (deflated) world market prices for agricultural commodities in a range from -1.5 to -3% per year. The changes of nominal and real world market prices over the whole period 1990 - 2010 are shown in Figure 5.1.

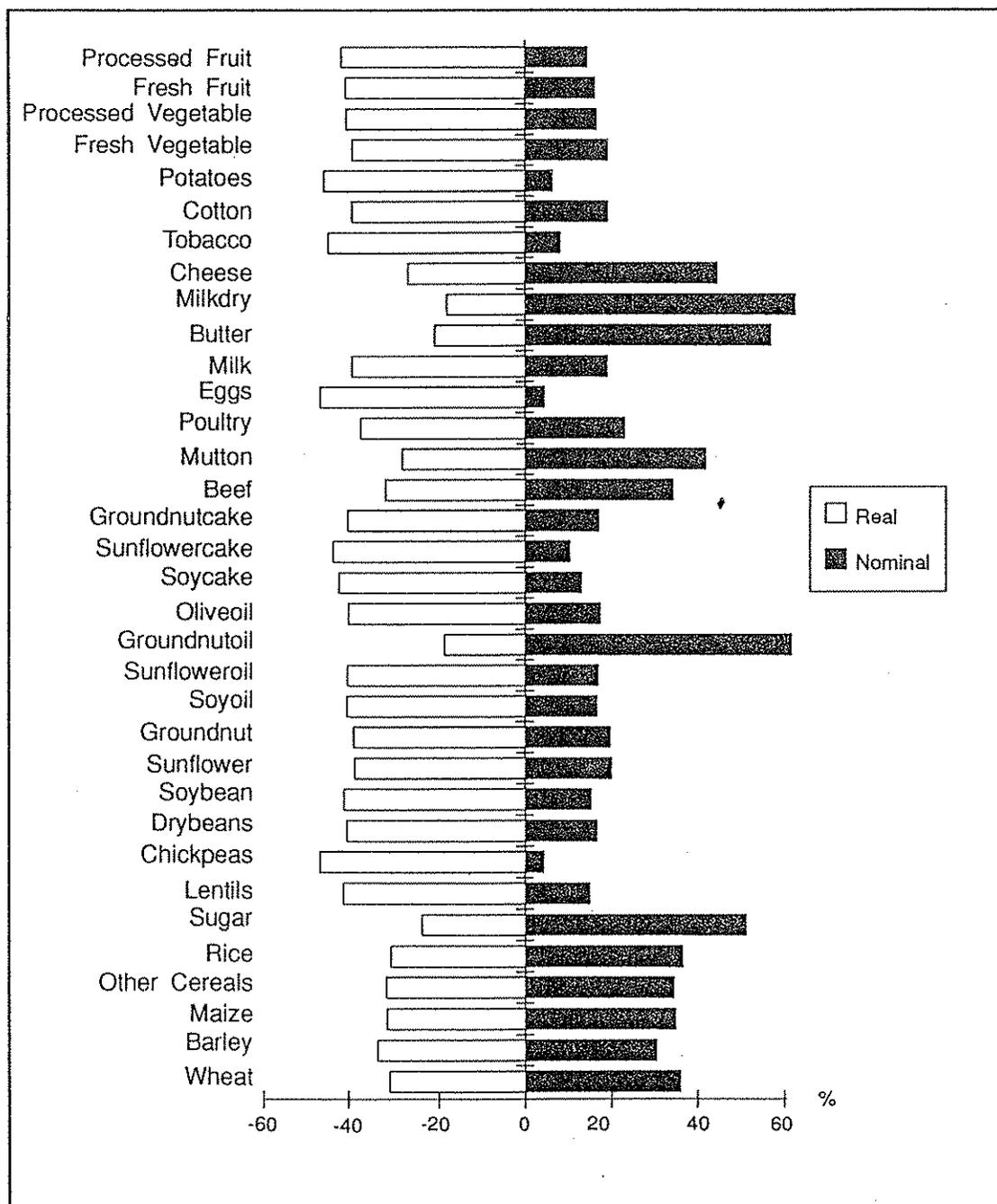
Figure 5.1: Nominal and Real Price Changes 1990-2010 In % (Base Scenario)



The results of the *GATT-Scenario* show for most agricultural commodities higher prices than in the Base Scenario (Figure 5.2). This is especially true for those commodities which are highly supported in the main producing countries, especially sugar, milk products, and the grains. These characteristic price deviations can be explained as follows: The reduction of trade barriers and export subsidies decreases producer and consumer prices, especially in the highly protected countries. The lower producer prices tend to reduce production whereas lower consumer prices stimulate demand. This causes world market prices to rise to a higher level (or in real terms: to decrease less) as compared to the Base Scenario. The

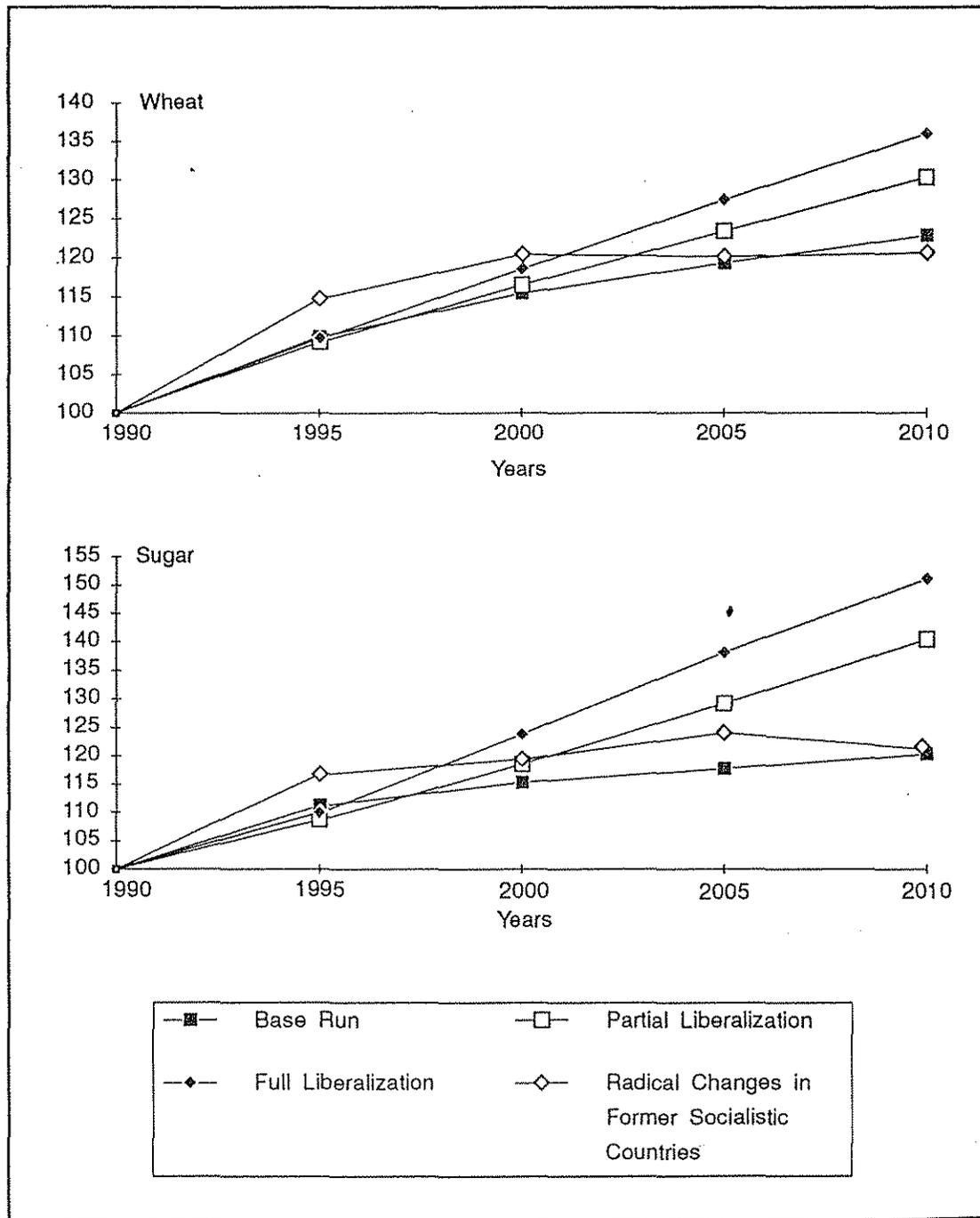
higher the former support of an individual product, the higher is the (relative) increase of the world market price.

Figure 5.2: Nominal and Real Price Changes 1990-2010 in % (GATT Scenario)



Scenario 3: The results of "GATT-Partial Liberalisation" tend into a similar direction, as shown for selected commodities in Figure 5.3.

Figure 5.3: Price Changes for Wheat and Sugar 1990-2010 (1990=100)



*Scenario 4: "Radical changes in the former socialist countries".* The impact of this scenario on world market prices depends largely on the specific assumptions about the depth of the fall of agricultural production in these countries during the phase of radical change, and the rapidity of its later recovery. This is clearly shown in Figure 5.3 and 5.4.

In these graphs the price developments over time are shown for all four scenarios. While for the Base Run and the GATT scenario price developments follow a rather stable pattern, in scenario 4 price changes vary considerably over time for some of the products. This is very obvious for wheat and sugar. In the first two periods, prices increase sharply due to a stagnating production caused by the adjustment problems in the socialistic countries. Later on production catches up and causes prices to stagnate more or less.

As can be seen from the developments for these selected products, for a realistic analysis of these impacts it would be necessary to monitor the situation and update model assumptions continuously.

#### **5.4 Implications for Turkey**

The expected price trends for agricultural producers in all parts of the world, also in Turkey and the GAP region, are not bright. This means that the next two decades seem to become again a phase of rapid structural adjustment in agriculture.

If the GATT negotiations are successful, it can be expected that the price ratios of world market prices will move slightly in favour of those commodities which have been highly supported by the developed countries during the last decades, as sugar, cereal products and milk products. In the longer term these changes might have a significant impact on the production structure and crop pattern in Turkey and the GAP-region.

### **6. Development of Agricultural Production in the GAP Region and Turkey**

#### **6.1 Characteristics of the Turkey and GAP Region Agricultural Sector Model**

To analyse the developments in the agricultural sector in the GAP Region and the rest of Turkey, over the next two decades covering the various stages of development of GAP irrigation projects, a region nested agricultural sector model (TURGAP) is constructed and employed together with the World Trade Model (WTM) described above.

The TURGAP Model is a partial equilibrium model of the agricultural sector of Turkey. It is a non-linear programming model with quadratic objective function which maximizes the sum of consumer and producer welfare.

TURGAP has a nested structure. The GAP Region is nested in Turkey and the individual irrigation projects are nested in the GAP region. All components are acting with each other through input and output flows and the model is solved simultaneously.

The model simulates the variables such as crop pattern, production, trade, livestock and human consumption, international trade, producer prices, factor prices, factor use at the project, GAP region and national levels.

The model works with price responsive domestic demand functions and foreign trade demand functions generated by the WTM. The supply functions are determined endogenously by the model based on the non-linear cost structures of individual crop activities.

The model treats simultaneously the field crops, perennial crops and livestock sector. There are 83 products in the model, 37 of which are field crops, 20 are perennial crops, 20 are livestock products and 6 are feed crops. 8 agro-climatic zones are specified for non-GAP regions and 732 sub-regions are specified for the GAP region. The GAP region is divided into dry and project areas and each are divided by 4 land capability classes. The model solutions are, therefore, specific for these 740 sub-regions.

In the model labour, machinery and water inputs are specified monthly (10 day periods during peak months) for the GAP region and quarterly for the rest of Turkey. Two types of fertilizers, namely nitrogen and phosphate are employed as inputs, in addition to seeds, and feed for livestock where variable feed rations are specified consisting of crop by-products, concentrates, grains, fodder and oilcakes.

All in all, TURGAP is one of the largest sector models of its kind in the literature and by far the largest which can be operated on personal computers. It has approximately 4500 variables and 1250 equations.

## **6.2 TURGAP Scenarios**

TURGAP is first employed to project the developments in the production, trade, consumption, factor use, factor and output prices in the GAP region and the rest of Turkey at the project and land class levels for the years 1995, 2000, 2005 and 2010. It is then employed to analyse the likely impacts of changes in the demand and supply conditions exogenous to the GAP region agriculture. To this end the following scenarios are conducted with TURGAP:

- World Market Developments: GATT Scenario
- Domestic Market Developments: Population and Income Growth Scenario
- GAP Management Developments: Project Efficiency Scenario and Irrigable Area Scenario.

## **6.3 Model Results and Implications for Turkey**

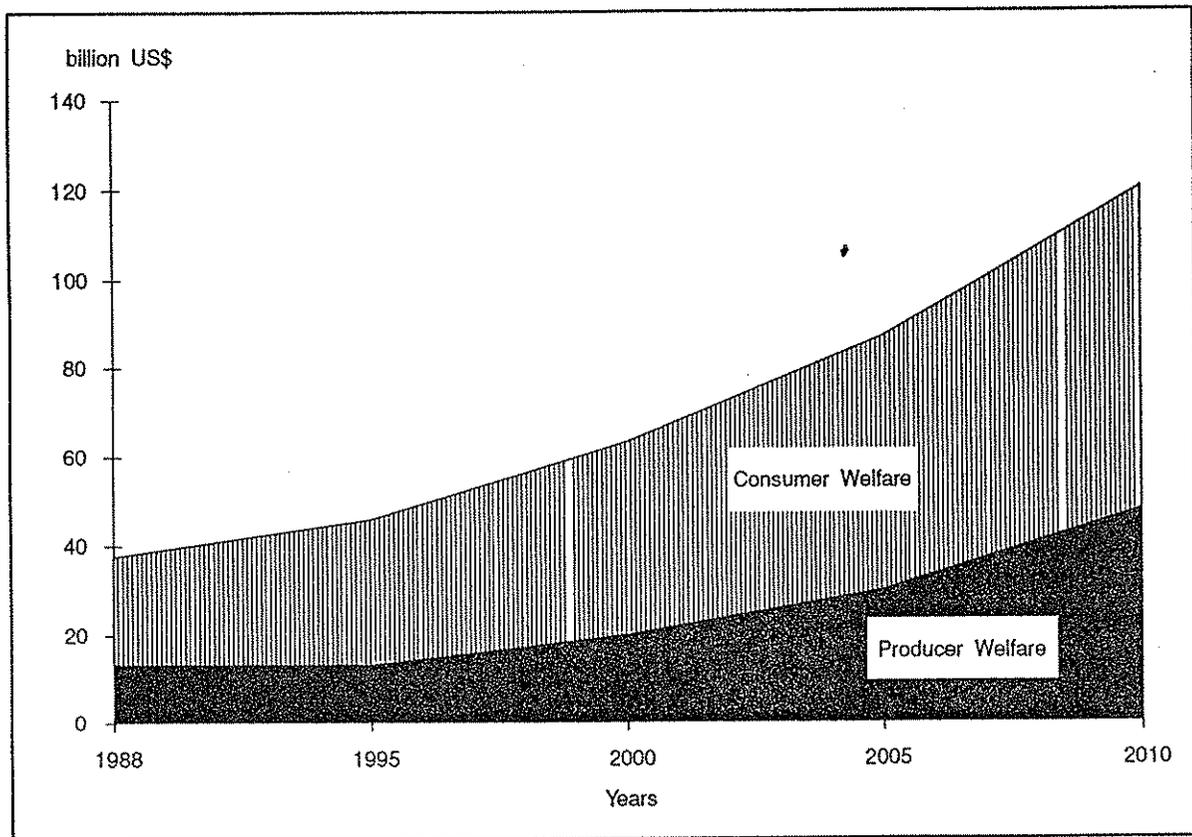
### **6.3.1 Base Projections to 2010**

Over the next two decades the welfare of the agricultural producers and consumers of food derived from the agricultural sector is expected to nearly triple. The welfare of the producers is predicted to increase by 25 percent more than that of consumers (Table 6.1 and Figure 6.1).

Table 6.1: Welfare Indices (billion US\$)

Year	Total Welfare	Consumer Welfare	Producer Welfare	Total Welfare index	Consumer Welfare Index	Producer Welfare Index
1988	37,60	24,81	12,79	100,00	100,00	100,00
1995	45,92	32,70	13,23	122,13	131,80	103,44
2000	63,25	43,14	20,11	168,22	173,88	157,23
2005	86,91	56,83	30,07	231,14	229,06	235,11
2010	120,38	72,38	48,00	320,16	291,74	375,29

Figure 6.1: Welfare Developments (billion US\$)

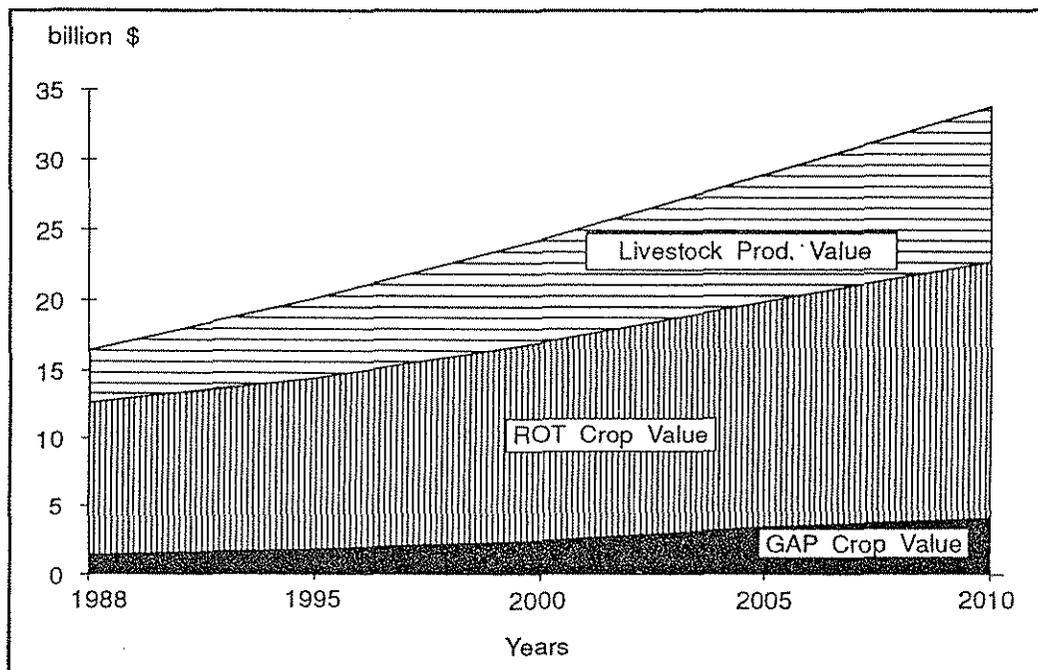


Between 1988 and 2010 the value of agricultural production in Turkey increases by nearly five times, from 16.4 to 75 billion US\$. Nearly half of the increase in value of production comes from increases in the quantity of production and little more than half comes from the increases in the prices of agricultural products, due to higher domestic demand and favourable international market conditions (Table 6.2, Figure 6.2). In other words, the volume of production more than doubles in the studied period.

**Table 6.2: Value of Production in the GAP Region and Turkey**

Year	Value of Production (billion \$)			Volume of Production (1988 Prices - billion \$)		
	Turkey Total Value	Turkey Crop Value	GAP Crop Value	Turkey Total Volume	Turkey Crop Volume	GAP Crop Volume
1988	16,43	12,56	1,40	16,43	12,56	1,40
1995	25,80	17,37	2,16	20,14	14,46	1,87
2000	36,78	22,81	3,08	24,30	16,99	2,44
2005	51,58	29,53	4,72	28,97	19,85	3,42
2010	75,84	40,31	6,49	33,80	22,68	4,03
Year	Indices of Value (1988=100)			Indices of Volume (1988=100)		
	Turkey Total Value	Turkey Crop Value	GAP Crop Value	Turkey Total Volume	Turkey Crop Volume	GAP Crop Volume
1988	100,00	100,00	100,00	100,00	100,00	100,00
1995	157,03	138,30	154,29	122,58	115,13	133,57
2000	223,86	181,61	220,00	147,90	135,27	174,29
2005	313,94	235,11	337,14	176,32	158,04	244,29
2010	461,59	320,94	463,57	205,72	180,57	287,86

**Figure 6.2: Value of Production in the GAP Region and Turkey (1988 Prices)**



In 1988, the livestock products constituted 24 percent of the value of production. In 2010 the value of livestock production is predicted to increase to 36 billion US\$, in 2010 \$ prices, constituting 47 percent of the total agricultural production value.

The value of crop production is projected to increase by 3.2 times from 12.6 billion US\$ in 1988 to 40.3 billion US\$ in 2010 in current \$ prices. The increase in 1988 prices is 1.8 times, implying that increases in the quantity of production between 1988 and 2010 account for nearly 60 percent and the increase in prices account for the remaining 40 percent of the threefold increase in the value of crop production (Table 6.2, Figure 6.2).

The value of crop production in the GAP region was 1.4 billion US\$ in 1988 and constituted 11 percent of the total agricultural crop value in Turkey. In 2010 with the full realization of GAP, the value of crop production in the GAP region is expected to increase by 4.6 times to 6.5 billion US\$, constituting 18 percent of the total value of crop production of Turkish agriculture. Over 60 percent of the increase in the value of GAP crop production will come from production increases and the remaining 40 percent from price increases (Table 6.2 and Figure 6.2).

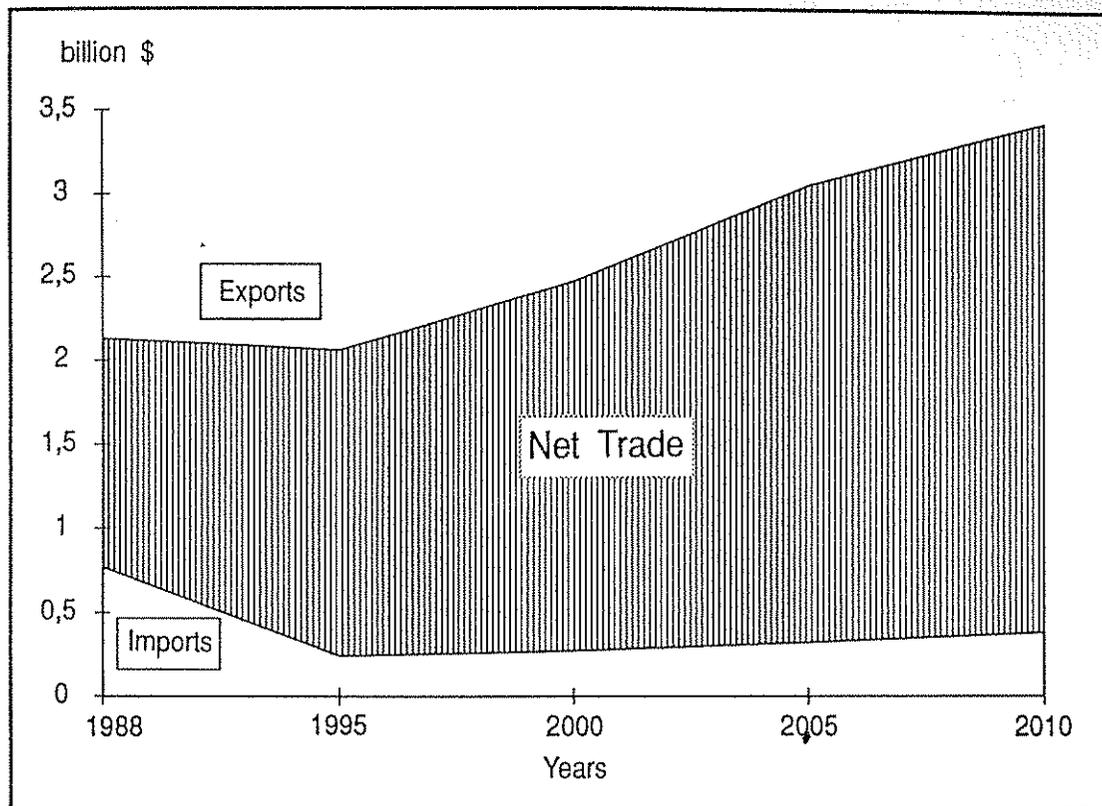
Therefore, over the next two decades GAP region will account for nearly 20 percent of the increase in total Turkish value of crop production.

**Table 6.3: International Trade In Agriculture**

Year	Exports (bil. \$)	Imports (bil. \$)	Net Trade (bil. \$)	Net Trade Index
1988	2,13	0,77	1,36	100,00
1995	2,06	0,24	1,82	134,81
2000	2,47	0,27	2,20	162,96
2005	3,04	0,32	2,73	202,22
2010	3,40	0,38	3,02	226,67

The net value of Turkish agricultural foreign trade is also projected to increase by over two fold. The expectations of higher returns from foreign trade are projected not to be realized both from the GAP region and the rest of Turkey, due to high increases in domestic demand as a result of high population and income growth rates, which is projected to absorb most of the two fold increase in production. Thus, the ratio of net trade earnings from agriculture to total value generated there, falls from 8 percent in 1988 to 4 percent in 2010 (Table 6.3, Figure 6.3).

Figure 6.3: International Trade in Agriculture



The agricultural production in the GAP region, is expected to register significant structural changes in the next two decades. With the completion of the irrigation projects, the region is expected to move from a region dependent on the agricultural production of the rest of Turkey in 1988 to a region which is self sufficient in most products and an exporter to the rest of Turkey in many products including corn, barley, chickpea, lentil, groundnut, soybean, cotton, fruits (Table 6.4, Figure 6.4).

**Table 6.4: Production in the GAP Region and Turkey**

Crop	Share of GAP 1988	Share of GAP 2010	GAP2010/ GAP 1988	TUR2010/ TUR 1988
WHEAT	0.10	0.15	2.05	1.34
CORN	0.00	0.28	174.97	2.12
RYE	0.00	0.15	INF	2.13
BARLEY	0.16	0.16	1.69	1.76
RICE	0.03	0.15	4.11	0.77
CHICKPEA	0.18	0.54	4.41	1.44
DRYBEAN	0.03	0.15	11.39	2.02
LENTIL	0.79	0.74	1.24	1.32
DRYBEAN	0.00	0.00	0.00	2.22
POTATO	0.00	0.15	82.57	2.16
ONION	0.12	0.15	2.53	1.98
TOMATO	0.04	0.15	6.56	1.93
AUBERGINE	0.14	0.15	2.28	2.15
MELON	0.18	0.15	1.86	2.18
CAULIFLOWER	0.00	0.15	INF	2.16
WATER-MELON	0.18	0.15	1.84	2.18
CARROT	0.03	0.15	12.00	2.04
CABBAGE	0.00	0.15	100.81	2.11
CUCUMBER	0.05	0.15	9.19	2.09
OCRA	0.05	0.15	6.09	2.13
PEPPER	0.06	0.17	6.05	2.11
LETTUCE	0.04	0.15	8.46	2.09
SPINACH	0.01	0.15	29.47	2.11
SQUASH	0.03	0.15	8.13	1.55
LEEK	0.00	0.15	INF	2.03
GROUNDNUT	0.00	1.00	INF	2.59
SESAME	0.54	0.15	0.63	2.26
SUNFLOWER	0.00	0.05	INF	2.82
SOYABEAN	0.00	0.89	INF	5.14
LINSEED	0.15	0.00	0.00	3.35
COLZA	0.00	0.00	0.00	2.50
COTON	0.12	0.37	5.63	1.91
TOBACCO	0.12	0.13	2.46	2.21
SUGARBEET	0.00	0.17	1725.79	2.50
PISTACHIO	0.85	1.00	3.59	3.07
HAZELNUT	0.00	0.00	0.00	0.75
OLIVE	0.04	0.10	4.59	1.61
TEA	0.00	0.00	0.00	1.74
GRAPE	0.21	0.24	2.58	2.19
FIGS	0.03	0.15	7.48	1.72
ORANGE	0.00	0.00	0.00	2.14
LEMON	0.00	0.00	0.00	1.68
APPLE	0.00	0.15	114.77	2.24
PEARS	0.01	0.00	0.00	2.28
PEACH	0.01	0.15	68.41	2.36
APRICOT	0.02	0.40	31.14	1.35
CHERRY	0.01	0.15	66.71	2.30
WILD CHERRY	0.01	0.65	189.33	2.17
POMEGRANATE	0.21	1.00	9.00	1.92

Figure 6.4: Domestic Trade Flows between GAP and ROT

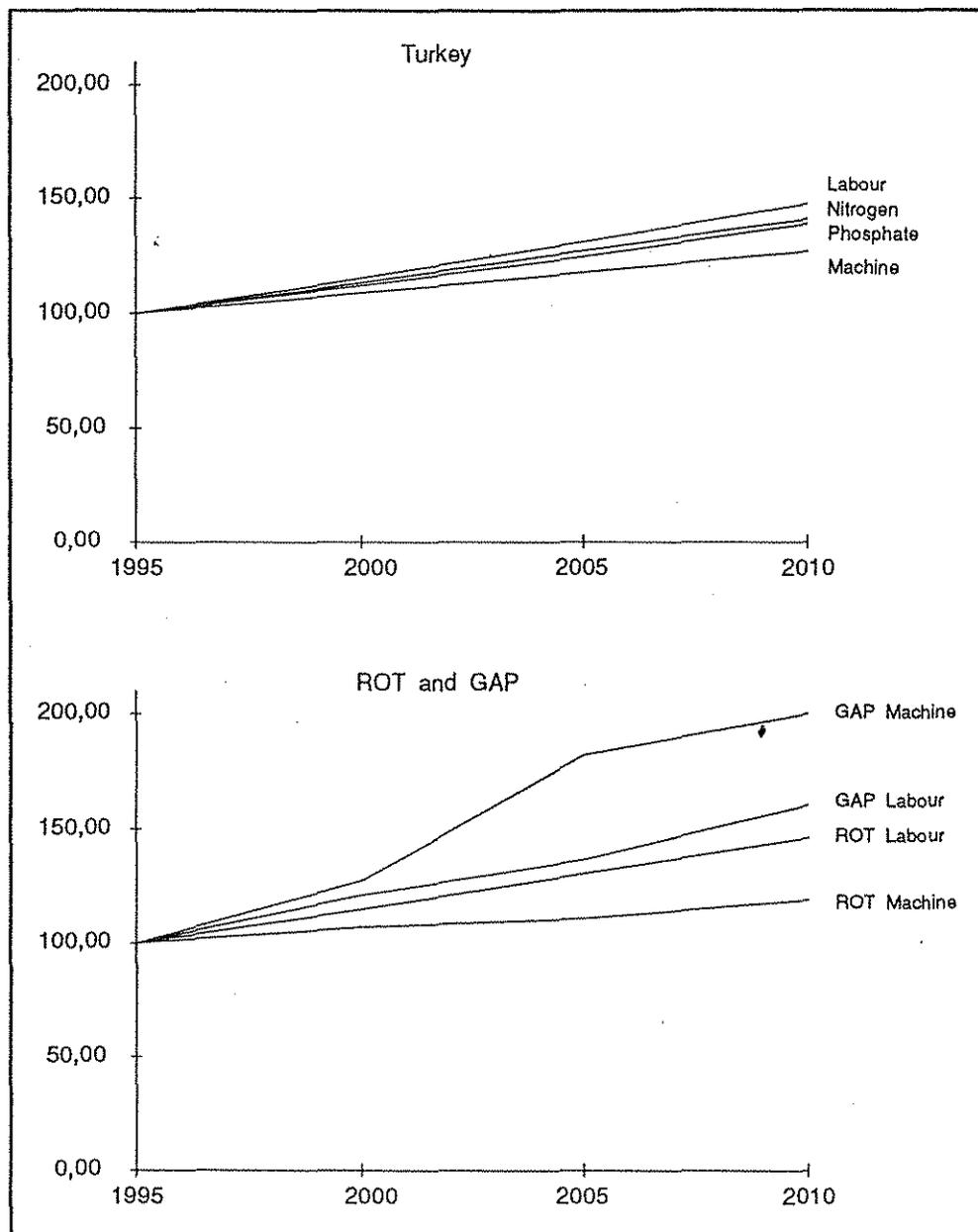
Year	Produced in GAP Surplus Sold to ROT.	Produced in GAP no Surplus or Deficit	Produced in GAP Deficit Purchased from ROT	Not Produced in GAP Purchased from ROT	
1988	BARLEY CHICKPEA LENTIL ONION MELON W.MELON SESAME LINSEED	COTTON TOBACCO PISTACH. GRAPE POMEGR.	WHEAT	RICE OKRA DRYBEAN PEPPER POTATO LETTUCE TOMATO SPINACH AUBERG. SQUASH CARROT LEEK CABBAGE SUGARB. CUCUMBER OLIVE FIGS APPLE PEARS PEACH APRICOT CHERRY W.CHERRY	CORN HAZELNUT RYE TEA DRYPEA ORANGE CAULIFL. LEMON GROUNDNUT SUNFLOWER SOYABEAN COLZA
2010	CORN BARLEY CHICKPEA LENTIL PEPPER GROUNDNUT SOYABEAN COTTON SUGARBEET PISTACHIO GRAPE APRICOT W.CHERRY POMEGRAN	WHEAT MELON RYE CAULIF RICE W.MELON DRYBEAN CARROT POTATO CABBAGE ONION CUCUMBER TOMATO OKRA AUBERG. LETTUCE SPINACH SQUASH LEEK SESAME FIGS APPLE PEACH CHERRY	SUNFLOWER TOBACCO OLIVE	DRYPEA LINSEED COLZA HAZELNUT TEA ORANGE LEMON PEARS	

With the increases in agricultural output, the demand for inputs increases, resulting in additional employment and higher returns. The demand for agricultural labour in Turkey is projected to increase by 76 percent and for machinery by 34 percent. In the GAP region the demand increases are 160 percent and 200 percent respectively for labour and tractors, between 1995-2010 as compared to 46 and 19 percent in the rest of Turkey. However, it should be realized that the increases in labour demand given above are not sufficient to absorb the existing underemployment in agriculture and the additional employment opportunities created by agriculture are likely to be nullified by high growth rates in population and hence labour availability. Nevertheless, the relatively higher growth rates in the GAP region of labour demand would likely have a slowing down effect on migration out of the region (Table 6.5, Figure 6.5).

Table 6.5: Labour, Machinery and Fertilizer Use Indices

Year	Turkey				ROT		GAP	
	Labour	Machine	Nitrog.	Phosph.	Labour	Machine	Labour	Machine
1995	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
2000	115,44	109,03	112,25	113,55	114,88	107,04	121,13	127,50
2005	131,01	117,67	124,50	127,11	130,46	110,72	136,62	182,16
2010	147,47	126,80	138,74	140,87	146,18	118,90	160,56	200,09

Figure 6.5: Resources Use Indices



The fertilizer use like labour and machinery is also expected to register significant increases. The consumption of nitrogen fertilizers is expected to increase by 18 percent from their present level of 1.1 million nutrient tons to 1.3 million tons in 2010. The consumption of phosphate fertilizers is expected to double in the studied period from 0.4 million nutrient tons to 0.8 million tons (Table 6.5, Figure 6.5).

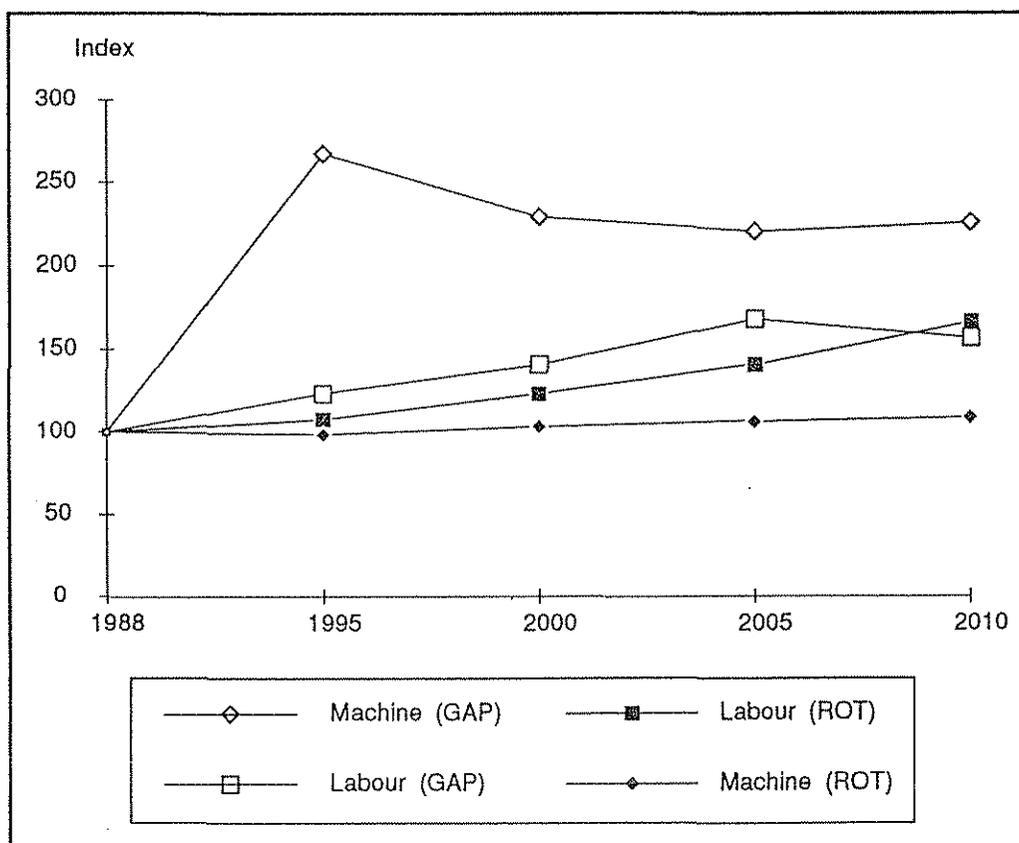
The wage rates and tractor rental rates and land prices are all expected to increase both in the GAP region and the rest of Turkey in the next two decades due to higher demand from national and international markets. Wage rates of agricultural labour in the GAP region

and rest of Turkey are expected to increase by over 50 percent between 1988 and 2010. The wage rates in GAP are projected to rise above that of rest of Turkey in 1995, reach their peak in 2005 and fall slightly below in 2010. The machine rentals are projected to be above the Turkish average all through the decades, reaching their maximum in earlier years but remaining above the national average. Land rentals in the GAP region are expected to register very high increases in the earlier years, reach their maximum in 2005 and level off slightly starting in 2010 (Table 6.6, Figure 6.6).

Table 6.6: Resource Costs in the GAP Region and Rest of Turkey

Year	Labour (1988 Turkey = 100)		Machine (1988 Turkey = 100)	
	Rot	GAP	Rot	GAP
1988	100,00	100,00	100,00	100,00
1995	107,84	123,53	98,80	267,38
2000	123,53	141,18	103,59	229,29
2005	141,18	168,63	106,83	220,92
2010	166,67	156,86	109,14	225,96

Figure 6.6: Resource Costs in the GAP Region and ROT



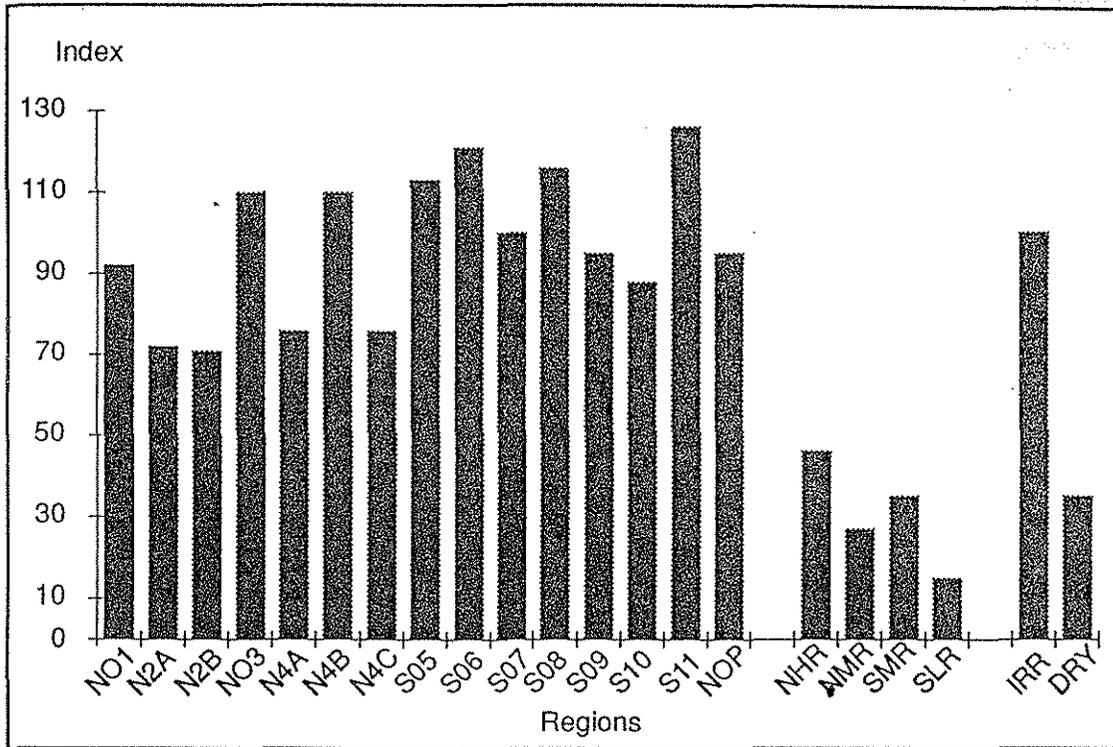
The projected shadow prices for land in project regions and dry areas are presented in Tables 6.7 and 6.8 and illustrated in Figures 6.7 and 6.8. The shadow prices show the marginal values of land, and hence can be employed to rank the irrigation projects in terms of their contributions to producer and consumer welfare. The results of the study suggest that the marginal value of land in south GAP irrigation projects are in general higher than those in the north. The four projects with the highest values are Silopi, Mardin-Ceylanpinari, Suruç-Bazik and Urfa-Harran, all in the south. The four projects with the lowest values are Adiyaman-Göksu-Araban, Adiyaman-Kahta, Garzan and Batman-Silvan, all in the north.

**Table 6.7: Land Value Indices in the GAP Region for the Year 2010  
(Irrigated Land Value = 100)**

Code	Region	Land Value Index
	Irrigated	
NO1	Siverek-Hilvan	92
N2A	Adiyaman-Kahta	72
N2B	Adiyaman-Göksu-Araban	71
NO3	Dicle	110
N4A	Garzan	76
N4B	Batman	110
N4C	Batman-Silvan	76
S05	Urfa-Harran	113
S06	Mardin-Ceylanpinari	121
S07	Bozova	100
S08	Suruc-Baziki	116
S09	Gaziantep	95
S10	Nusaybin-Cizre-Idil	88
S11	Silopi	126
NOP	Non-Project	95
	Dry	
NHR	North-High Rainfall	46
NMR	North-Medium Rainfall	27
SMR	South-Medium Rainfall	35
SLR	South-Low Rainfall	15

One of the important factors which determine the relative land values in the project regions is their land endowments. The shadow price of first class land in irrigated areas is nearly 3 times that of third class land and 50 percent more than that of second class land (Table 6.8, Figure 6.8). A similar relationship is also true for different classes of land in non-irrigated areas.

Figure 6.7: Land Value Indices in the GAP Region

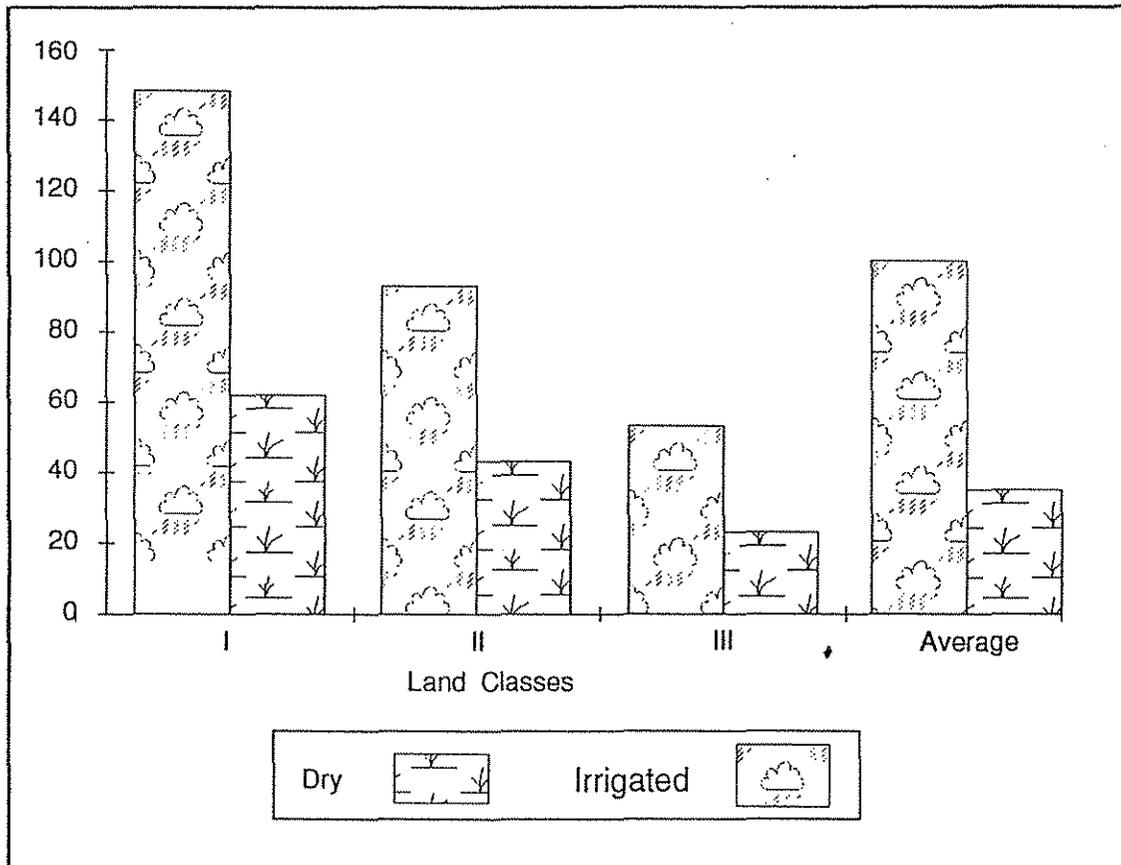


The value of irrigated land in the year 2010 is projected to be almost 3 times that of non-irrigated land in the GAP region. The difference between values of irrigated and dry land will be higher in the south (almost 4 times) and lower in the north (nearly 2 times), as values of the dry land in the north are higher than those in the south, but the reverse is true for the irrigated land.

Table 6.8: Land Value Indices in the GAP Region for the Year 2010 by Land Classes (Irrigated Land Value = 100)

Code	Land Type	Land Class			Weighted Average
		I	II	III	
IRR	Irrigated Land Average	148	93	53	100
DRY	Dry Land Average	62	43	23	35

Figure 6.8: Land Value Indices in the GAP Region  
 (Average Irrigated Land Value = 100)

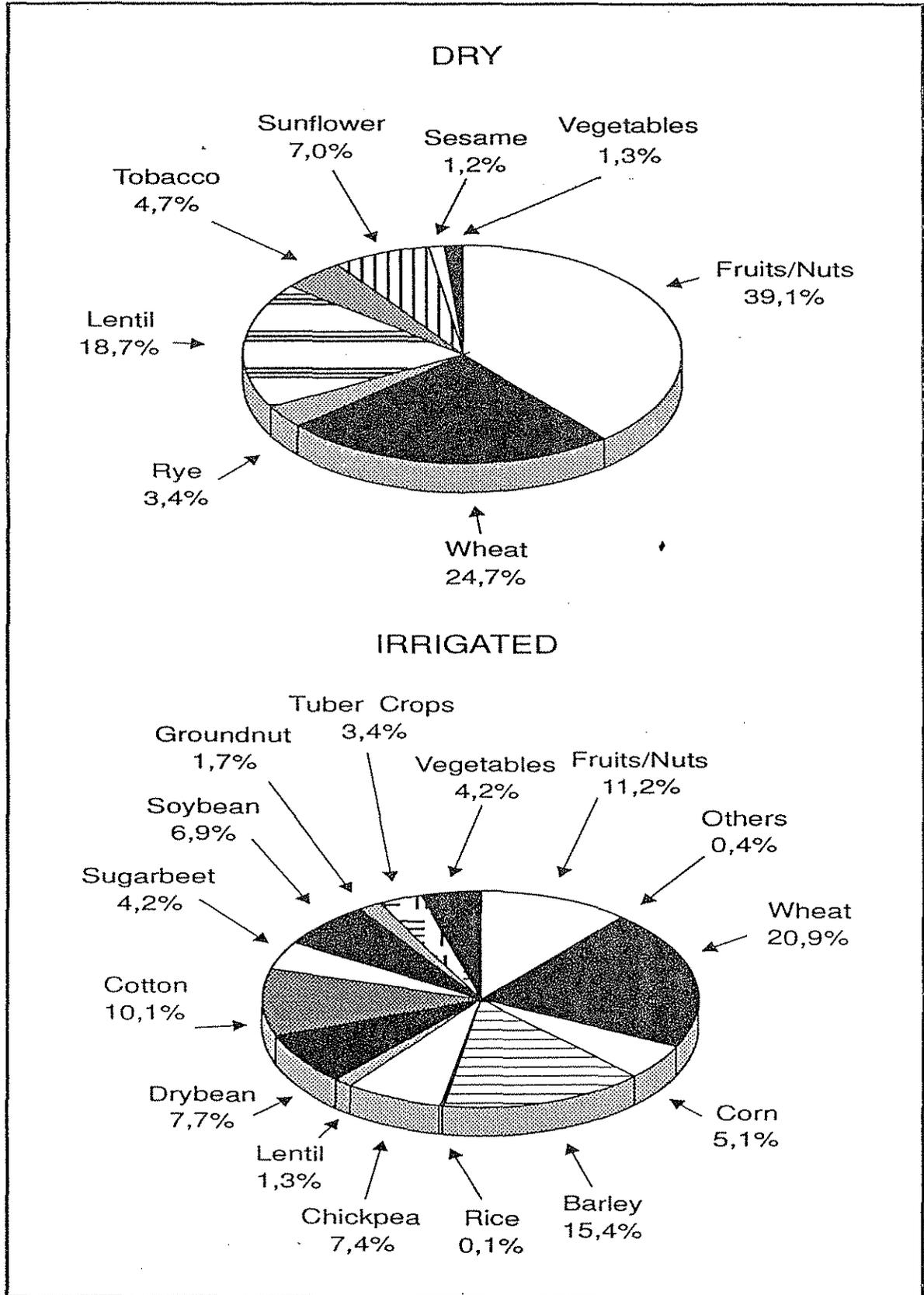


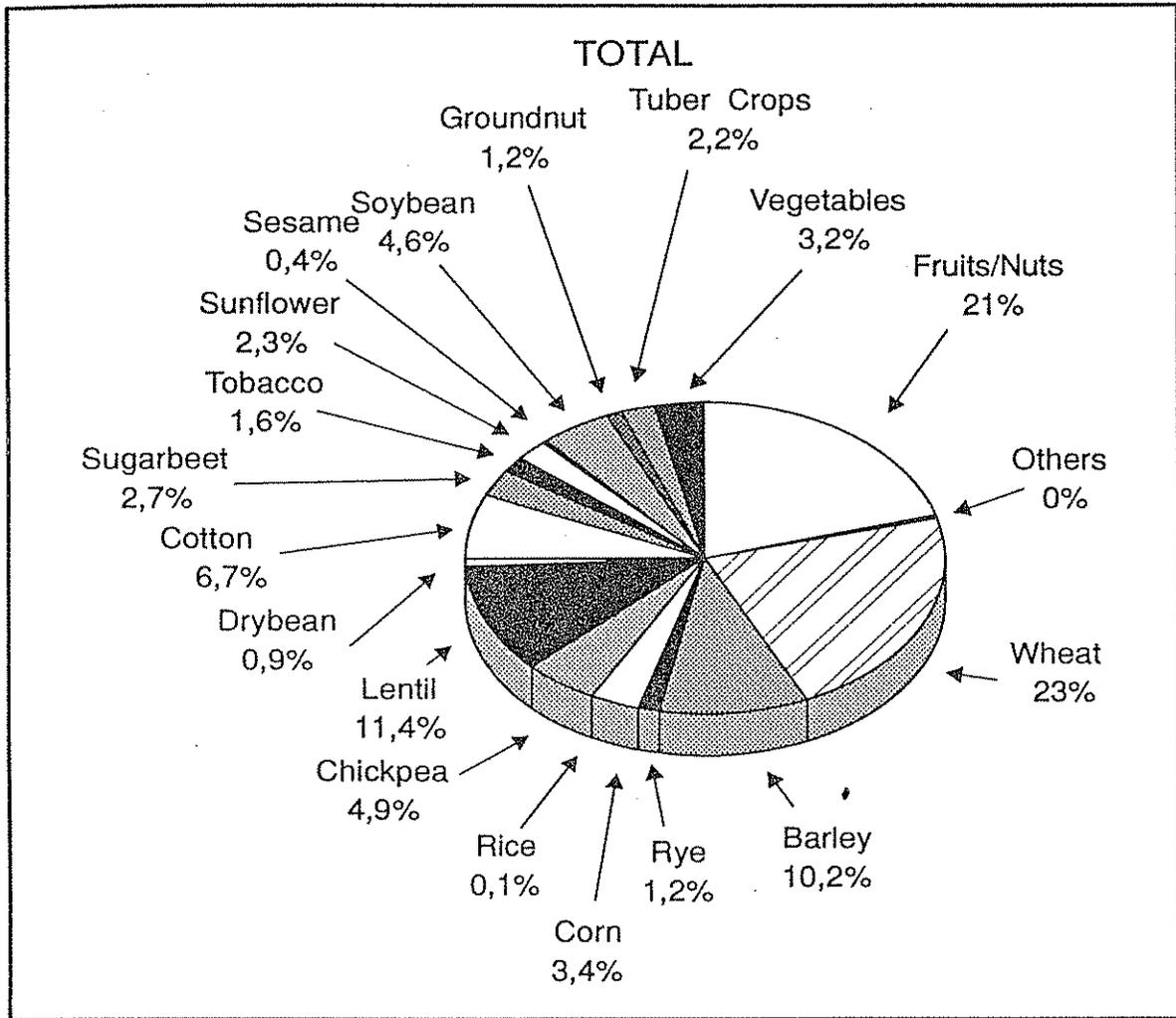
The crop patterns are projected in the GAP region for years 1995, 2000, 2005 and 2010 using the TURGAP model at the project and land-class levels for each of the irrigation projects. For the dry areas regionalized by rainfall and temperature zones, crop patterns are projected for the same years. The crop patterns projected show significant deviations from those proposed in the GAP Master Plan and show significant variations over projects and regions and over time as opposed to a single pattern for all projects and years proposed by the Master Plan. The crop patterns projected are presented in detail in Chapter 5 of Volume IV. The summarized crop pattern for 2010 is presented in Table 6.9 and illustrated in Figure 6.9.

Table 6.9: Projected Crop Pattern for 2010 in the GAP Region

Crops	SVEREK- HILVAN	ADYAMAN KAHTA	ADYAMAN GOKSU ARABAN	DICLE	GARZAN	BATMAN	BATMAN- SILVAN	URFA- HARRAN	MARDIN CEYLAN- PINARI	BOZOVA	SURUC BAZIKI	G.ANTEP	NUSAYBIN CIZRE IDIL	SILÖPI	NON PROJECT REGION	TOTAL IRRIGATED AREAS	TOTAL DRY AREAS	TOTAL GAP
CEREALS	46.7	48.2	49.7	41.3	44.2	48.1	44.1	105.2	30.5	31.9	34.9	57.0	55.6	41.2	50.0	47.7	24.1	38.1
WHEAT	31.1	16.1	20.3	29.9	13.0	33.4	10.6	41.5	19.7	11.1	18.6	32.3	33.1	23.9	38.4	24.1	21.2	23.0
CORN								55.2			2.1	5.0	5.1	13.5		5.9	0.0	3.5
BARLEY	15.6	32.0	29.4	11.4	31.3	14.6	33.4	8.5	10.8	20.8	14.3	17.7	16.8	3.8	11.6	17.6	0.0	10.4
RICE												2.1	0.5			0.1	0.0	0.1
RYE																0.0	2.9	1.2
PULSES	20.8	22.4	25.6	9.9	23.4	18.5	28.7	7.5	14.7	19.0	13.4	32.2	30.5	13.7	17.5	19.1	16.1	17.8
CHICK PEA	10.9	22.4	25.6	8.0	23.4	18.5	24.9								17.5	8.6	0.0	5.1
DRY BEAN	9.8			1.9			3.8									1.5	0.0	0.9
LENTIL								7.5	14.7	19.0	13.4	32.2	30.5	13.7		8.9	16.1	11.9
INDUSTRIAL CROPS	13.7	14.9	4.0	26.0	11.9	25.5	12.3		29.9	28.0	30.7	1.2		35.4	1.3	16.5	4.0	11.4
COTTON	13.7	14.9	4.0	26.0	8.0	25.5	8.4		17.5	15.7	12.3	1.2		35.4	1.3	11.7	0.0	6.9
SUGAR BEET					4.0		3.9		11.4	12.3	18.4					4.8	0.0	2.8
TOBACCO																0.0	4.0	1.6
OIL SEEDS	14.0	1.9	12.9	22.3	7.6	21.6	2.3		15.7		9.2	10.6			23.5	10.0	7.0	8.8
SUNFLOWER																0.0	6.0	2.4
SOYBEAN	7.1	1.9	12.9	11.0	0.1	21.6	0.4		15.7		9.2	10.6			23.5	8.0	0.0	4.7
GROUNDNUT	7.0			11.3	7.5		1.8									2.0	0.0	1.2
SESAME																0.0	1.0	0.4
TUBER CROPS		0.1	1.7					28.3	3.8				0.5	10.1	8.9	3.9	0.0	2.3
POTATO		0.1	1.7					28.3							8.9	3.0	0.0	1.8
ONION									3.8				0.5	10.1		0.9	0.0	0.6
VEGETABLES		0.6	5.5	2.4	0.7			1.4	8.7	8.2	9.2	6.5	8.4	10.8	10.8	4.8	1.1	3.3
TOMATO									4.0	2.3	3.0	2.6				1.2	0.0	0.7
EGGPLANT											2.1					0.2	0.0	0.1
MELON								0.6	2.8	4.1	2.9					1.0	0.0	0.6
CAULIFLOWER														1.8		0.0	0.0	0.0
WATER MELON									2.0		0.2	3.9	8.0	5.2		1.1	1.1	1.1
CARROT											0.6					0.0	0.0	0.0
CABBAGE		0.1	1.7												3.1	0.2	0.0	0.1
CUCUMBER			2.2												4.5	0.3	0.0	0.2
OKRA													0.4	0.5		0.0	0.0	0.0
PEPPER		0.5	1.7	2.4											3.1	0.4	0.0	0.2
LETTUCE					0.7						0.2					0.0	0.0	0.0
SPINACH										0.5						0.1	0.0	0.0
SQUASH								0.9						3.4		0.1	0.0	0.0
LEEK										1.3	0.1					0.1	0.0	0.0
FRUITS AND NUTS	11.9	13.9	15.0	9.1	13.2	8.0	13.1	13.2	13.0	15.0	15.0	12.7	14.4	7.0	15.0	12.9	33.6	21.3
OLIVE																0.0	13.2	5.4
GRAPE			12.6					13.2	7.7	3.2	2.3	11.1	9.0	5.8	9.3	5.1	10.0	7.1
FIG									0.9	0.2	4.3			1.1		0.6	0.0	0.3
APPLE	8.2	13.9		9.1	13.2	4.4	13.1									4.2	0.0	2.5
PEAR																0.0	0.0	0.0
PEACH										5.6	4.2	0.9	0.4			0.6	0.0	0.4
APRICOT	3.7		2.4			3.5									5.7	0.8	0.0	0.4
CHERRY											4.1					0.3	0.0	0.2
WILDCHERRY									4.4							0.8	0.0	0.5
POMEGRANADE										6.0		0.7	5.1			0.5	0.0	0.3
PISTACHIO																0.0	10.3	4.2
FEED CROPS									2.1	0.9						0.5	0.0	0.3
CORN-									2.1	0.9						0.5	0.0	0.3
SILAGE																0.5	0.0	0.3
TOTAL	107.1	102.0	114.4	111.0	101.1	121.6	100.4	155.5	117.4	102.9	112.5	120.3	109.5	121.4	127.0	115.3	85.9	103.4

Figure 6.9: Crop Pattern In the GAP Region for the Year 2010  
 (% of Cultivated Land)





### 6.3.2 TURGAP Scenarios

TURGAP is also employed to analyse the likely effects of various changes in the world markets (GATT Simulations), domestic macro policies (Population and Income Growth Simulations) and irrigation project management (Project Efficiency and Irrigable Land Simulations). The implications of these exogenous changes on the endogenous variables such as regional and national crop patterns, welfare, prices, trade, input use are discussed in detail in Chapter 5 of Volume IV.

The important message of the various scenarios is that the changes in exogenous factors to the model and hence to the agricultural sector of GAP region can have important implications on the region, and even more so than those directly addressing the region such as project management. The full liberalization implied by GATT negotiations and macro policies, changing population growth rate by 0.2 and income growth rate by 0.5 percentage points, have a much larger impact than changes in project efficiency by 15 percentage points and changing irrigable area by 30 percent.

## 7. Marketing

There will be three important marketing flows of agricultural produce: from GAP to the rest of Turkey, within GAP and from rest of Turkey to GAP. All these flows will require different emphasis on marketing systems, strategies and infrastructure. Yet, the intensities of these flows will not reach maturity until all projects are completed. Each new irrigation project within GAP will interact with the existing projects and with the rest of Turkey. Although the project locations will indicate prospective locations of physical marketing facilities, it is recommended not to rush to huge marketing-investments in the early stages of the projects, because temporary output advantages may be misleading. The crop pattern model results for different periods offer in this respect valuable guidance. Each project location can also be evaluated according to the importance of model-output results and each output in turn can be classified according to marketing features such as perishability, storability, suitability for industrial processing, which once again suggest specific marketing systems, strategies and infrastructure.

### 7.1 Marketing Systems and Strategies

General marketing recommendations on systems and strategies are related to:

- The organizational structure of the marketing system
  - changes in governmental supported marketing organizations along the line of economic principles;
    - co-operatives*  
the regional buying and selling co-operatives should intensify participation in the free market and base their activities on co-operative principles, with the full support of primary (village) co-operatives;
    - parastatal marketing organizations*  
the parastatal marketing organizations should intensify their co-operation with private sector enterprises and delegate certain operational tasks to the private sector, including co-operatives;
    - state farms*  
state farms should participate in the marketing process on a basis that is not conflicting with farmers interests; privatization could be an issue in development of farming systems in the region, while staff could fulfil an important role in training and extension of farmers;
  - expansion of the activities of Commodity Exchange Organizations "Bourses";
    - the Commodity Exchange Organization can fulfill an important role in facilitating the marketing process of agricultural commodities; the organizations should be strengthened and transformed to a Marketing Development Authority (MADA) for the GAP region;

- establishment of an organization for market information services;  
the formation of an organization on market information services should be considered; the new organization should include all major commodities and make use of the experience and facilities of the various specialized services in the country;
- Facilitating services such as:
  - availability of suitable production inputs and credits  
production inputs should be available against reasonable and uniform conditions and be of reliable quality; sufficient supply of inputs is facilitating production of crops and generally improves the bargaining position of producers in the marketing process;
  - introduction of standards on quality, weight and packaging  
the marketing process of products should be facilitated by the introduction and enforcement of suitable and well accepted standards on quality, weights and packaging; the regulations should be derived for respective levels in marketing channels and regularly controlled;
  - marketing extension services  
adoption of improved crop production and post-harvest handling methods should be supported by extension services; optimal pre- and post-harvest handling are improving product quality and thus enhancing marketability of produce;
- Commodity specific recommendations, which have been developed along the following lines:
  - maximal involvement of existing institutions and organizations;
  - encouragement of producer's participation in the marketing process (farmers' associations; on-farm handling such as grading and storage);
  - consideration of crop pattern development over implementation time;
  - taking into account the growth of crop production along with the realization rate of irrigation projects;
  - development of marketing systems and strategies on the basis of results of marketing and demand studies;
  - maximal adoption of available infrastructural facilities in the GAP region, with a phased planning of different steps of project implementation;
  - employment of results of detailed feasibility studies for a determination of location and capacities of physical marketing facilities.

Table 7.1: Product Specific Marketing Recommendations

Products	Additional Marketing Recommendations			
	1	2	3	4
Cereals/ Pulses	De-regulation and privatization of TMO	Changes in price-stabilization-function of TMO	Re-organization of co-operatives	Encouragement of participation of private sector
Cotton	Cooperation of GAP-bourses and other bourses	Rehabilitation of private processing facilities in GAP	Re-organization of co-operatives	Quality standard differentiation/ Government involvement in the planning of large-scale industries
Oilseed	Re-organization of co-operatives	Rehabilitation of private processing facilities in GAP	Development of rules and regulations on post-harvest handling and storage	Government involvement in the planning of large-scale industries
Fruits/Nuts/ Vegetables	Development of regional marketing co-operatives and central marketing organization	Export promotion organization and export revenue stabilization fund	Establishment of price information services and introduction of effective standards on quality and weight	Establishment of wholesale markets in urban regions with interregional marketing function establishment of collecting, grading packing centres
Dairy products	Enforcement of production and processing co-operatives	National dairy organization	De-regulation and privatization of TZEK	Implementation of milk collecting centres
Livestock/ Meat	Curtailing the informal sector	Privatization of municipality-owned slaughter-houses	Stimulate cooperation betw. EBK and private sector and producers/ re-organization of TBK into co-op.	Quality standard differentiation as to domestic and export market; establishment of slaughter house(s) for export marketing
Poultry/Eggs	Contract production (vertical integration)	National committee on poultry production and marketing	Market development and export promotion	Marketing and demand study
Fish	Licensing system on production	Auction system	Marketing and demand study	Price information and production development services
Sugar	De-regulation and privatization of Turkish Sugar Industry (TSI) in the GAP region	Adjustments in input supply system		

## 7.2 Marketing Infrastructure

Infrastructure in the GAP region is not sufficient for the marketing and processing of agricultural produce. Even without GAP, considerable rehabilitation and extension of facilities would be required.

The establishment of physical infrastructure is proposed in various fields. Current marketing systems have been taken into consideration, too, and reorganization has also been proposed.

Establishment of complementary physical facilities outside the GAP region are also discussed. Harbour facilities should convene the handling of GAP produce in future.

The proposals have been related to the following priority ranking: perishability, storability, industrial processing possibilities and quantitative production development in the region.

**Table 7.2 Priority Rating as to Infrastructure Facilities**

perishability	<ol style="list-style-type: none"> <li>1. Fruit and vegetables (fresh)</li> <li>2. Animal products               <ul style="list-style-type: none"> <li>- milk</li> <li>- meat</li> </ul> </li> </ol>
storability	<ol style="list-style-type: none"> <li>1. Cereals and pulses</li> <li>2. Oil crops</li> <li>3. Cotton</li> <li>4. Potato</li> </ol>
industrial processing possibilities	<ol style="list-style-type: none"> <li>1. Oil crops</li> <li>2. Cotton</li> <li>3. Sugar-beet</li> </ol>
quantity (crops that have a considerable production increase in the project region)	<ol style="list-style-type: none"> <li>1. Vegetables and fruit</li> <li>2. Cotton</li> <li>3. Sugar-beet</li> <li>4. Cereals</li> <li>5. Potato</li> </ol>

These priorities have to be evaluated with four additional elements:

- Facilities that are going to be implemented in the early stages and which are going to be used by a homogeneous group of marketing partners for performing the exchange functions: wholesale market places for fruits, vegetables and cereals, the responsibilities for these infrastructural facilities should be assigned more to governmental organizations.

- Facilities that are required for processing and conservation of products due to perishability: slaughter houses, drying facilities, storage places for cereals, cold stores could easily be added, all over the project region and be developed in line with progress of production; however, here responsibility of establishing physical facilities should be shared by governmental organizations and private initiative.
- Facilities that are going to be established for processing of products more for industrial purposes; oil-mills; ginneries; capacities of those facilities can easily be added, all over the project region and be developed in line with progress of production, too. The initiative here should be expected exclusively from the private sector and co-operatives.
- Facilities that are going to support export products are also proposed. Typical examples refer to the implementation of slaughterhouses, that exclusively aim at marketing in export markets and first class segments in the domestic market. Furthermore, the need for physical facilities in airports and harbours are discussed for suitably conveying the flow of products.

The proposal for installing various infrastructural facilities is linked to the implementation sequence of irrigation projects. Stabilization of cropping pattern within GAP will be realized in a later stage of the project. This will complicate the application of investment policies.

In other cases, where production development is stable, and concentrated, the influence of processing firms outside the region could form a barrier for entry into the industry by new investors in the GAP region. A clear example will be observed in relation to the development of processing facilities for oil crops.

Infrastructure has been proposed as to locations and indicative capacities in cases that short-term adjustments would be easy to realize. In case that provisions were needed in order to cope with sufficient extension possibilities, indications have been provided for required capacities (wholesale food terminals).

A Critical issue that remains subject to negotiations in future are organizational aspects of the facilities. Under increasing deregulation and privatization, ownership by private sector and producers' organizations are frequently proposed. Producers' involvement in ownership is especially suggested in cases where vertical integration of marketing activities would decrease marketing risks.

## **8. Conclusions, Recommendations and Outlook**

- The findings of the study presented should not be interpreted as the rules of nature but they are rather estimates made on the basis of information available at present. They have to be updated and revised continuously as additional information becomes available. Success requires in the present time fast response to rapidly changing conditions, so flexibility appears to be a principle which no policy can escape.

- The rational objective in an economy is not to maximize farmer or industrial profits, but rather to maximize the total welfare of the society. The resources of an economy should be allocated to achieve this overall objective rather than the parts of the objective, all of which cannot be maximized at the same time. The objective of agriculture in GAP should not be the maximization of output or incomes in the region but rather it should be the maximization of the agricultural sector's contribution to the welfare in Turkey as a whole. Therefore, GAP region should not be analysed in isolation.

- When the sources of growth in Turkish agriculture are analysed over the past five decades, it is observed that through expansions of land in the 50's, increasing use of fertilizers in 60's, expansions in irrigation and mechanization in 70's and finally improvements in crop composition and rotations in 80's, it has been possible to match the growing domestic demand and also to export the surplus to world markets.

During the next two decades, the GAP project is expected to increase Turkish agricultural production considerably, via a large scale expansion of irrigated land. But it should be pointed out that the expansion in the valuable resource of irrigable land will not continue forever, and it will not be repeated until a project of the same or bigger size comes to existence. Therefore meeting the demand of the decades to follow will not be as easy and policy free as up to then. Therefore, it is crucial that the resources not be wasted and opportunities missed with the illusion of short or medium term successes.

- The developments in the agricultural sector in Turkey and the GAP region over the next two decades depend critically on the developments on the demand and supply side as well as on the policy environments surrounding them. It is not possible to isolate the developments in the GAP region from the rest of Turkey and the world.

The demand for agricultural products can be divided into two components, namely domestic demand and international demand. The domestic demand will increase rapidly under the influence of high population and income growth and favourable price developments. This strong demand increase will absorb a large part of the additional supply of the GAP region. Contrary to optimistic expectations, not much will be left over for a dramatic expansion of exports.

The TURGAP and WTM scenarios conducted for this study suggest that in year 2010 Turkey will continue to be one of the few countries which will succeed in preserving its self-sufficiency in agriculture and at the same time export some of its surplus to international markets. The GAP region, with the completion of the irrigation project in year 2010 will move from being dependent on the rest of Turkey for agricultural products to a region which is self-sufficient and exporter in many products to the rest of the country and the world.

- On the agricultural world markets a continuation of slightly decreasing real prices can be expected under the present political framework conditions. This will give for most products hardly a stimulus for additional exports. But if the GATT negotiations

will be finally successful, the results of the WTM scenarios show that Turkey will enjoy higher prices and increasing markets for some major commodities. It will concentrate its exports on a few products where it has the highest comparative advantage, and will also increase imports of some commodities, both due to removing own restrictions and to realize a better allocation of its limited resources.

- Both models employed, the World Trade Model and the Crop Pattern Model, have proven to be useful and efficient tools to analyse the interplay of the various factors which determine production and marketing developments in the GAP region. They have generated rich information on the development perspectives for the GAP region and the rest of Turkey under alternative framework conditions and policy scenarios. But to make full use of the created analytical potential it is necessary to incorporate new information on changes of basic economic, social and technological trends, and new policy orientations, whenever it becomes available. This means that the updating of the models as well as the reshaping of strategies and policies for the GAP region are continuous tasks.