

Republic of Turkey
Prime Ministry
State Planning Organization

GAP

**The Southeastern
Anatolia Project
Master Plan Study**

Final Master Plan Report

VOLUME

1

Executive Summary

June 1990
(Second Edition)

Nippon Koei Co. Ltd.
Tokyo, Japan

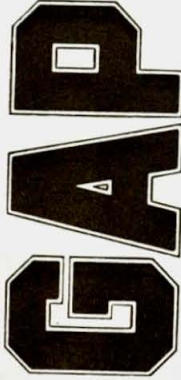


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Joint Venture

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THE SOUTHEASTERN ANATOLIA PROJECT MASTER PLAN STUDY

Final Master Plan Report

Volume 1 Executive Summary

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Executive Summary

1. Introduction

GAP today

The Southeastern Anatolia Project (GAP) region (the Region) is defined as the jurisdictions of six provinces: viz. Adiyaman, Diyarbakir, Gaziantep, Mardin, Siirt and Şanlıurfa. It occupies the southeastern part of Turkey bordering on Syria to the south and Iraq to the southeast, covering the land area of 73,863 km² corresponding to 9.5% of the total national land area.

The total population at the 1985 census was 4,303,567 in the GAP region, accounting for 8.5% of the Nation's total, 50,664,458 in 1985. All the six provinces in the Region are net out-migrating areas. Still the average annual growth of the Region's population has been 2.9% in the past two decades, much higher than the national average of 2.4%

The GAP region is one of less developed regions in Turkey, and its per capita gross regional product was 47% of the per capita gross domestic product of Turkey in 1985. However, the Region has attained self-sufficiency in basic foodstuffs including wheat, meat and milk. Also the Region is a significant producer of some agricultural products, having high shares in the national production (Chart 1).

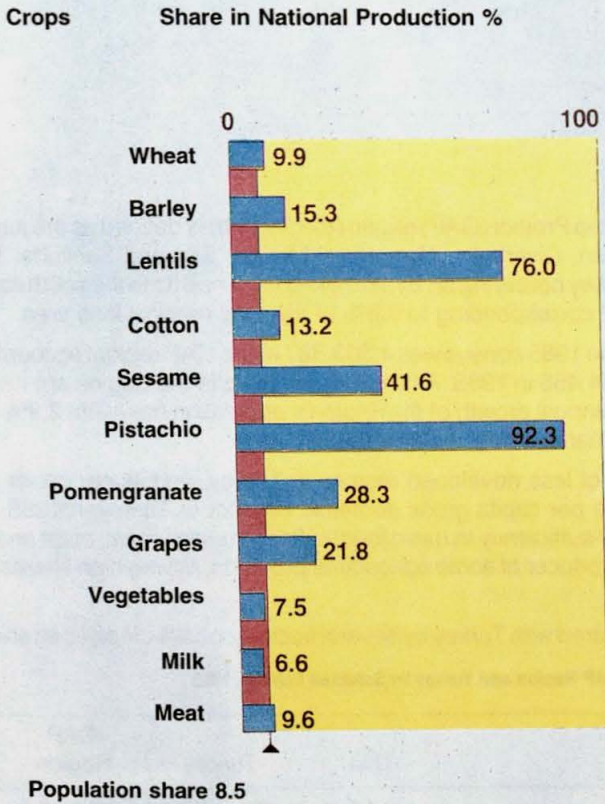
The GAP region is compared with Turkey by several socio-economic indices as shown in Table 1.

Table 1: Comparison of the GAP Region and Turkey by Selected Indices, 1985

Index	Unit	Turkey	GAP Region	GAP Share (%)
Land Area	km ²	779,459	73,863	9.5
Total Population		50,664,458	4,303,567	8.5
Population Growth (1965-85)	% p.a.	2.4	2.9	—
Population Density	/km ²	65	58	—
Urban Population	% to total	53.0	49.9	—
Economic Structure	% in GDP/GRP			
Agriculture		17.7	39.6	(9.0)
Manufacturing		25.2	11.7	(1.9)
Gross Domestic Product	10 ⁹ TL	83,785,419	3,365,559	4.0
Per Capita GDP/GRP	10 ³ TL	1,822	862	(47)

Source: Statistical Year Book of Turkey 1987

Chart1 : GAP Region's Shares of Selected Crop Production, 1985



GAP project

The GAP project originally planned by the State Hydraulic Works (DSI) is a combination of 13 major projects primarily for irrigation and hydropower generation. The project envisages the construction of 21 dams and 17 hydroelectric power plants on the Fırat and the Dicle rivers and their tributaries. It is planned that at full development over 1.6 million ha of land will be irrigated, and 26 billion kWh of electric energy will be generated annually with the installed capacity over 7,500 MW. The total planned irrigation area corresponds to 19% of the total economically irrigable area in Turkey (8.5 million ha), and the total annual electricity generation accounts for 22% of the Turkey's economically viable hydropower potential (118 billion kWh).

The GAP project is now one of the most ambitious regional development projects ever attempted in the World. It covers, in addition to the original irrigation and hydropower, all the related sectors including industry, transportation and social sectors.

Government policy

The Turkish government has been placing increasing emphasis on the rectification of inter-regional disparity in the Nation's socio-economic development. This is not only a reflection of the concern on equitable development but also based on an unerring recognition that the realization of development potentials in less developed regions will contribute also to the national objectives of sustained economic growth, export promotion and social stability. Concomitant to the economic growth, provision of social services will have to be improved. In order to make the investment into the original GAP irrigation and hydropower schemes more efficient, investments into related projects and sectors will have to be well planned and coordinated. The GAP Master Plan Study is an attempt to formulate specific measures to complement the implementation of the original GAP schemes and put them into coherent and integrated long-term regional development plan. Its prime objective is to promote the GAP implementation by providing a guideline and tool to facilitate the coordination and integration of development efforts by various Government agencies.

2. Development Objectives and Strategy

On the basis of the analysis on the present conditions in the GAP region with its resource base and constraints faced as well as national economy and national development objectives, the objectives and the basic strategy for the Region's development are set as follows (Tables 2 and 3).

Table 2: Development Objectives

Development Objectives		
Overall development objectives	Agricultural development objectives	Industrial development objectives
(1) To raise the income levels in the GAP region by improving the economic structure in order to narrow the income disparity between the Region and other regions	(1) To raise the income levels in rural areas by enhancing agricultural productivity and diversifying farming activities	(1) To serve on the one hand as a driving force for economic development of the GAP region and on the other hand as a demand generator for education/training and technology development, in order to enhance the Region's images, social welfare and the people's motivation
(2) To increase the productivity and employment opportunities in rural areas	(2) To provide sufficient inputs to agro-processing industries	
(3) To enhance the assimilative capacity of larger cities in the Region	(3) To increase employment opportunities to minimize the drift of people out of the rural areas	(2) To contribute to the rectification of inter-regional income disparity by expanding high income employment opportunities
(4) To contribute to the national objectives of sustained economic growth, export promotion, and social stability by efficient utilization of the Region's resources	(4) To contribute to the production of exportable surpluses	(3) To contribute to the national objectives of export promotion and foreign exchange earnings/savings

Table 3: Development Strategy

Development Strategy:

Basic development strategy	Agricultural development strategy	Industrial development strategy
<p>(1) To develop and manage water and related land resources for irrigation, urban and industrial uses,</p> <p>(2) To improve the land use by managing cropping patterns and establishing better farming practices and farm management,</p>	<p><u>Overall</u></p> <p>(1) To provide irrigation facilities where effective in overcoming adverse agro-ecological conditions,</p> <p>(2) To promote farm mechanization in proper combination with the application of fertilizer, agro-chemicals and irrigation water,</p> <p>(3) To distribute better inputs timely and in sufficient quality and quantity,</p> <p>(4) To improve land tenure systems, and</p> <p>(5) To improve pricing and marketing to give incentives for farmers.</p>	<p>(1) To identify and promote industries of strategic importance which utilize locally available raw materials, can be developed in stages and will be oriented to exports,</p> <p>(2) To utilize the strategic industries to demonstrate production and management technologies, procurement of capital, development of entrepreneurship and access to international markets,</p>
<p>(3) To promote manufacturing industry with emphasis on agro-related ones and those based on indigenous resources, and</p>	<p><u>Irrigation</u></p> <p>(1) To identify and promote strategic crops in view of marketability and agro-ecological conditions,</p> <p>(2) To encourage high crop intensity by establishing crop cycles and adjusting water charges, and</p> <p>(3) To organize farmers in irrigated areas for on-farm water management and extension.</p>	<p>(3) To establish at least one such strategic industry in each of the five less developed provinces in consideration of comparative locational advantages and inter-provincial relationships,</p>
<p>(4) To provide better social services to meet the requirements of local people and to attract technical and administrative staff to stay in the Region</p>	<p><u>Livestock</u></p> <p>(1) To improve husbandry productivity by</p> <p>a) improving the local cattle breeds through artificial and natural insemination,</p> <p>b) improving feeding by pasture management and forage and feed concentrate production, and</p> <p>c) improving veterinary services, and</p> <p>(2) To improve the physical infrastructure to promote commercial livestock production.</p>	<p>(4) To streamline functions of related public agencies, and</p>
	<p><u>Fishery and forestry</u></p> <p>(1) To utilize dam lakes to promote inland fishery,</p> <p>(2) To provide a package of support services for aquaculture including hatchery, fingerling production, training and research, processing, marketing and pricing, and</p> <p>(3) To conduct intensive afforestation within the designated forest areas and areas around the reservoirs and to encourage on-farm tree planting</p>	<p>(5) To encourage the local entrepreneurs through the provision of credit, information and technical supports.</p>

3. Development Scenarios

3.1. Basic development scenario

The basic development scenario for the GAP region is to make it "the Agro-Related Export Base". The main features, development phasing, and spatial development process are summarized (Table 4).

Table 4: Development Scenarios

Agro-Related Export Base

Main features:

- (1) Structural changes of the Region's economy by crop diversification in favour of industrial crops, intensive stock raising, and industrial development based on agro-industries and those utilizing indigenous resources; and
 - (2) More active and positive interactions between rural and urban areas with proper functional division.
-

Phasing:

Phase 1 (-1994): Trend development and preparation for taking-off

- 1) Completion of on-going projects
- 2) Emphasis on extension and information dissemination for better varieties and farming practices,
- 3) Demonstration activities for new industrial crops,
- 4) Steady growth of consumer goods industries,
- 5) Urgent measures to improve water supply in major cities,
- 6) Improvement of communication facilities, and
- 7) Feasibility studies of post-Atatürk projects.

Phase 2 (1995-2004): Economic re-structuring and accelerated growth

- 1) Completion of all the priority hydropower and irrigation schemes of GAP,
- 2) Intensification of land-use by mixed farming with intensive cattle raising, poultry, horticulture etc.
- 3) Expansion of new agro-industries,
- 4) Further improvement of urban infrastructure and utilities, and
- 5) Major infrastructure development of strategic importance, e.g. artery highways, industrial estates, selective railway reinforcement, an international airport, and container depots.

Phase 3 (2005 -): Stable and sustained growth

- 1) Active private sector investment in some infrastructure and social services, and
- 2) Higher order service functions in major urban centers such as communication/conference, higher education/technology development, and international tourism.

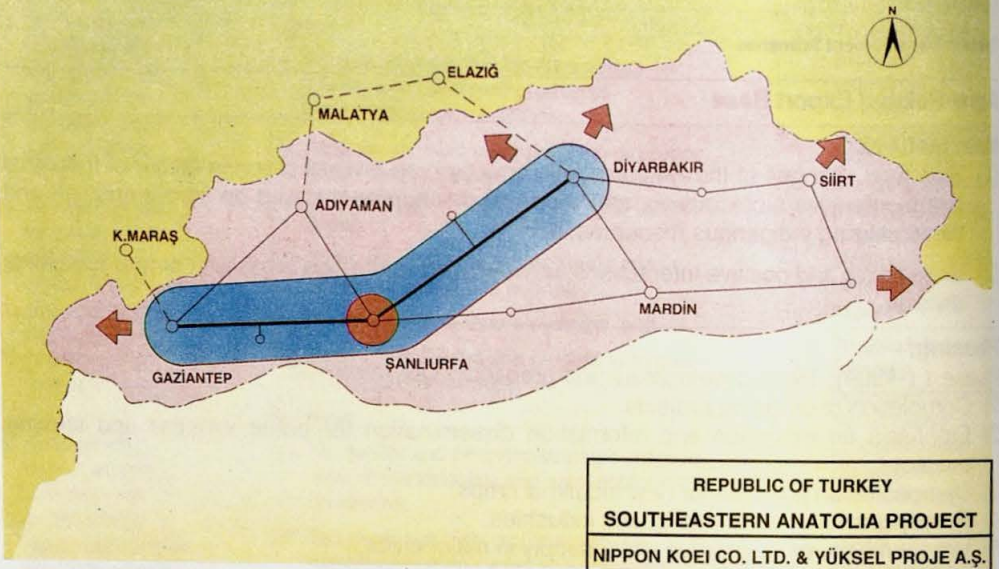


Open society with an open economy directly linked to many countries as well as other regions of Turkey.

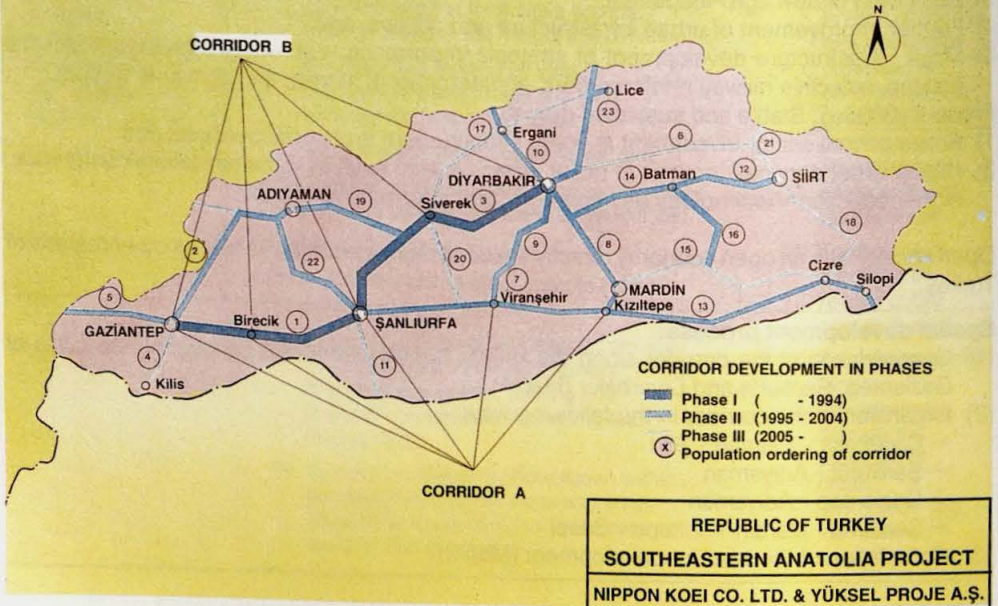
Spatial development process:

- (1) Consolidation of the corridor along the kinked development axis connecting the cities of Gaziantep, Şanlıurfa and Diyarbakır (Map 1)
 - (2) Expansion of the corridor in the following way:
 - Diyarbakır - Batman - Siirt
 - Şanlıurfa - Adiyaman
 - Gaziantep - Adiyaman
 - Şanlıurfa - Mardin/Kızıltepe - Silopi
 - (3) Completion of the corridor development (Map 2)
-

Map 1 : Spatial Development Structure with "Kinked Development Axis"



Map 2 : Development Corridors and Phasing



3.2 Agricultural development scenarios

(1) Step-wise implementation of GAP irrigation schemes

Step-wise implementation of the GAP irrigation schemes is envisaged, in view of the capacity of implementing agencies particularly for on-farm development, the present status of land redistribution and consolidation, and needs for extension and research. General criteria for this would be:

- early implementation of priority schemes including those at advanced development stages,
- attainment of higher productivity by higher crop intensity with proper water management and extension services, and
- maximization of geographic dispersion of irrigation benefits or better income distribution within the Region.

(2) Cropping patterns

Crops to be promoted

In view of agro-ecological conditions and marketability including requirements from other sectors, the following crops should be promoted in the GAP region particularly under irrigation, in addition to presently dominant cereals, pulses and cotton.

- Oil seed: soybeans, sunflower, rape and safflower
- Fruits and vegetables
- Forage crops and feed grains: high yielding sorghum, maize, vetch

Crop rotations

Typical crop rotations envisaged in the Region are as follows.

	<u>Winter</u>	<u>Summer</u>
1)	Winter vegetables, oil seed or pulses	Cotton
2)	Winter wheat	Oil seed, maize or summer vegetables

The following rotations seem particularly promising and deserve further investigations/trials.

- Wheat - Soybean
- Cotton/maize - Winter growing leguminous crops - i.e. pulses or oil seed such as rape or safflower
- Cotton - Vetch - Maize

Notional cropping pattern

Initially the area under wheat and pulses will be dominant and the cotton area will expand rapidly, as the irrigation schemes are implemented. As research and demonstration activities advance, those crops listed above will gradually increase their areas. A notional cropping pattern which may be established at full development is shown (Table 5).

Table 5: Notional Cropping Pattern for the Master Plan

(Unit: %)

Crop	Share in total area
Primary crops	
Wheat	25
Barley and other feed grains	15
Lentil and dry bean	8
Cotton	25
Winter vegetables	2
Perennials*	20
Sub-total	95
Secondary crops	
Soybean	10
Corn and fodder crops	8
Groundnut	5
Sunflower	5
Sesame	5
Vegetables, including tomatoes and potatoes	6
Sub-total	39
Total (Crop intensity)	134

* Include pistachios, grapes, fruit trees, poplar and tree nursery

3.3 Industrial development scenarios

(1) Industrialization process

The industrialization of the GAP region will generally follow the following process.

- 1) Development of new industries of strategic importance together with trend development of consumer goods and construction materials industries;
- 2) Expansion of the strategic industries and trend acceleration of consumer goods and construction materials industries, as the income increases and the urbanization proceeds, and
- 3) Emergence of new industries meeting higher demands from other sectors such as fertilizer and agricultural machinery and equipment industries, followed by the general machinery industry.

(2) Industries of strategic importance

Prospective industries

Prospective manufacturing industries that may be newly introduced or much enhanced in the Region have been identified.

- Wheat-related industry: wheat flour, macaroni/semolina, instant noodles
- Cotton-related industry: ginning, cotton yarn, fabrics and wool, apparel
- Edible oils industry: raw and refined edible oils, animal feed
- Livestock industry: slaughtering, hides and skins, meat and milk processing, leather products
- Construction materials industry: concrete blocks, tiles and bricks, pipes
- Others: printing and publishing, packing materials, packaging

Industries of strategic importance

The following industries have been selected as the industries of strategic importance for the five less developed GAP provinces, except Gaziantep (Table 6).

Table 6: Industries of Strategic Importance

Province	Main	Others
Adiyaman	Tourism related industries	
Diyarbakir Mardin	Edible oils	Animal feed, Livestock industries Ginning, Semolina/pasta, Fruits processing, Seed cleaning, Wine making, Phosphate fertilizer
Siirt	Meat processing and leather industries	Copper extraction, Asphaltite
Şanlıurfa	Textile-garment	Edible oils, Animal feed, Tourism-related industries

4. Development Frameworks

4.1 Socio-economic framework

(1) Alternative socio-economic frameworks

Socio-economic projections for the GAP region have been made for three separate cases. In one case (Alternative A), all of the initially planned irrigation areas will be developed by 2005. As a second case (Alternative B), the Government may aim at maximizing power generation subject to the implementation of priority irrigation schemes. Under the third alternative (Alternative C), only the priority irrigation and hydropower schemes will be implemented by 2005.

These alternatives have been evaluated within a consistent policy framework at the national level and the same assumptions related to labour productivity, crop yields, value-added ratios, input-output ratios and other socio-economic factors. The evaluation results are summarized (Table 7).

Table 7: Evaluation of Development Alternatives by Selected Economic Indices

Index	Alternative		
	A Max. Irrigation	B Max. Power	C Slower Development
Incremental Capital-Output Ratio	3.71	3.27	3.24
GRP Growth % p.a.	7.7	7.3	6.8
Per Capita GRP in 2005 10 ³ TL	1,778	1,842	1,784
Total Public Investment Requirements 10 ⁹ TL	28,800	22,400	20,600
Foreign Currency Requirements 10 ⁶ US\$	6,100	5,400	4,900

(2) Recommended socio-economic framework

In view of sizable public investment required for the GAP implementation and inherent uncertainties involved in the long-term investment decisions, the deferment of non-priority schemes (Alternative C) is presently recommended. As the implementation of the original GAP schemes is extended over a longer period, the following favourable effects are expected.

- 1) The allocation of public sector resources to GAP will be more compatible with the requirements of other regions;
- 2) Initial investments in the priority schemes will be more cost-effective;
- 3) On-farm development can keep better pace with the development of irrigation facilities;
- 4) This will help to minimize the salinization and water logging problems due to lack of sufficient drainage;
- 5) Future advance of technology can be incorporated in those schemes to be implemented in a later stage, making the overall efficiency of GAP investments better.

Expected performance of this recommended alternative is summarized and compared with the present conditions and trend projection (Table 8, Chart 2, Chart 3).

Table 8: Recommended Socio-Economic Framework

	1985	2005	
		Trend Projection	Recommended Framework
GRP TL 10 ⁹	3,709	9,329 (4.7)	13,929 (6.8)
Agriculture	1,467	2,499 (2.7)	3,186 (4.0)
Industry	582	1,867 (6.0)	3,307 (9.1)
Construction	276	680 (4.6)	864 (5.9)
Services	1,384	4,283 (5.8)	6,572 (8.1)
Population 10 ³	4,304	7,575 (2.9)	7,809 (3.0)
Urban	2,148	4,859 (4.2)	5,313 (4.6)
Rural	2,156	2,716 (1.2)	2,496 (0.7)
Employment 10 ³	1,528	2,355 (2.2)	2,796 (3.1)
Per capita TL 10 ³ GRP	862	1,232 (1.8)	1,784 (3.7)

* Average annual growth rates % during 1985-2005 in parentheses.

The priority irrigation and hydropower schemes to be implemented by 2005 are listed below (Table 9). The combined area of all the priority irrigation schemes covers 894 thousand ha or 55 % of the total irrigable area originally planned. The combined generating capacity of all the priority hydropower schemes corresponds to 5,300 MW or 70 % of the total installed capacity of all the GAP hydropower schemes (Chart 4).

Chart 2 : Change in Economic Structure of GAP Region under the Master Plan

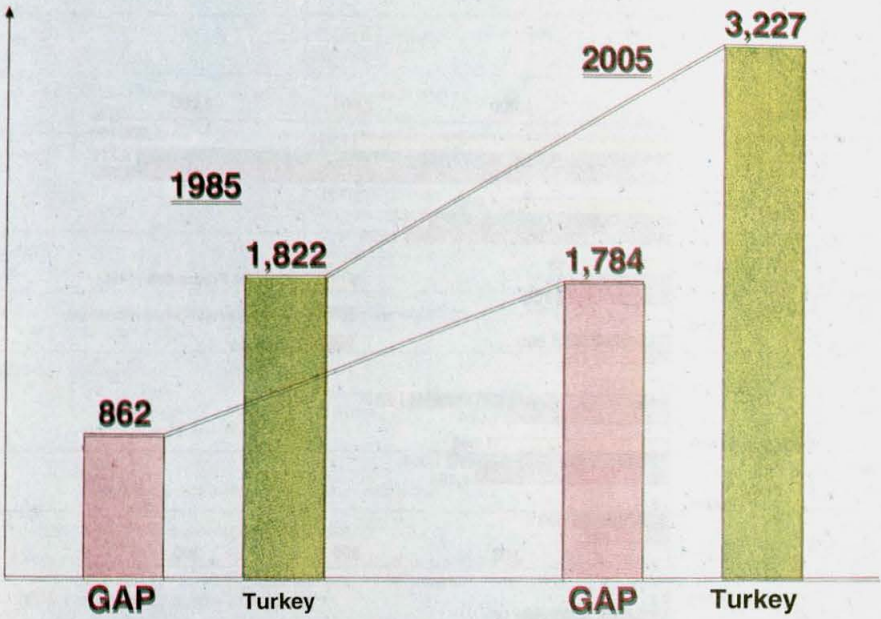


Chart 3 : Growth of Per Capita Product, Turkey's GDP and GAP GRP

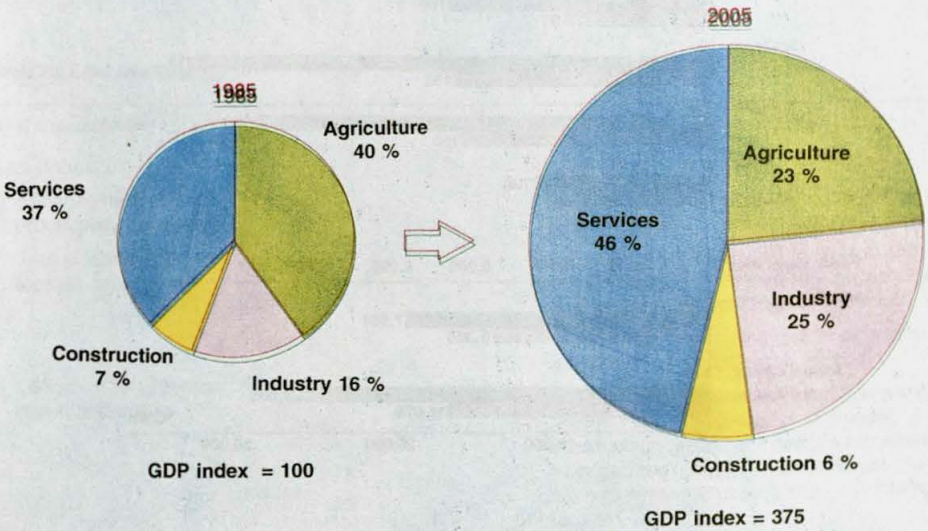


Chart 4 : Production of Main Crops and Power Generation

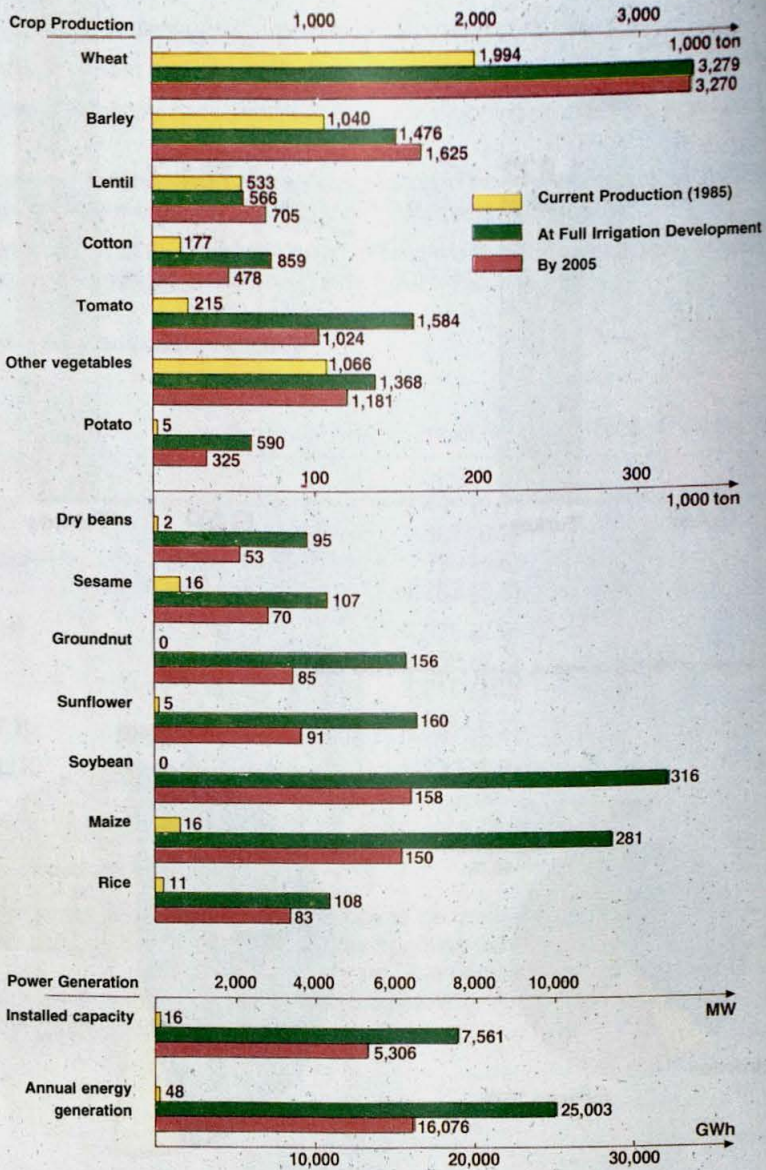


Table 9: Priority Irrigation and Hydropower Schemes

Province	Under Construction Project	Type	To be newly implemented Project	Type	Evaluation Irrigation (10 ³ TL per ha)	Power IRR (%)	Gross irrigated area (ha)	Installed capacity (MW)
Adiyaman			Kocalı & Fatopasa Büyükçay	IR, HP IR, HP	0.78 1.06		21.605 12.322	62 30
Diyarbakır	Dicle-Kıralıkızı 1 st	IR, HP	Dicle-Kıralıkızı 2nd Batman-Silvan	IR IR, HP	1.14 1.26		74.047 213.000	150
Gaziantep	Hancağız	IR	Kaycık dam and irrigation Birecik pumping system Çataltepe dam and Gaziantep water supply***	IR IR WS, IR	1.21 1.09		2.896 55.960 11.937	
Mardin			Mardin-Ceylanpınarı I İlisu	IR HP	1.23	13.70	230.130	1.200
Siirt	Batman irrigation Garzan-Kozluk	IR, HP IR	Hezil-Silopi irrigation	IR, HP	1.28		32.000	173
Şanlıurfa	Ataturk dam Urfa tunnel Urfa irrigation Harran Irrigation	IR, Hp IR,HP,WS IR IR	Birecik Karkamış	HP HP		19.20 16.40		672 180
Total							653.897	2.467
Grand Total including those under construction							894.459	5.306

* IR-irrigation, HP-hydropower, WS-water supply

** Criteria for project selection: Irrigation project: cost/ha smaller than 1.3 million TL/ha
Hydropower project: internal rate of return (IRR) greater than 12 %

*** Selected with water supply priority

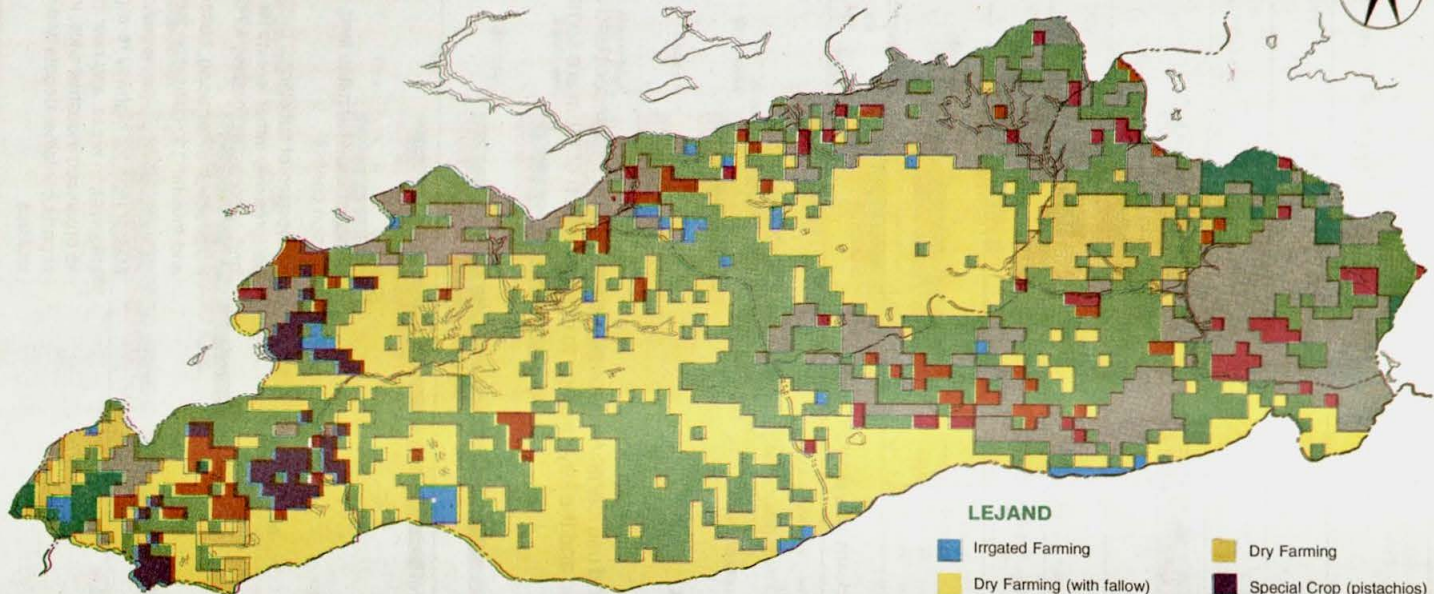
4.2 Spatial framework

(1) Land use







Main issues related to land use identified through the analysis on the present land use (Map 3) and land capability evaluation and the key strategy to deal with each of them are summarized (Table 10, Map 4).

Table 10: Land Use Strategy

Land use strategy:	
Main issues	Strategy
1) Enhancement of land productivity for agriculture	– Management of irrigated land, destoning and erosion control
2) Tree planting and erosion control	– Conversion of substantial bush land and pastures into either forests for publicly owned land or controlled grazing for communal land
	– Introduction of terracing, buffer strip cropping and mulching to cultivation areas
3) Land take for urbanization and infrastructure	– Careful planning within a broad framework of the Master Plan for highway re-alignment, urbanization areas, and new infrastructure such as organized industrial sites, international airports, container depots and grain storage facilities

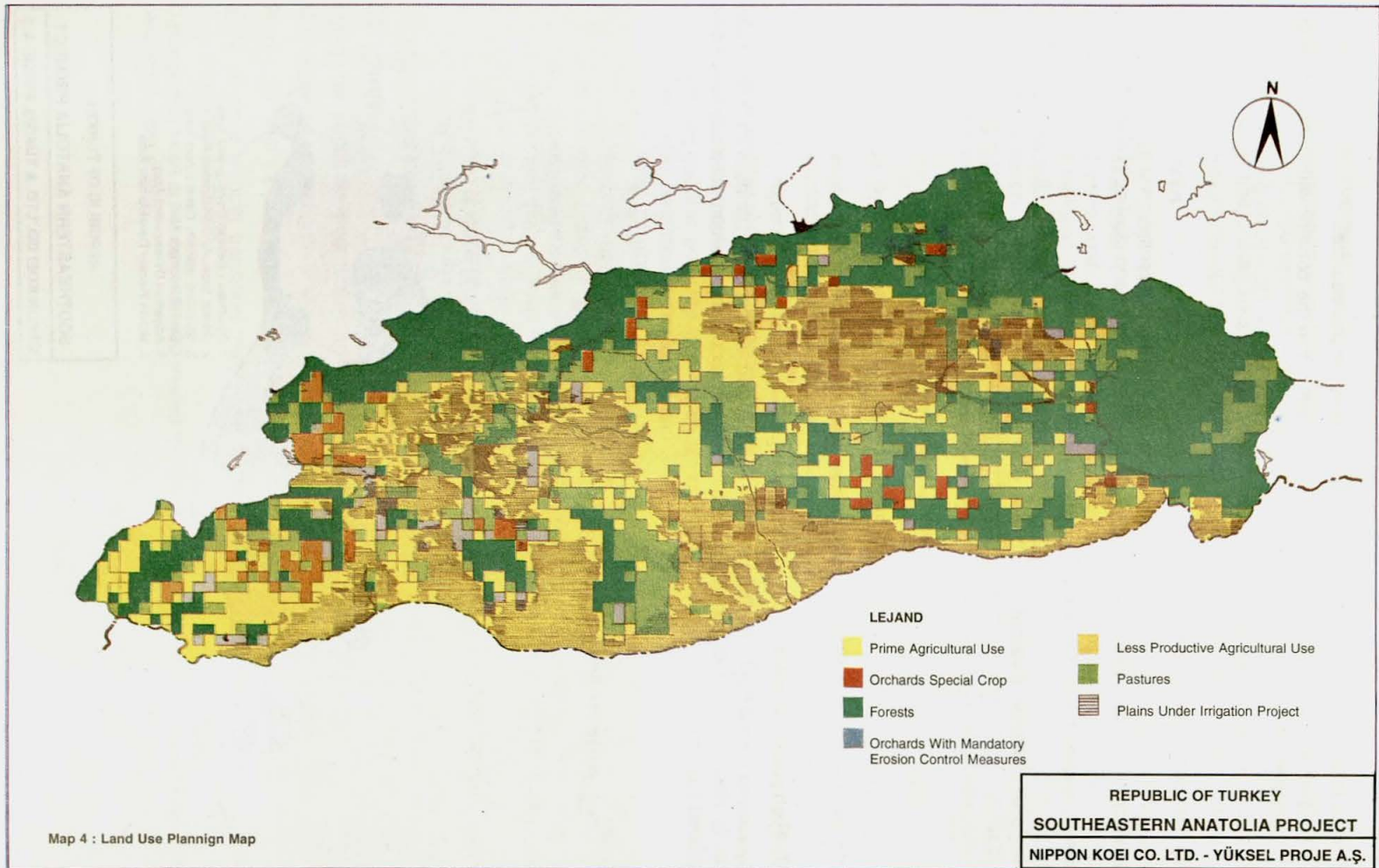


LEJAND

- | | |
|--|---|
|  Irrigated Farming |  Dry Farming |
|  Dry Farming (with fallow) |  Special Crop (pistachios) |
|  Orchards |  Pastures |
|  Forests |  Heath |
|  Deserted Land, Rocks, Debris | |

Map 3 : Existing Land Use Pattern

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SOUTHEASTERN ANATOLIA PROJECT
NIPPON KOEI CO. LTD. - YÜKSEL PROJE A.Ş.



Map 4 : Land Use Plannign Map

In order to guide the future land use, the following will be prerequisites.

- 1) Detailed land use planning for major urban areas within the corridor within the consistent framework of regional spatial development; and
- 2) Policy measures to enforce environmental impact assessment and social/economic cost-benefit analysis for all the major investments on prime agricultural lands.

(2) Transportation network

Through the analysis on existing transport conditions, trends and prospects of traffic, the overall strategy for the transport development in the GAP region has been clarified (Table 11).

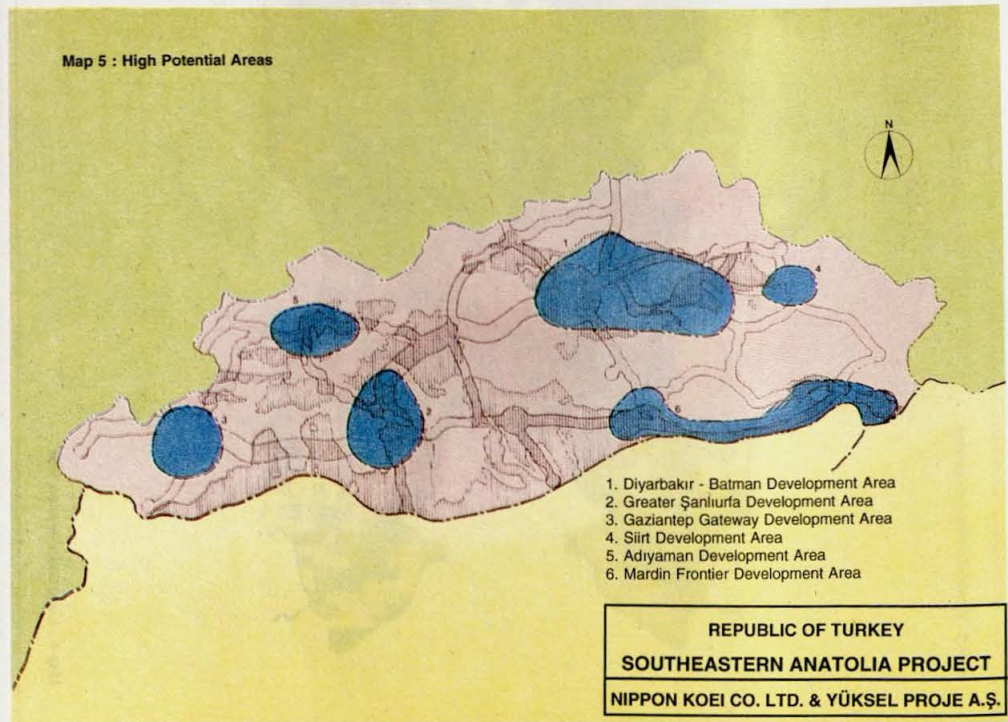
Table 11: Regional Transport Strategy

Regional transport strategy:

- 1) To further improve the road network as the prime mode of transportation for both inter-and intra-regional traffics first by improving the maintenance and upgrading trunk roads, second by correcting network deficiencies, and third by improving access to selected rural centers;
- 2) To establish and consolidate export corridors for GAP related commodities by selectively improving trunk roads and the railway system, upgrading the outer ports and providing associated facilities;
- 3) To improve the air transport by upgrading selected airports, establishing local aviation networks, and increasing inter-regional services aiming primarily at domestic and foreign tourism and industrial development; and
- 4) To meet specific local transport needs such as rural access roads, extension of small pipelines, storage facilities and truck/bus terminals in some urban centers.

(3) High potential areas

By using as criteria the accessibility to urban services and land capability, lands in the GAP region can be classified into four zones. On the basis of this, six broad development areas have been defined (Map 5).



5. Resource Development

The regional development involves various resources, and it will realize over time as the resource base expands. Most resources are subject to direct development activities. Some resources are more critical, posing constraints to development unless their base is expanded according to careful planning. Those resources more critical in the GAP region are water, energy, environmental, human and financial resources.

(1) Water resources

Even with the higher crop intensity under the proposed cropping pattern, the planned irrigation area can be properly covered for most irrigation schemes by the facilities originally planned by DSI. For some schemes, water deficits would occur in the driest years experienced in the past, but these are local phenomena. Counter-measures are conceivable for them including an additional dam and/or inter-subbasin water transfer and the adoption of water saving irrigation technologies such as drip irrigation. The adoption of higher crop intensity will improve the viability of each individual irrigation scheme, but the feasibility of some schemes needs to be carefully re-established, taking account of recent research results and trading-off between hydropower and irrigation development where relevant.

In view of the above, the following pragmatic approach is recommended.

- 1) The first priority should be given to the prompt completion of projects under construction.
- 2) Those projects at an advanced stage (detailed design completed and/or ready for financing) should be implemented at the earliest time.
- 3) Other priority projects having lower unit irrigation cost per ha or higher rate of return from power generation should be advanced for implementation in the near future.
- 4) In the mean time, research should be intensified on
 - i) cropping patterns and crop rotations under irrigation,
 - ii) water saving irrigation technologies, and
 - iii) on-farm water management.
- 5) For those projects/components, where alternative schemes are conceivable for increasing firm discharges and/or irrigable areas, comprehensive feasibility studies should be conducted, including the examination of those alternative schemes and review of the planned schemes, except those at an advanced stage. Such studies should be based on the updated information on the issues listed under 4) above.
- 6) Implementation of those projects/components should follow in accordance with the viability and priority established in step 5).

Priority projects identified following the steps 1) through 3) are listed in Table 9

(2) Energy

Energy resources development in the GAP region should aim at the following:

- 1) To support the high rate of industrialization envisioned by the Master Plan;
- 2) To cope with the structural changes in energy use by rural households; and
- 3) To make a smooth transition from conventional energy to commercial energy as the urbanization proceeds.

General measures are recommended related to energy for industrialization, rural energy, and new/renewable energy.

Industrialization

- 1) Extension of power transmission and distribution network to ensure stable and reliable supply of electricity to be generated by the GAP hydropower schemes;
- 2) Examination of alternatives for transporting increasing amount of petroleum import;
- 3) Continuing exploration of asphaltite for earlier exploitation; and
- 4) Establishment of proper energy pricing system to encourage efficient use and better balance between domestic and import energy sources.

Rural energy

- 1) Emphasis on small hydropower for isolated demand centers;
- 2) Diversification of energy sources including electricity, biogas, LPG and plant wastes, and integration of energy supply with various rural activities; and
- 3) Organization of rural cooperatives for energy development with local participation and information dissemination for efficient energy use and saving.

New/renewable energy

- 1) Encouragement of solar water heaters for industrial and public uses such as process heat for agro-processing, cleaning at slaughterhouses and other sanitary purposes;
- 2) Experimental use of photovoltaics for demonstration controlled grazing and public facilities;
- 3) Demonstration installation of biogas digesters and windmills to be followed by local manufacturing of equipment and wider use; and
- 4) Exploration of geothermal energy in the long run for multiple purposes including power generation, industrial process heat, green houses, recreational and domestic uses.

(3) Environment

It has been widely recognized that high economic growth in any region, especially under severe natural conditions, cannot be sustained without proper management of environment. Thus the real issue is not a trade-off between economic development and environmental conservation but rather the environmental management for sustained economic growth.

Two sets of measures are recommended to cope with the possible environmental problems in the GAP region. First, the Environmental Impact Assessment practices should be initiated for the GAP. This will help to identify project-specific environmental problems and formulate counter-measures. Most of the major GAP related investments and the GAP as a whole fall in the category where the filing of an Environmental Impact Assessment Report is mandatory. The magnitude of development, extra-territorial effects and model case of regional development, all foreseen for the GAP, justify such an initiative.

Second, continuous efforts should be made by relevant agencies to cope with other environmental problems calling for a more integrated approach. Agricultural extension, demonstration and monitoring are essential components. Application of irrigation water, fertilizer and pesticides, adoption of better cropping patterns and farming practices and on-farm tree planting are subject for agricultural extension. For the promotion of managed pasture and controlled grazing, and accelerated afforestation, demonstration projects will be effective. Monitoring is essential for controlling water-borne diseases and assessing climatic and ecological changes. These measures are described in relevant sections of this report.

(4) Human resources

Development of human resources is not only an essential condition for successful regional development but more importantly a goal by itself. It should aim at:

- 1) reversing the net out-migrating trend, and
- 2) developing manpower within the Region.

To realize these, three broad measures are recommended.

Education and health services

- 1) Improved provision of education and health services within the Region aiming at attaining by 2005 at least the present national average levels for enrollment ratios at schools of different levels and provision of health facilities and personnel; and
- 2) Monitoring and control of diseases that may proliferate as a result of extensive irrigation and water impoundment.

Technical education/training

- 1) Encouragement of technical education and training in a wide range of fields including various agro-processing, intensive cattle raising, poultry and associated service activities; and
- 2) Promotion of extended education gearing with the Region's specific needs such as weaving, handicraft and home economics.

Higher order services

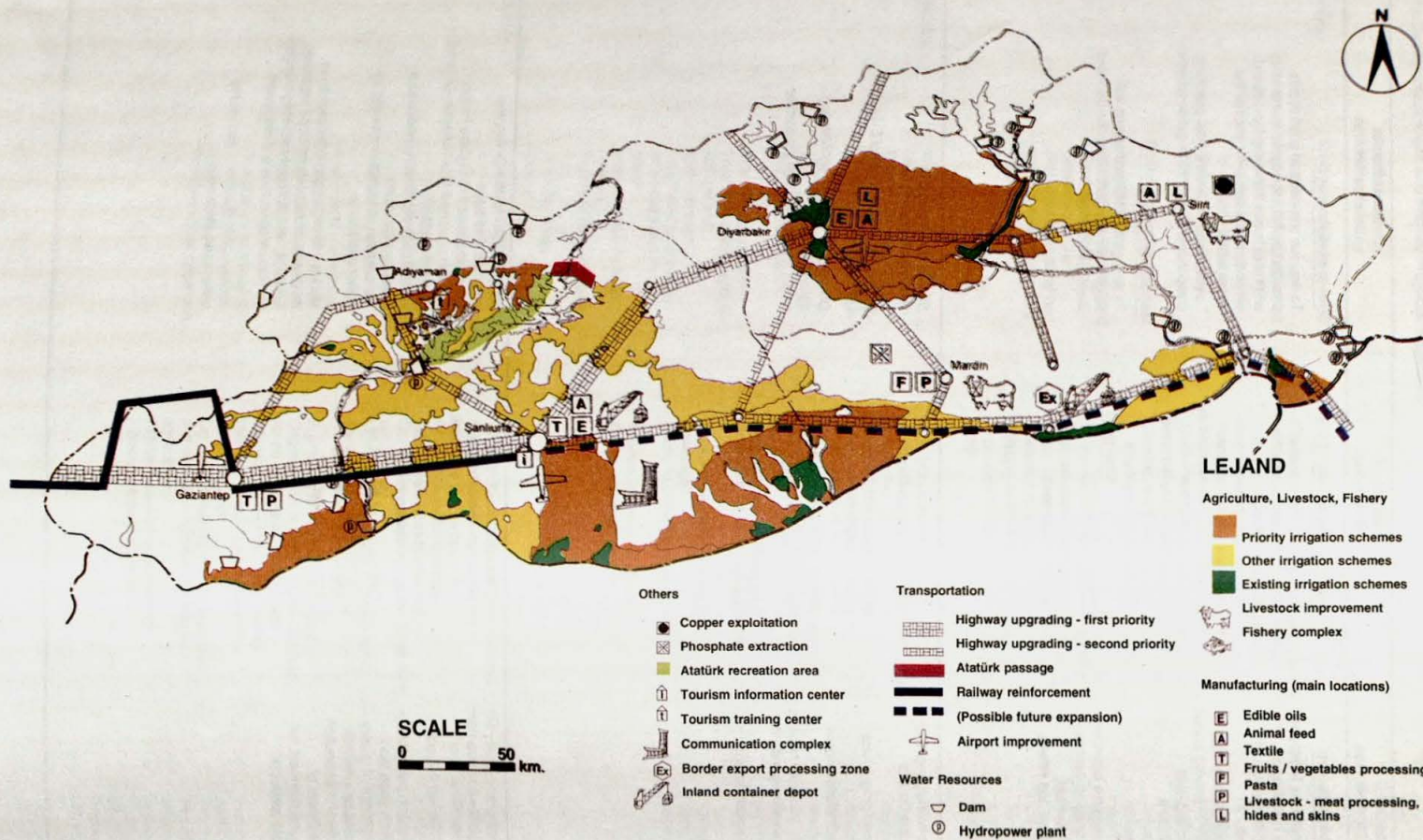
- 1) Establishment of a major institute for higher education in the near future and other facilities of higher order function in the long run such as international conference and technology development in order to enhance the overall image of the Region.

(5) Finance

The GAP implementation as planned will require the allocation of public sector investment equivalent to 8.6 % of the national investment expenditure during the sixth five year plan period, 10.3 % during the seventh and 8.0 % during the eighth plan period, assuming a 4.0 % annual increase of the total public investment at the national level. Allocation in the eighth plan period could be larger, if non-priority projects are reformulated into more viable ones with advanced technologies.

6. Development Areas and Projects

Six broad areas have been identified as development areas, where the development efforts should be concentrated in the next two decades. On the basis of analysis on present conditions, with constraints faced and resource base, these areas have been characterized with expected functions and different programs formulated with basic strategy and priority projects and other measures for development (Table 12, Map 6).



Map 6 : GAP Region and Master Plan Project

REPUBLIC OF TURKEY

SOUTHEASTERN ANATOLIA PROJECT

7. Institutional Measures

7.1 Agriculture

(1) Land tenure system

- 1) The status of land ownership in the GAP region need to be classified urgently, and the Government should clarify the future land reform legislation to ensure secure land titles.
- 2) Provision of credit and other inputs to the landless share croppers/tenants should be improved together with extension and organization efforts directed to them in order to enhance their position vis a vis the land owners; similar arrangement can be considered for the State owned land as well.
- 3) Top priority should be placed on increasing the area owned by family farms of 1 to 5 ha as labour utilization and crop intensities will be much higher in such farms.
- 4) For medium size family farms, cooperatives should be established for the procurement of modern inputs, marketing, on-farm water management and effective transmission of extension.
- 5) Land consolidation will be a necessary prerequisite for planned irrigation areas where small holders are dominant.

(2) Extension, research and information services

- 1) The TYUAP project should be extended to all the GAP provinces and applied for expansion of new crops such as oil crops and feed grains.
- 2) Research works should place emphasis on adoption of crop varieties, crop cycles and cultivation techniques under irrigation. Important institutions for this include the Institute of Irrigation Techniques, the Gaziantep Pistachio Research Institute, the Çukurova Agricultural Research Institute and soil analysis laboratories to clarify more efficient fertilizer utilization.
- 3) A research coordination committee may be established to coordinate research works for the GAP region with the participation of all the related institutes including those for extension services. Also, maintenance of well organized links with institutes in other regions and education/training for research staff will be important consideration.
- 4) Information on better farming practices, improved varieties and availability of support facilities should be conveyed to the majority of farmers, and so should be meteorological information to allow timely land preparation and seeding as well as market information.

(3) Financial system

- 1) Mutual guarantee should be taken as a collateral for short term production credit; for medium to long term credit, TCZB can carefully assess the project instead of relying on a collateral.
- 2) Coordination between TCZB and MAFRA extension services should be further strengthened for screening farmers' credit applications, evaluating their needs, and effectively providing extension and training to successful farmers.
- 3) Agricultural credit cooperatives (TKK) should be staffed with more qualified personnel as they are more important in providing short term production credit to small farmers. New cooperatives should be established in locations of new irrigation.
- 4) Establishment of "Agricultural Development Fund" should be considered to increase substantially the amount of credit available to farmers in the Region, and management schemes and criteria for implementing the Fund examined.

(4) Agricultural inputs

- 1) The Ceylanpınar agricultural enterprise will be the main institution to supply all kinds of quality

seed suitable for the Region. A nursery should be established within the Gaziantep Pistachio Research Institute to examine pistachio and vine varieties suitable for irrigated conditions. Private enterprises should be encouraged to establish seed production units and nurseries; some public lands may be rented to them for this purpose.

- 2) The TKK storage capacity for fertilizer should be increased, as it is more important for the distribution to individual farmers. Private dealers and manufacturers should be supported.
- 3) Mixed farming with crop cultivation and stock raising should be further promoted so that manure can be used effectively to minimize the use of chemical fertilizer.
- 4) Pests and diseases which may proliferate under irrigation can be minimized by properly managing crop rotations. The Plant Protection Institute in Diyarbakır should be supported to provide farmers with plant protection and other related services.

(5) Farm mechanization

- 1) The combine harvester and tractor hiring services should be extended to other machinery and equipment particularly for small and medium size farms. For this, some medium size farms owners/operators should be encouraged to expand their machinery park, supported by extension and TCZB credit.
- 2) The farm machinery and equipment manufacturing plant of TZDK in Şanlıurfa will meet the Region's specific requirements.

(6) Marketing

- 1) The Çukurova Cotton Agricultural Sales Cooperative (Çukobirlik) and the Southeastern Agricultural Sales Cooperative (Güneydoğubirlik) should be re-organized with increased financial and personnel capacities to cope with marketing of cotton, soybean, groundnut, sesame and sunflower for proper pricing, development of domestic and international markets and provision of incentives and financial supports to farmers.
- 2) Investments by private sector in agro-processing, storage and conservation facilities, packaging and transportation should be supported for better functioning of marketing channels in the Region.
- 3) Quality standards and product classification should be established particularly for those agricultural products and agro-processed commodities oriented to export.

7.2 Livestock, forestry and fishery

(1) Livestock

- 1) Demonstration projects for controlled grazing should be started immediately. The feed base should be expanded by introducing feed grains and forages into the summer rotations under irrigated conditions. Demonstration forage production should be undertaken in areas where high yield cattle breeds are available.
- 2) Periodic vaccinations should be strictly undertaken together with the control of internal and external parasites, as the GAP region is part of the border band for control of epidemic diseases.
- 3) Marketing of livestock products should be improved. Composition of processed products should be changed: from cheese to fresh milk and yoghurt, and from whole carcasses export to choice cuts of packaged meat. The State owned processing facilities (EBK, SEK) should be improved and privatized.
- 4) Cross breeding for cattle should be encouraged through artificial and natural insemination, with the increasing emphasis on the former, in order to increase the livestock production keeping the herd size constant.

- 5) Agricultural credit for cattle should be directed to medium sized farms to encourage mixed farming. Sheep and goat raising families with no cultivation land should be the exclusive beneficiaries for sheep and goat credit from the Agricultural Bank.

(2) Forestry

- 1) On-farm tree planting should be encouraged by providing farmers with seedlings of selected species and technical extension on nursery practices and woodlot management and clarifying marketing and economic aspects of wood production.
- 2) Seedlings/saplings supply by private enterprises should be encouraged with incentives provided by Forestry Law 6831 as amended and new Afforestation Legislation introduced in 1987.

(3) Fishery

- 1) An inland fishery center should be established and managed by a designated entity for research/training for fishing gears and methods, equipped with a hatchery and fingerlings production facilities, and for establishment of distribution and marketing channels.

7.3 Industry

(1) Manufacturing

- 1) Technical guidance should be provided to prospective investors, covering in general investment opportunities, marketing prospects and available support services, and more specifically new production processes/technologies and other factors affecting the establishment of new industries. In addition to SPO initiative in this area, technical training by Small Industry Development Organization (KÜSGET) should be extended to cover all the GAP Provinces.
- 2) Both the number of branches of the development banks in the Region and the Region's share in total lending should be increased to meet the rapidly increasing demand in the private manufacturing investments. Foreign investment should be promoted in the forms of joint-venture formation, direct investment and BOT schemes by dissemination of information on investment opportunities, available incentive measures and other conditions, and identification of local partners.
- 3) A private sector firm should be contracted for the provision of technical guidance, assistance in obtaining loans, promotion of foreign participation and advice to local governments on promotional measures, in cooperation with other public and private agencies.
- 4) Potential indigenous entrepreneurs should be identified, representative pre-feasibility studies prepared, and all relevant candidate entrepreneurs invited for application to new investment opportunities. Training should be provided, if necessary for any specific industry, covering general industrial project management and specialized subjects.

(2) Mining

- 1) Existing data on mineral deposits and assay results should be compiled for easy access by the private sector. This may be done as part of comprehensive survey to prepare mineral resources base maps.

(3) Tourism

- 1) A tourism resource inventory should be prepared with the cooperation of the Ministry of Culture and Tourism and local and foreign travel agencies. A comprehensive study of these resources should be conducted and broad guidelines established including an action restoration program for historical ruins.
- 2) Tourism personnel should be trained by the Ministry and TURSAB for hotel management, catering, tour operators and travel agencies.

7.4 Trade and commerce

- 1) Bank branches and financial advisory services should be established in those sub-regional centers lacking THB.
- 2) On-the-job training programs for employees of banks/finance and hotel/restaurant services should be encouraged and supported.
- 3) More trading centers need to be established in the long run, including a few specialized in international trade.

7.5 Infrastructure

(1) Water resources

- 1) In order to address management issues related to irrigation in a coherent way, irrigation districts should be established, first on a pilot project base. Model farms should be established in areas where small farmers are dominant and/or land consolidation/redistribution has been completed. Farmers should be organized to become a substantial implementing agency for irrigation development and management. New water charge system and irrigation technologies can be tested through such an entity.
- 2) Activities of various implementing agencies related to water and land resources should be coordinated with the concept of watershed management.

(2) Transportation

- 1) The following measures should be taken in the nearest future to clarify specific needs for road transport related to GAP implementation:
 - i) Completion of O-D survey and study of traffic demand on priority roads,
 - ii) Comparative feasibility study of Atatürk reservoir passage, and
 - iii) Corridor study to identify infrastructure and utility needs for strategic industries along the kinked development axis.
- 2) A comprehensive study should be carried out to clarify the role of railway and improve the existing system, covering both the needs for improving physical facilities and management issues.
- 3) Re-evaluation of the outer ports for the Region should be conducted, considering the impact from the international and domestic adoption of cargo containerization.
- 4) A Regional Transport Study should be conducted to take all these measures effectively, covering also modal split, aviation needs including improvement of local airports and establishment of local air services, and pipelines for domestic needs.

(3) Social infrastructure

- 1) Top priority should be given to the improvement of education and health services by establishing a fair share allocation of State budget in order to narrow gaps in service levels between the Region and the national average.
- 2) Extended education should be encouraged. A study should be carried out to examine courses to be offered, target population, and facility needs to make it fit to the Region's needs.
- 3) A major institute for higher education/studies should be established, where post-graduate training will be provided in such subjects as irrigation technologies, Middle Eastern trade and policy. The institute should aim at an international reputation, and contacts with international research institutes and donor agencies should be established.

7.6 Urban sector

- 1) Municipal finances need to be much improved and the following measures should be considered:
 - i) Funding from the general budget should be increased, earmarked to specific urban projects in the GAP region;
 - ii) Municipalities should be given access to loans at concessional rates;
 - iii) Accumulated short term loans should be consolidated and rescheduled;
 - iv) The accumulation of funds due to municipalities should be placed in separate accounts to ensure their availability for GAP projects. These funds would be supplemented by extra-budgetary funds.
 - v) Municipal administrations should be oriented to be as efficient as possible with efforts made to revalue assets, make adequate provision for liabilities, and identify new sources of income.
- 2) Municipalities are encouraged to prepare projects of their own. For this, they can use external professional services or apply to the Iller Bank.
- 3) Municipalities are encouraged to undertake cost recovery measures. For this, the Reconstruction Act and the Municipal Revenue Act provide the most viable sets of principles.
- 4) The planning of major urban centers should be improved in line with the following principles:
 - i) The plan should clarify the socio-economic framework of urban development within the regional development frameworks provided by the GAP Master Plan, rather than just being a physical plan of facilities and land use. Objectives and basic strategy of urban development should be specified.
 - ii) The plan should be a realistic and implementable one. Cost estimates and implementation phasing should be included in the plan, and needs for human, financial and other resources should be carefully weighted against respective availability during program formulation.
 - iii) The plan should formulate measures for mobilizing private sector resources and guiding private sector activities. The measures will include land use control, user charges, environmental regulations, building codes and others. They need to be institutionalized with formal adoption of the plan.
 - iv) Procedures must be established for collecting and structuring basic data for urban planning and updating the plan.

PRICE REVISION

EXPLANATION

Monetary figures in TL used in the 2nd Edition of Master Plan are as of June, 1988 prices. Multiplier value of 2.276351 is used to convert these figures to January, 1990 prices.

U.S. Dollar figures are first converted to TL equivalents on the basis of the exchange rate of June, 1988. The resultant TL figures are converted to January, 1990 prices by using the same multiplier 2.276351, and then converted back to U.S. Dollars on the basis of the exchange rate of January, 1990, which is 2.320.-TL to 1 U.S. Dollar.

Conversions described above are based on data from "Main Economic Indicators of Turkey", March, 1990.

Table 1 : Comparison of the GAP Region and Turkey by Selected Indices, 1985

1990 Prices

Index	Unit	Turkey	GAP Region	GAP Share (%)
Land Area	km ²	779,459	73,863	9.5
Total Population		50,664,458	4,303,567	8.5
Population Growth (1965-85)	% p.a.	2.4	2.9	-
Population Density	/km ²	65	58	-
Urban Population	% to total	53.0	49.9	-
Economic Structure	% in GDP/GRP			
Agriculture		17.7	39.6	(9.0)
Manufacturing		25.2	11.7	(1.9)
Gross Domestic Product	Million TL	190,725,000	7,661,194	4.0
Per Capita GDP/GRP	Thousand TL	4,147.5	1,962	(47)

Source : Statistical Year Book of Turkey 1987

Table 7 : Evaluation of Development Alternatives by Selected Economic Indices

1990 Prices

Index	A Max. Irrigation	Alternative B Max. Power	C Slower Development
Incremental Capital-Output Ratio	3.71	3.27	3.24
GRP Growth % p.a.	7.7	7.3	6.8
Per Capita GRP in 2005 (Thousand TL)	4,047	4,193	4,061
Total Public Investment Requirements (Billion TL)	65,560	50,990	46,890
Foreign Currency Requirements (Million TL)	8,080	7,147	6,490

* 2320 TL/\$ January 1990 foreign exchange rate.

Table 8 : Recommended Socio-Economic Framework

1990 Prices

	1985	2005		Recommended Framework	
		Trend Projection			
GRP (TL billion)	8,442	21,235	(4.7)	31,706	(6.8)
Agriculture	3,339	5,688	(2.7)	7,252	(4.0)
Industry	1,324	4,250	(6.0)	7,528	(9.1)
Construction	628	1,548	(4.6)	1,966	(5.9)
Services	3,150	9,749	(5.8)	14,960	(8.1)
Population (Thousand)	4,304	7,575	(2.9)	7,809	(3.0)
Urban	2,148	4,859	(4.2)	5,313	(4.6)
Rural	2,156	2,716	(1.2)	2,496	(0.7)
Employment (Thousand)	1,528	2,355	(2.2)	2,796	(3.1)
Per capita GRP (Thousand TL)	1,962	2,804	(1.8)	4,061	(3.7)

* Average annual growth rates % during 1985-2005 in parentheses.

