



REPUBLIC OF TURKEY  
MINISTRY OF FORESTRY AND WATER AFFAIRS



# ACTION PLAN OF COMBATING EROSION 2013-2017



Forest and Water is Life.

An aerial photograph of a mountainous region. The foreground shows a dirt road curving through a valley filled with green coniferous trees. The middle ground features rolling hills with patches of green vegetation and brown, eroded soil. The background consists of steep, rocky mountains under a blue sky with scattered white clouds. A large orange text box is overlaid on the top left of the image.

**Erosion is not prevented,  
it is controlled...**

# INTRODUCTION

Issues related with global warming and climate change has been increasing day by day. Turkey is one of the countries which will be affected by these issues because of its geographical position. It has been observed that there is an increase in flood and overflow issues both in the World and in Turkey.

Importance of soil protection in Turkey that is under the threat of desertification and erosion and combating with desertification ,erosion and flood and avalanche works are known by everybody. Afforestation and erosion control works are the effective combating methods by desertification ,erosion ,flood and avalanches.

Erosion has been continued in %59 of agricultural lands, %64 of rangelands,%54 of forest lands in Turkey. But works of erosion control are being continued with afforestation and combating with erosion works. In this context, in contrast to reduction in forest asset, our forest asset which was 20,2 million hectares of land according to inventory for 1963-1972 period has been reached to 21,6 million hectares of land as a result of afforestation, erosion control and improvement works by the end of 2012. Today Turkey is ranked among 3 countries which make maximum afforestation work in the world. Our target is to rehabilitate our forests as soon as possible and to increase at least %30 in the 100th anniversary of our Republic. Turkey in which most of its soils are under the threat of desertification and erosion has been prepared **“Afforestation and Erosion Control National Mobilization Action Plan”** covering 2008-2012 in order to accelerate afforestation and erosion control works, afforestation, combating with erosion and rehabilitation of forests works have been realized in 2 million 429 thousand hectares of land in a five years.

**“Combating with Erosion Action Plan”** covering 2013-2017 and prepared with related agents and agencies in the coordination of our ministry with the aim of advancing these works will to be implemented in 2013. It has been targeted to restore ecological balance by increasing soil losses, to increase coordination of public agencies that combating with erosion , efficient use of public resources and effectiveness of works of combating with erosion by Combating with Erosion Action Plan.

## AIM and CONTEXT

It is aimed to combat with erosion effectively in whole Turkey, to provide coordination in between agents and agencies which combat with erosion and efficient use of public resources.

Working of all parts of the society and public agents and agencies in a coordinated way will be provided by Action Plan covering 2013-2017 years. In the scope of plan, afforestation, rehabilitation, erosion control rangeland rehabilitation works will be realized in 1.400.000 hectares of land in 5 years in order to combating with erosion and maintenance work will be realized in 2.287.000 hectares of land in afforestation and erosion control fields worked in the past. Total cost of these works is estimated 1.890.881.000 TL.



*Kastamonu - Tosya - Erosion Control Work*

## In the scope of Action Plan; It is aimed

- To combat with erosion around Turkey primarily in the areas which have high erosion risk and to reduce soil loss to a minimum level,
- To reduce flood risk with erosion control works to be held in river catchments
- To prolong dams and ponds life with erosion control measures to be taken and to increase quality and quantity of water in the catchments that potable water is obtained,
- To increase soil productivity by protecting organic substance in soil with erosion control works and to provide food security,
- To decrease negative effects of global warming, climate change and desertification on,
- To develop new techniques in combating with erosion with R&D works and to establish erosion monitoring system,
- To use Turkey's resources efficiently by developing intuitional capacity and cooperation among intuitions in combating with erosion,
- To provide the participation of community to the protection of natural resources and to combating with erosion by training, advertisement and awareness activities.



*Kastamonu - Tosya - Erosion Control Work*

# EROSION IN TURKEY

Turkey is very sensitive to erosion because of its geographical position, climate, topography, geological structure and soil conditions. Intervention and overuse of people increase erosion more. As a result, organic substance is being transported with the soils that transported with erosion, productivity of soils are decreased, economic life of dams shortens with transported sediments and floods and overflows cause life and property loss.

As a result of soil's unproductivity regarding to erosion, overwhelming increasing in agriculture and livestock production occur and this increase immigration from rural places to urban cities. This case causes important socio-economic issues, and gives important damages to our national economy.



*Tarsus - İnköy Catchment*

## EROSION IN RANGELANDS

Turkey's total agricultural lands is 24.437.000 hectares of land and annual (sowed land, fallow and vegetable orchards) and perennial plants (fruit, yard, olive grove) are grown in these lands (TÜİK, 2011).

Agricultural lands are the lands usually culture plants are grown by cultivating the soil. Causes such as not to use agricultural lands according to their capacity, to make agriculture in sloppy marginal lands, false soil cultivation, to plow incorrect time with inappropriate equipment, not take in field measures for soil and water protection( field leveling, drainage in field, rehabilitation of salty and alkali soils etc.) lead to the loss of soil's productivity. Erosion is being increased rapidly in agriculture lands as a result of degradation of physical properties of soil and this cause active erosion in %59 of agriculture lands.

Because of plants intensity and their species differences, their affect to protect soil from erosion is also different. The easiest way in the combination of different plants is to plant in strips that follows each other in a line. Generally mattock plants (cotton, corn, vegetable etc.) are the least effective ones in the protection of soil and they cause severe erosion problems. In this regard, mattock plants should be combined with protective plants. Legume (trefoil, vicia sativa,

alfaalfa etc) and poaceae(bromus,couch grass, oat grass) forages are the most suitable plants to be used in crop rotation. These plants provide increasing in productivity of soil and higher aggregate stabilization by increasing organic substance of soil in addition to providing good vegetation cover. Soil protected agriculture should be implemented in order to prevent erosion and to provide plant production. Expand and support of non-cultivate agriculture, agriculture in minimum soil cultivation, strip agriculture, best agriculture and organic agriculture practices will decrease erosion in agricultural lands and prevent immigration from rural in addition to land consolidation works.



Şanlıurfa

## EROSION IN RANGELANDS

According to Turkish Statistical Institute 2011 data , there are 14.617.000 hectares of land (%18,6) rangelands. More than %70 our rangelands are located in arid and semi-arid climate zone. This case is the most important factor in the development of weak vegetation. Turkey's rangelands condition in most of the part is in between medium and weak. Also misuse of rangelands (early grazing, overgrazing) lead to weaken of vegeta-

tion cover and leads active erosion in the %64 of rangelands.

Arid and semi-arid region rangelands are sensitive to erosion and erosion occurs as a result of incorrect rangeland management. As a result of grazing, composition of species change, covering area of vegetation cover decreases, productivity decreases and erosion increases.

Maximum pasture and rangeland with %34,8 rate is situated in Eastern Anatolia. In this region (in the middle and east) continental climate is dominated, precipitation is very inadequate. The most important reason of erosion in Eastern Anatolia rangelands is overgrazing and early grazing. Especially the soils which lost their vegetation cover in south hills are exposed to erosion. Overgrazing and early grazing should be prevented in order to prevent erosion in these rangelands and the terraces should be formed in order to decrease speed of rainfall.

Vegetation cover in Taurus rangelands start to dry by June with the effect hot and arid climate. Soils which are weaker in terms of vegetation cover are exposed to erosion by severe rainfall and overgrazing in autumn. Overgrazing should be prevented in these rangelands in order to prevent erosion, plants such as stone cordon etc should be constructed in order to stop the speed of rainfall.



Erzurum



# EROSION IN FOREST LANDS

Turkey's forest asset is 21.670.000 hectares of land by the end of 2012. 11.551.57 hectares of forests are productive, 10.118.430 hectares of forests are degraded. (OGM).

If it is taken into consideration that degraded forest lands constitute %46,7 of forest asset, it is obvious that forest lands are exposed to erosion and erosion measures should be taken in There is active erosion in % 54 of these forest lands.

Destruction of forests by over and misuse, fires, clear fields, environment and air pollution as a result of industrialization and acid rains increase erosion in forest lands.

Forests have erosion reducing effect, even impeding effect totally. Forests also improve soil properties and prevent erosion by decreasing wind speed. Principle of sustainability and protection should be taken into consideration while benefiting from forests.

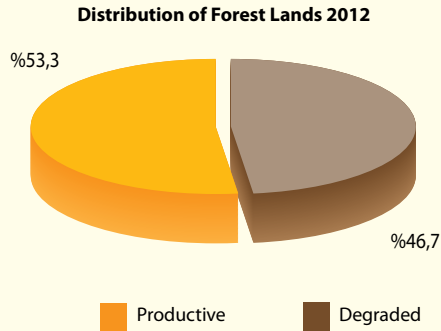


Figure1. Distribution of Forest Lands (2012 OGM)



Sloppy land that its closeness is less

## ACTIVITIES HELD TO DATE

Activities of afforestation, erosion control, rehabilitation of degraded forest lands and rangelands have been continued since 1946.

- Afforestation and erosion control works have been reached maximum level with Afforestation and Erosion Control Mobilization covering, 2008-2012, 2.429.000 hectares of land have been afforested
- Afforestation, erosion control, rehabilitation of degraded forest lands, rehabilitation of rangelands, establishment of energy forests, artificial regeneration and private afforestation works have been held in 7.889.301 hectares of land till the end of 2012
- 1.070.435 hectares of land are the work of erosion control, other works have contributed to prevention of erosion indirectly.
- According to Forest Resources Assessment (FRA) 2010 Report, decrease in forest asset in the World was 5,2 million hectares of land averagely in 10 years, Turkey has been ranked in top levels among the countries which increased the forest asset with afforestation and rehabilitation works realized within 10 years.
- In this context, Turkey has achieved to increase its forest land into %6 and its forest asset into % 50 in the last 30 years. Our target is to increase Turkey's total forest land from % 27,6 to %30in 2023.

TYPE OF WORK	ALL ACTIVITIES HELD UP TO END OF 2012 ON THE BASIS INSTUTION				TOTAL
	OGM	DSİ	BÜGEM	OTHER	
<b>Erosion Control</b>	1.015.010	55.425			1.070.435
<b>Afforestation</b>	2.070.333	24.681		85.750	2.180.764
<b>Rehabilitation</b>	2.492.683				2.492.683
<b>Rangeland Rehabilitation</b>	151.834		446.534		598.368
<b>Establishment of Energy Forest</b>	622.878				622.878
<b>Artificial Regeneration</b>	802.591				802.591
<b>Private Afforestation</b>	121.582				121.582
<b>TOTAL</b>	<b>7.276.911</b>	<b>80.106</b>	<b>446.534</b>	<b>85.750</b>	<b>7.889.301</b>

# ACTIVITIES TO BE HELD IN THE SCOPE OF ACTION PLAN

**Activities to be held in the scope of Action Plan are grouped under four titles.**

- Erosion control, afforestation, rehabilitation of degraded forest lands, range-land rehabilitation,
- Maintenance of activities held in previous years
- Research and development activities,
- Training, advertisement and capacity development activities.



*Kastamonu - Tosya - Erosion Control Work*

# Erosion Control

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## Administrative Measures:

Administrative measure is to stop over-grazing in the field that expose to erosion, formation of land use according to land classification and the determination and putting into practice of methods which may provide the participation of community for problem solving. The most comprehensive administrative measure is to put into practice of projects which increase income level of the community.

## Cultural Measures:

Cultural Measures are the implementations which aim to stop erosion by forming vegetation cover or developing existing vegetation cover. Afforestation, cover development, revegetation and rangeland rehabilitation works are in the context of cultural measures.

## Mechanical Measures (Engineering Measures):

Mechanical measures are divided into two as measures implemented in hills and the measures implemented against to gully erosion,

- 1. Preventing techniques of surface erosion:** Terracing line sowing, wattle fences, brushed stone cordon, mulching etc..
- 2. Preventing techniques of gully erosion:** Diversion ditches, discgarge chanel, drystone checkdam, wattle living checkdam, brushed living checkdam, gabion checkdam, mixed checkdam and cemented rehabilitation checkdam

# Afforestation

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In the scope of action plan ,combating with erosion will be held via afforestation in appropriate habitat conditions. In this context, afforestation works will be realized in degraded forest lands, in the spaces in the forest and the out, around cities, road sides, field sides and pond, lake and dam catchments.



Denizli

## Rehabilitation of Degraded Forest Lands

In degraded forest lands, coniferous, leaved and mixed lands which are not rehabilitated and the areas in it will be mentioned in rehabilitation works with natural regeneration and silvicultural maintenance implementations.

Existing species will be protected by not giving any harm to forest ecosystem in degraded forest lands with rehabilitation, spaces will be completed with appropriate species and the field will be rehabilitated by taking necessary erosion measures.



*Mersin - Rehabilitation of Degraded Forest Lands*

## Rangeland Rehabilitation

In the scope of protocol signed in between Ministry of Forestry and Water Affairs and Ministry of Food, Agriculture and Livestock on 17.01.2012, afforestation work will be held for the soil protection in degraded rangelands by making qualification change.

Rehabilitation of rangeland and erosion measures related to forest will be realized by General Directorate of Forestry (OGM), rangeland rehabilitation works in other rangelands will be realized by General Directorate of Plant Production (BÜGEM) erosion measures will be taken by BÜGEM and OGM.



*Ağrı - Doğubeyazıt*

## Research and Development Works

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In the scope of this Action Plan, research and development works will be realized by General Directorate of Combating With Desertification and Erosion, General Directorate of Agricultural Researches and Politics and General Directorate Of Agricultural Reform in order to develop intuitional capacity, to develop new techniques and increase efficiency and to train expert.



## Training Activities

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In the scope of this Action Plan, workshop, symposium, conference and so on meetings will be organized and training, advertisement works will be held by General Directorate of Combating With Desertification and Erosion, General Directorate of Agricultural Researches and Politics and General Directorate Of Agricultural Reform in order to develop intuitional capacity of staff, to provide participation of our community to combating with erosion and protection of resources and to train developing and least developed countries, community and students.

# ACTIVITIES TO BE REALIZED ON THE BASIS OF INSTUTION

## Implementation Activities;

Activity No	Name of Activity	Responsible and Related Agencies	Implementation Year
1	Updating of Soil Map	ÇEM-OGM-TRGM	2013-2017
2	Updating of erosion Risk Map	ÇEM-OGM-BİD	2013-2017
3	Establishment of Erosion and Catchment Monitoring System	ÇEM-OGM	2013-2017
4	Preparation of Integrated Catchment and Rehabilitation Plan and Project	ÇEM-OGM	2013-2017
5	Design of Integrated Catchment Plan in the scope of combating with desertification and erosion	ÇEM-OGM	2013-2017
6	Projects of Land Consolidation and In the Field Development Projects	TRGM	2013-2017
7	Projects of Land Use Planning	TRGM	2013-2017
8	Projects of Soil Survey	TRGM	2013-2017
9	Rangeland Rehabilitation( it is planned to be held in 175 000 hectares of land)	BÜGEM	2013-2017
10	Around Turkey in the scope of action plan; In Erosion Control: 400.000 hectares of land plantation and 1.131.000 hectares of land maintenance, In Afforestation: 250.000 hectares of land plantation and 616.600 hectares of land maintenance, In Rehabilitation: 525.000 hectares of land plantation and 539.400 hectares of land maintenance, In Rangeland Rehabilitation: 50.000 hectares of land plantation work have been planned .	OGM	2013-2017

## Research and Development Activities;

Activity No	Activity Name	Related and responsible Agencies	Implementation Year
1	Works of determination of erosion risk	TAGEM	2013-2016
2	Researches of preventing wind erosion	TAGEM-OGM-ÇEM	2013-2017
3	Project of sustainable land management and climate friendly agricultural implementations	ÇEM-OGM-DKMP-GTHB- FAO	2013-2016
4	Development of potential afforestation fields data base and monitoring system of catchment	ÇEM-OGM-BİD	2011 –2015

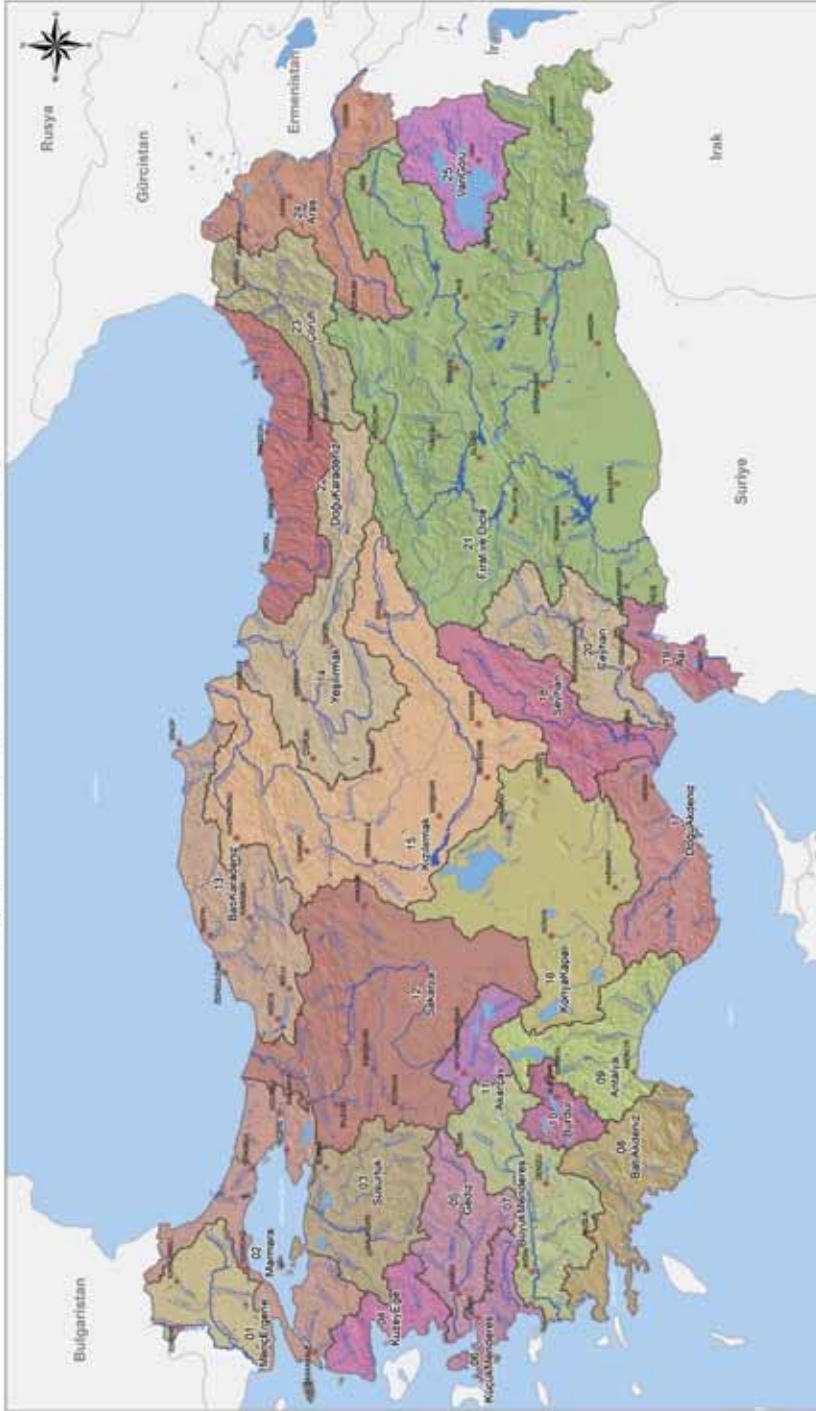
Activity No	Activity Name	Related and responsible Agencies	Implementation Year
5	Researches of combating with desertification	ÇEM-OGM-TAGEM	2013-2016
6	TÜBİTAK (KAMAG) 1007 Effectiveness of Combating with Erosion Project	ÇEM-OGM-DSİ-MGM-ÇŞB-GTHB-TÜBİTAK	2013-2016
7	Project of determination of species resistant to extreme conditions and their adaptation	ÇEM-TİGEM-OGM	2012-2021
8	Humic acid's effect on plant production in arid and semi arid areas and soil rehabilitation in	ÇEM-OGM	2012-2014
9	Determination criteria of erosion risk areas in forest management plans and silvicultural implementation	OGM	2013-2014
10	Research Projects for origin creating	OGM-ÇEM-TAGEM	1984-2025
11	Plantation works in extreme conditions (desertification, salinity and mining areas)	OGM-ÇEM	2013-2017
12	Capacity Development Project of Combating with desertification and Erosions in the least developed countries in Africa	ÇEM-OGM-TİKA	2013-2017

## Training and Advertisement Activities;

Activity No	Activity Name	Related and responsible Agencies	Implementation Year
1	Visual and press media for public awareness	ÇEM-OGM-EYDB	2013-2017
2	Workshops and technical visits	ÇEM-OGM	2013-2017
3	International trainings	ÇEM-OGM	2013-2017
4	Bilateral and regional cooperation with countries in the context of combating with desertification and erosion	ÇEM-OGM	2013-2017
5	In service training on combating with desertification and erosion	ÇEM-OGM	2013-2017
6	Training of combating with desertification and erosion	TAGEM	2013-2017
7	Training organization of experts for forestry sector on combating with desertification and erosion	ÇEM-OGM	2013-2018



# Map of River Catchments of Turkey



## Presentation

- Province —
- Dam —
- Lake —
- Border Provinces —

- | Catchment name (no) | 03 - Susurluk  | 06 - Kocçik Mendere | 09 - Arslan  | 12 - Sakarya        | 15 - Kizilirmak       | 18 - Seyhan | 21 - Fırat ve Dicle | 24 - Aras    |
|---------------------|----------------|---------------------|--------------|---------------------|-----------------------|-------------|---------------------|--------------|
| 01 - Maviç Ergene   | 04 - Kuzey Ege | 07 - Büyük Mendere  | 10 - Burdur  | 13 - Batı Karadeniz | 16 - Konya Kızılırmak | 19 - Akı    | 22 - Doğu Karadeniz | 25 - Van Gök |
| 02 - Marmara        | 05 - Gediz     | 08 - Batı Akdeniz   | 11 - Antalya | 14 - Yeşilirmak     | 17 - Doğu Akdeniz     | 20 - Çayhan | 23 - Çoruh          |              |

## ACTION PLAN ACCORDING TO CATCHMENTS

- Turkey is divided into 25 catchments because of its climate and topography. Activities in the Action Plan to be held in between 2013-2017 have been prepared on the catchment basis.
- In the scope of action plan in between 2013-2017, plantation and maintenance number and their costs to be realized in 25 catchments:

### ACTIVITIES TO BE HELD WITH ACTION PLAN

Year	Plantation (Hectare)	Cost (TL)	Maintenance (Hectare)	Cost (TL)	Total Cost
2013	281.000	260.608.000	470.000	112.122.000	<b>372.730.000</b>
2014	281.000	260.608.000	462.000	114.675.000	<b>375.283.000</b>
2015	281.000	260.608.000	457.000	115.178.000	<b>375.786.000</b>
2016	279.000	259.872.000	448.000	123.626.000	<b>383.498.000</b>
2017	278.000	259.504.000	450.000	124.080.000	<b>383.584.000</b>
<b>TOTAL</b>	<b>1.400.000</b>	<b>1.301.200.000</b>	<b>2.287.000</b>	<b>589.681.000</b>	<b>1.890.881.000</b>

## MONITORING and EVALUATION

Realizations will be monitored establishing web based monitoring system quarterly. Intuitions will note their realizations to the system on the web quarterly.

Monitoring system will be coordinated by **General Directorate of Combating with Desertification and Erosion** and public opinion will be informed publishing on related agencies web page.

Reports will be prepared with research intuitions and universities on the effects of activities to erosion in the scope of action plan.



## 2013-2017 ACTIVITY AND COST TABLE

YEAR	2013	2014	2015	2016	2017	Total	
<b>EROSION CONTROL</b>	Hectare	80.000	80.000	80.000	80.000	80.000	400.000
	TL	80.000.000	80.000.000	80.000.000	80.000.000	80.000.000	400.000.000
	Hectare	190.000	225.000	238.000	238.000	240.000	1.131.000
	TL	43.130.000	51.075.000	54.026.000	54.026.000	54.480.000	256.737.000
<b>AFFORESTATION</b>	Hectare	50.000	50.000	50.000	50.000	50.000	250.000
	TL	125.000.000	125.000.000	125.000.000	125.000.000	125.000.000	625.000.000
	Hectare	100.800	107.000	108.800	150.000	150.000	616.600
	TL	40.320.000	42.800.000	43.520.000	60.000.000	60.000.000	246.640.000
<b>REHABILITATION</b>	Hectare	106.000	106.000	106.000	104.000	103.000	525.000
	TL	39.008.000	39.008.000	39.008.000	38.272.000	37.904.000	193.200.000
	Hectare	179.200	130.000	110.200	60.000	60.000	539.400
	TL	28.672.000	20.800.000	17.632.000	9.600.000	9.600.000	86.304.000
<b>RANGELAND REHABILITATION</b>	Hectare	10.000	10.000	10.000	10.000	10.000	50.000
	TL	4.000.000	4.000.000	4.000.000	4.000.000	4.000.000	20.000.000
	Hectare	35.000	35.000	35.000	35.000	35.000	175.000
	TL	12.600.000	12.600.000	12.600.000	12.600.000	12.600.000	63.000.000
<b>Total Plantation</b>	Hectare	281.000	281.000	281.000	279.000	278.000	1.400.000
<b>Plantation Cost</b>	TL	260.608.000	260.608.000	260.608.000	259.872.000	259.504.000	1.301.200.000
<b>Total Maintenance</b>	Hectare	470.000	462.000	457.000	448.000	450.000	2.287.000
<b>Maintenance Cost</b>	TL	112.122.000	114.675.000	115.178.000	123.626.000	124.080.000	589.681.000
<b>Total Cost</b>	TL	372.730.000	375.283.000	375.786.000	383.498.000	383.584.000	1.890.881.000



REPUBLIC OF TURKEY  
MINISTRY OF FORESTRY AND WATER AFFAIRS



Mersin - Arslanköy



Konya - Altınova