

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

REPUBLIC OF TURKEY, MINISTRY OF ENVIRONMENT AND FORESTRY (MEF)

**THE MASTER PLAN STUDY
ON
PARTICIPATORY WATERSHED REHABILITATION
IN
CORUH RIVER
IN
THE REPUBLIC OF TURKEY**

FINAL REPORT

MAIN REPORT

JANUARY, 2004

**PACIFIC CONSULTANTS INTERNATIONAL
RECS INTERNATIONAL INC.**

ExchangeRate (August, 2003)		
US\$ 1.00	=	TL 1,500,000
TL 1,000,000	=	US\$ 0.67
US\$ 1.00	=	Yen 120

PREFACE

In response to a request from the Government of the Republic of Turkey, the Government of Japan decided to conduct a study on “The Master Plan Study on Participatory Watershed Rehabilitation in Coruh River in the Republic of Turkey” and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA dispatched to Turkey a study team headed by Mr. Yutaka Nozaki of Pacific Consultants International, three (3) times between September 2002 to November 2003.

The team held discussions with the officials concerned of the Government of Turkey, and conducted field surveys in the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Turkey for their close cooperation extended to the team.

January, 2004

Shinki Suzuki

Vice President

Japan International Cooperation Agency

Tokyo, January of 2004

Mr. Shinki Suzuki
Vice President
Japan International Cooperation Agency

Transmittal Letter

We are glad to submit the Final Report of “The Master Plan Study on Participatory Watershed Rehabilitation in Coruh River in the Republic of Turkey”.

The report consists of the master plan for the watershed rehabilitation in the study area, which have been prepared in consideration of the advices and recommendations of relevant ministries of the Government of Japan and JICA on formulation of rehabilitation plan, as well as the discussions with the Turkish counterpart on the Draft Final Report and their comments on the report.

Forest lands in Turkey total 20.7 million ha, accounting for 26% of the area of the country, have about 8 million people, or 12% of the total population, living in forest villages located inside or near forest areas. However, employment opportunities as well as resource capacity in the forest villages are insufficient, and the income level of the inhabitants is generally very low. To meet their daily needs, people often encroach into the forest areas to graze animals, collect non-wood forest products and cut trees in an unsustainable manner. Hence, the forest areas in the Coruh River catchment are under rapid degradation. Poverty leads to the degradation of natural and social environment, which consequently propels further poverty. Therefore, a comprehensive watershed rehabilitation plan including environmental conservation and poverty alleviation is needed in order to prevent the further progression of the “vicious spiral of poverty and natural resource degradation”.

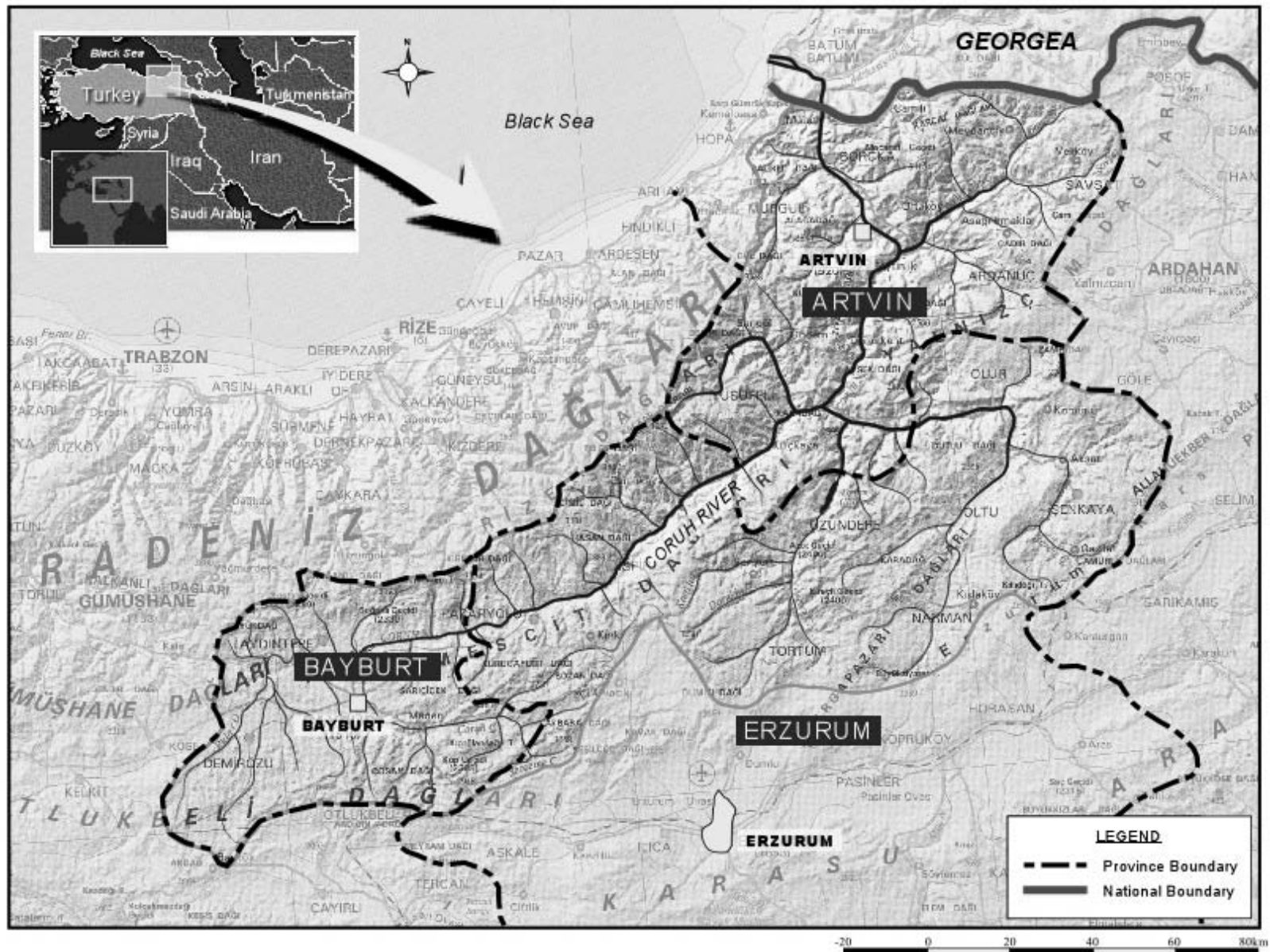
The implementation of this Master Plan proposed in this Report enables the rehabilitation of degraded areas in the Coruh River catchment through sustainable watershed management harmonizing environmental conservation and economic activities of local villagers. Consequently, this will sever both ends of the vicious spiral of poverty and natural resource degradation. Furthermore, the implementation of the MC Plans proposed in this Master Plan will bring about ripple effects and can be expanded to the whole catchment, and will largely contribute to the rehabilitation of the whole Coruh River catchment as a participatory watershed rehabilitation model. It is thus anticipated that this plan be put into implementation

as soon as possible following the implementation schedule proposed in the report.

Taking this opportunity, we express our sincere gratitude to the officials of your Agency, the Ministry of Foreign Affairs and the Ministry of Agriculture, Forestry and Fishery of the Government of Japan for their valuable advices and recommendations for our study. We are also grateful to the officials of the Turkish Government, the Ministry of Environment and Forestry and other public organizations involved in the Study for their devoted cooperation and support during the implementation of the Study in Turkey.

Sincerely yours,

Yutaka Nozaki
Team Leader
The Master Plan Study
on Participatory Watershed Rehabilitation in Coruh River



LOCATION MAP OF THE STUDY AREA

The Master Plan Study on Participatory Watershed Rehabilitation in Coruh River (I)



1. Sever soil erosion with exposed surface



2. Frequent turbulent flood widening river



3. Substantial amount of sedimentation flowing into Tortum lake

The Master Plan Study on Participatory Watershed Rehabilitation in Coruh River (II)



4. Quercus tree harvest for house heating and cooking



5. Overgrazing is one of the most serious problems: a herd of sheep coming back from mountains



6. Children in a poor forest village

The Master Plan Study on Participatory Watershed Rehabilitation in Coruh River (III)



7. Erosion Control: Fencing and terracing by villagers participation



8. Small check dam with Robinia tree planting



9. Apiculture by Caucasian bee as an income raising activity

The Master Plan Study on Participatory Watershed Rehabilitation in Coruh River (IV)



10. Village workshops where many opinions were raised by forest villagers



11. A Technical Transfer Seminar held in Ankara



12. Signing on M/M of Draft Final Report

Summary

Summary

Chapter 1 Introduction

1.1 Background of the Study

Forest lands in Turkey total 20.7 million ha, accounting for 26% of the area of the country. About 8 million people, or 12% of the total population, are living in forest villages located inside or near forest areas. However, employment opportunities as well as resource capacity in the forest villages are insufficient and the income level of the inhabitants is generally very low. To meet their daily needs, people often encroach into the forest areas to graze animals, collect non-wood forest products and cut trees in an unsustainable manner. These activities result in serious degradation of forests and natural resources.

Under such circumstances, the Government of the Republic of Turkey requested the Government of Japan to provide technical assistance for the preparation of a watershed rehabilitation plan in degraded areas. In response to this request, the Government of Japan, through the Japan International Cooperation Agency (JICA), dispatched a preparatory study team to the Republic of Turkey in April 2002 to discuss the Scope of Works (S/W) with the Ministry of Forestry (the present Ministry of Environment and Forestry). Based on the S/W, the Study Team composed of specialists was sent from September 2002 for the realization of the “Master Plan Study on Participatory Watershed Rehabilitation in Coruh River in the Republic of Turkey”. The results of the Study are elaborated in this report.

1.2 Objectives and Scope of the Study

- i) To formulate a Master Plan on Participatory Watershed Rehabilitation in Coruh River in the Republic of Turkey in order to contribute to natural resources management, erosion control and improvement of livelihood of local people.
- ii) To transfer relevant technology to the counterpart personnel through on-the-job training in the course of the Study.

1.3 The Study Area

The Study Area covers the Coruh River catchment which has a total area of about 2 million ha. The catchment is located in the northeast of Turkey, south of the Black Sea and next to the national border with Georgia, and ranges among the three Provinces of Artvin, Erzurum and Bayburt.

Chapter 2 National Development Policies on Major Issues

2.1 National Policies

(1) Regional Development

The Turkish Government’s regional development policy has two objectives. The prime objective is to reduce the differences in income and welfare levels between different regions in Turkey. The second objective calls for implementing a set of policies and development programs to maximize the utilization of different regional potentials. The Government is trying to reduce the regional disparities in the levels of development by promoting growth of income and employment opportunities in the less developed regions through regional development. There are two elements of the strategy to promote the development of the less developed regions. One is the provision of incentives for investments, and the other is provision of subsidies for production infrastructure.

(2) Forest Management

The Turkish national forest policies have both long and short term strategies for forest resource management as follows:

Short-term strategy

Development of multipurpose and participatory management of forests by preparation and implementation of integrated forest resources management plans on watershed basis by integration of the programs and activities of the different units of the MEF.

Long-term strategy

Planning/implementation of all natural resource management and rural development integrated watershed basis, and planning/implementation of forest resources management as a major component of the integrated watershed management-rural development program.

(3) Agricultural Development

The main government support program for the agricultural sector is the ongoing direct income support for the farmers, with TL. 135 million per ha of land that they operate. On the other hand, there are four programs that support the livestock sector: namely, i) Subsidy for forage crop production support, ii) Subsidy for artificial insemination, iii) Subsidy for breeding stock, and iv) Milk subsidy.

2.2 Participatory Resource Management and Development Projects

(1) Participatory resource management

As shown in the study conducted under the National Forestry Program and from field survey results, different stakeholders and interest groups of the society have different types and priorities of demands and expectations regarding natural resources and their management. Attention should be paid to the fact that different combinations of multiple and competing demands and expectations are valid in relation to rehabilitation and management of the natural resources in different areas of the Coruh River catchment, depending on the variations and trends in the site specific ecological, social and economic conditions.

(2) Development projects

The components of all area development projects implemented in Turkey similarly have three components: namely, (i) natural resource rehabilitation, (ii) rural income generation, and (iii) rural infrastructure. These projects tend to cover relatively large geographic areas (generally of more than five million ha and over 10 provinces) and all of them have received external assistance for implementation. All projects are planned and implemented in a top-down approach, but all claim to be implemented in participatory and sustainable manners.

Area development projects, bring a concentration of financial and manpower resources into an area. This concentrated effort may produce some benefits during the project implementation but rarely have long-term impacts. Moreover, none of the projects have seriously involved the special provincial administrations. These will become critical under the public administration reforms that the present government is keen to implement.

Chapter 3 Present Conditions of the Study Area

3.1 Natural Conditions and Soil Conservation

(1) Natural conditions

The natural conditions of the Study Area are mainly characterized by steep topography and harsh climates. The topography of the Study Area demonstrates significant spatial distribution

of different slope classes. In general, the downstream part of the Study Area is much more mountainous than the upstream area. The Study Area has extremely low temperatures in Winter, but is generally hot in Summer. Precipitation in the area is generally low, with occasional high intensity storms. Other characteristics of the Study Area are described below.

- i) The Coruh River rises in the western part of the catchment at altitudes of about 2,000 m, and flows about 300 km distance to the Black Sea via Georgia. Wide ranges between maximum and minimum discharges are seen in the River, especially in its three tributaries. The discharge of the River demonstrates highest discharges during spring, very low discharges in Summer, and generally low flows in Autumn and Winter.
- ii) A wide variety of rock types are found in the Coruh River catchment, although the area is dominated by volcanic rocks of different types and ages. The only reasonably large extensive deposits of recent alluvia in the catchment are found on flat or gently undulating plains west of Bayburt.
- iii) Most of the Coruh River catchment falls into Land Capability Classes VI, VII and VIII, reflecting its steep topography. About 85% of the land is in Classes VI to VIII, with Class VII predominating at 59%. This indicates the generally limited potential for intensive agriculture and horticulture.
- iv) The Lower and Middle Coruh River catchment are in the Dry Forest-Shrub region; the Kackar and Yalnizcan Mountain ranges are in the Mountain Grass region; and Bayburt and Tortum are on the Dry Forest-Anthropogene Steppe region. (Ecoregions of Turkey, I Atalay, 2002)
- v) The Coruh Catchment Tourism and Recreation Development Project Report has noted the presence of 21 mammals, 50 birds and 4 fish species.

(2) Soil conservation

Over the whole catchment, only 3.8% of the areas have “none or very little soil erosion”. Only about 4% of its land is in satisfactory state from the standpoint of soil erosion. The most common soils in the Study Area are Basaltic Soils, Brown Forest Soils, Brown Soils, Chestnut Soils and High Mountain Pasture Soils. Most of the soils are moderately or strongly erodible, especially on steep slopes. Most of the soils possess only moderate fertility, and present severe constraints such as shallowness and stony sub-soils.

3.2 Socio-Economic Conditions and Forest Villages

(1) Socio-economic conditions

The Coruh River catchment largely coincides with the administrative boundary of 17 districts of three provinces of Artvin, Erzurum and Bayburt: 6 districts in Artvin, 8 districts in Erzurum, and 3 districts in Bayburt. The area of the catchment accounts for about 55% of the total area of the three provinces. Some of the characteristic socio-economic conditions of the Study Area are described below.

- i) The population in the whole Coruh River catchment totals 432,259 as of year 2000 with a forest village population of 156,130. During the last decade the population decreased by 10.2%. Annual average population growth rate in the last decade was –1.1% on average.
- ii) Median age in Artvin, Erzurum and Bayburt has increased during the last two decades. In Artvin it has increased from 20.6 in 1980 to 29.4 in 2000, also from 17.6 to 21.4 in Erzurum and from 20.3 in 1990 to 23.1 in Bayburt during the same period. There is a common tendency for all three Provinces for more males in urban areas and more females in rural areas. Average household size is 4.5 for Artvin, 5.7 for Erzurum and 5.6 for

Bayburt, respectively. In all Provinces, average household size is the smallest in the Province center.

- iii) Employment opportunities in urban areas are limited in the three Provinces. The agriculture sector absorbs 63% of the total employment in the three Provinces. Self-employment in the agricultural sector is dominant in rural areas, and in most cases women are employed as unpaid family labor. The rural economy mostly depends on the agriculture sector.
- iv) The literacy rate of the populace six years old and over in the three Provinces is 84.4% with males having a higher literacy rate of 92.7% while the rate for women is 75.7%. The literacy rates of women in rural areas are much lower than in urban areas.

(2) Forest villages

There are 832 villages in the Coruh River catchment, 62% of which are forest villages. In Artvin, 250 out of the total 254 villages are forest villages, while in Bayburt only 37 out of 175 are forest villages. In Erzurum, 228 out of 403 are forest villages. During the last decade, the population in the forest villages has decreased at a higher rate than in non-forest villages, at 3.14% per annum compared with 2.27% per annum.

3.3 Land Use

About 21.7% of the total catchment areas are forests. Others are: transitional woodland shrub (11.7%), rangeland (46.2%), arable land (13.9%), and other areas (6.5%). The forest area is mainly found in the lower and middle reaches of the Coruh River, the whole Berta River catchment and part of the middle reach of Oltu River. On the other hand, agricultural lands extend mainly over the plains in the upper reaches of the Coruh and Oltu Rivers. Transitional woodland and shrub are found mainly in the middle and upper reaches of the Coruh, and parts of Tortum and Oltu Rivers, and rangeland occupies the upstream area of the Coruh and major parts of the Oltu and Tortum Rivers.

3.4 Forest Resources and Forest Management

(1) Area and Conditions of the Forests

The area of forests in the Coruh River catchment is estimated at some 440,000 ha (approx. 22% of the catchment), while according to forest management plans, the total forest area within three Provinces is about 786,000 ha. These figures show that the forest areas are far from adequate. High forest accounts for 62% of the forests in the catchment area. Coniferous trees are dominant in the high forests with the share of 71 %, followed by mixed tree species with 19% and broad- leaved with 10%. About 59% of the forests are degraded.

The site classes of the normal forests in the Study Area indicate the low potentials for wood production. Most of the trees in the forests the Study Area are from 31 to 50 years old. Regarding that, the standard cutting ages of major wood species for the Study Area are 100 to 120 years, and the majority of the forests in the Study Area need many years to mature. All the forests in the Coruh River catchment are owned by the state. However, cadastral surveys and delineation works have been completed only for a very small portion of the forests (i.e. 11.6% of the forests in Artvin and for less than 10% in Erzurum and Bayburt).

(2) Forest Resources Management

Despite the prevalence of the harsh and difficult site conditions strongly limiting forest production, the majority of forests in the Study Area are still managed with the aim of production under the current management plan. There are only limited amounts of protected forests (2%) and forests assigned for protective functions (15%). Degraded forest areas are

shown as potential reforestation and rehabilitation sites in the management plans. AGM carries out site surveys and assessments on such areas, prepares and implements reforestation, erosion control and range improvement projects for their appropriate rehabilitation and sustainable utilization.

(3) Forest Products

The production of industrial wood in Artvin decreased from 176,600m³ in 1996 to 92,400m³ in 1999. Production of fuel wood shows no obvious tendency to increase or decrease with the average production of about 145,000 m³. Although wood production in the other Provinces in the Study Area is not recorded, the annual fuel wood production in Bayburt is reported to be around 1,500sters on average (estimated as nearly 1,000 m³). However, considering illegal cutting, the actual consumption of fuel wood is thought to be more than the reported production amount. Moreover, the assumption of the monthly fuel wood requirement obviously shows that the consumption amount largely exceeds the amount of increment.

There is a variety of Non Wood Forest Products (NWFPs) in the Study Area, though in relatively small scales. Although differing in value, major NWFPs in terms of production include rose hip, cornelian cherry and rhododendron flowers. In addition, the production and utilization of 'kapari (*Capparis ovata*)' is also seen though statistical information was not available.

3.5 Agriculture

(1) Cultivated Area and Main Crops

The total cultivated area for the three provinces, composing the Study Area is 308,798 ha (2000), 62% of which are under cereals such as wheat and barley, followed by 18% of fodder crop. The yields of major crops are generally lower than the national average. The average area of farmland per farm household is 2.5 ha. The total production value of the major crops for the three provinces is TL. 93,176,617 million for the year 2000.

(2) Irrigation

Irrigation is done for 33% of the areas for upland farming, 53% for perennial crops and 88% for vegetables. During the period from the 1980s to mid-1990s GDRS constructed irrigation facilities such as intake structures and main canals, but these have generally not been properly maintained and are now becoming less functional. GDRS in cooperation with ORKOY is currently implementing small-scale irrigation facilities.

(3) Marketing

Marketed amounts of agricultural products produced in the Study Area are limited. The factors making marketing difficult include: long distance from major markets, poor road conditions, difficulty in securing stable supply amount, inefficient marketing systems, and poor product quality. The increasing demand for fruits and vegetables have been recently outgrowing the capacity of the present wholesale market in Erzurum. From autumn to winter, the price of vegetables rises to more than double the price in summer.

(4) Agricultural Credit

ORKOY assistance for farm households in the forest villages mainly consists of credit activities for income improvement by increasing agricultural production. Credit provided by ORKOY is focused on cooperative credit, where the ripple effect is large. The annual interest for credit provided by ORKOY was 10% (actual credit for FY2002). The annual interest rate of the National Agricultural Bank (TCZB), for FY2002 was between 65% to 75%.

3.6 Livestock and Rangeland Management

(1) Herd size, composition, and production

The number of animals has declined in all three Provinces for all types of livestock. The herd size has declined from 321,043 livestock units (LUs) in 1991 to 216,273 LUs in 2001. Cattle have always been the dominant livestock type and this dominance has increased in recent years. The sheep/goat herd in the Study Area is small in terms of LUs, and its size has declined steadily over the last decade. The milk yield from the local cows under the traditional pasture based systems is estimated to be 816 liters per year, while that of pure breed cows under intensive management is estimated at 4,080 liters per year.

(2) Productivity of Pastures and Pasture Hay Production

Almost all forage production in the Coruh River catchment is self consumed with very little specialization for the market. The pastures are reported to provide only 60% to 80% of the feed requirements for the existing herd. However, some villages have excess grazing resources and rent them to nomadic herdsman. Pasture and meadows areas in the Study Area total about 716,000 ha and 66,000 ha respectively. The total dry matter production of pasture hay is estimated at around 760,000 tons. Only parts of these grasses are palatable. The share of this part may be assumed at between 50% to 70%. Meadow hay obtained from a single cut is reported to vary from 3.5 to 5 tons/ha. Assuming an average of 4 tons, production of cut hay from pastures is 264,000 tons.

(3) Apiculture

As of 1997, apiculture is seen at 72% of the total villages in the Coruh River catchment. Apiculture activity in the Coruh River catchment has been promoted by various agencies such as MARA and MEF with credit facilities and technical assistance and by NGOs including TEMA with financial assistance from foreign organizations. Caucasian Bee (*Apis Mellifera Caucasia*) that thrives naturally in Borcka and Savsat districts of Artvin has been becoming popular because of its queen bee's characteristics of being hardworking and having high production capacity.

3.7 Infrastructure

Only 5.7% of roads are paved in asphalt or concrete. The rest is generally stabilized and graded. The density of the road network in the three Provinces is almost equivalent to the national average. The most critical obstruction is snow, followed by flooding and consequent road damage, preventing villagers from marketing farm products and performing daily activities. Almost all of the villages in the Study Area have access to electric power supply. However, fuel wood is the main energy source for heating and cooking the Study Area, as nearly 85% of the villages (709 villages) in the Study Area mostly depend upon fuel wood for heating. There are 117 clinics and 178 sanitary stations in the Study Area. There are no hospitals capable of executing operations, thus patients must be transported to Erzurum city for such treatment.

3.8 Institutional and Legal Framework, and Extension

(1) Institutional and legal framework

The Ministry of Environment and Forestry (MEF) is the main government agency working on watershed rehabilitation. The activities are mainly carried out by the four General Directorates of the former Ministry of Forestry. Other agencies working on similar activities include: the Ministry of Agriculture and Rural Affairs (MARA); the General Directorate of Rural Services (GDRS); and the General Directorate of State Hydraulic Works (DSI). Field activities in the Study Area are under the jurisdiction of the three OGM Regional Directorates and the three

Provincial Directorates of Environment and Forestry. The legal framework concerning rehabilitation and management of watershed areas include: Forest Law, National Afforestation Mobilization Law, National Parks Law, Forest Villagers Development Support Law, Range Law, Environment Law, Land Cadastre Law, Village Law, Organic Laws, as well as by-laws, instructions and circulars issued for the laws.

(2) Extension

AGM, OGM, ORKOY and DMPG of MEF, the General Directorate of Organization and Support (GDOS) of MARA, GDRS, DSI and Forest Cooperatives Central Union (OR-KOOP) are the main agencies providing extension service. However, in the Study Area with the population of 156,130, ORKOY has only six personnel capable of providing extension service. Therefore, in most cases ORKOY requests MARA, GDRS and DSI for actual extension services, but these organizations can not always respond.

3.9 Environmental Considerations

The protected areas in the Study Area include Karagol-Sahara and Hatila Vadisi National Parks, Camili-Efeler Ormani and Camili-Gorgit Nature conservation areas, and Borcka Karagol Nature park. 70 important plant species are listed for the three Provinces in which the Study Area is located. Neither comprehensive inventories nor measures for the protection for rare and endemic species have been taken by MEF. Five mammal species and 13 bird species found in the area are identified as protected animals in reference to the Land Hunting Law (No. 3167). The Study Area is also important for birds migrating between the continents of Eurasia and Africa. There are six first-degree archeological sites, three first-degree natural sites, one second-degree natural site and one third-degree natural site in the Study Area.

Chapter 4 Problems, Constraints and Potentials for Watershed Rehabilitation and Management in the Study Area

4.1 Problems and Constraints

The problems and constraints for watershed rehabilitation in the Coruh River catchment, in relation to factors of natural conditions, social conditions, economic activities, and institutions and organizations are summarized below.

Natural conditions: i) steep topography with southern aspects, ii) harsh climates with intensive storms and seasonal bias of rainfall, iii) high erodibility of soils and geographical features, and iv) rapid river flows and floods.

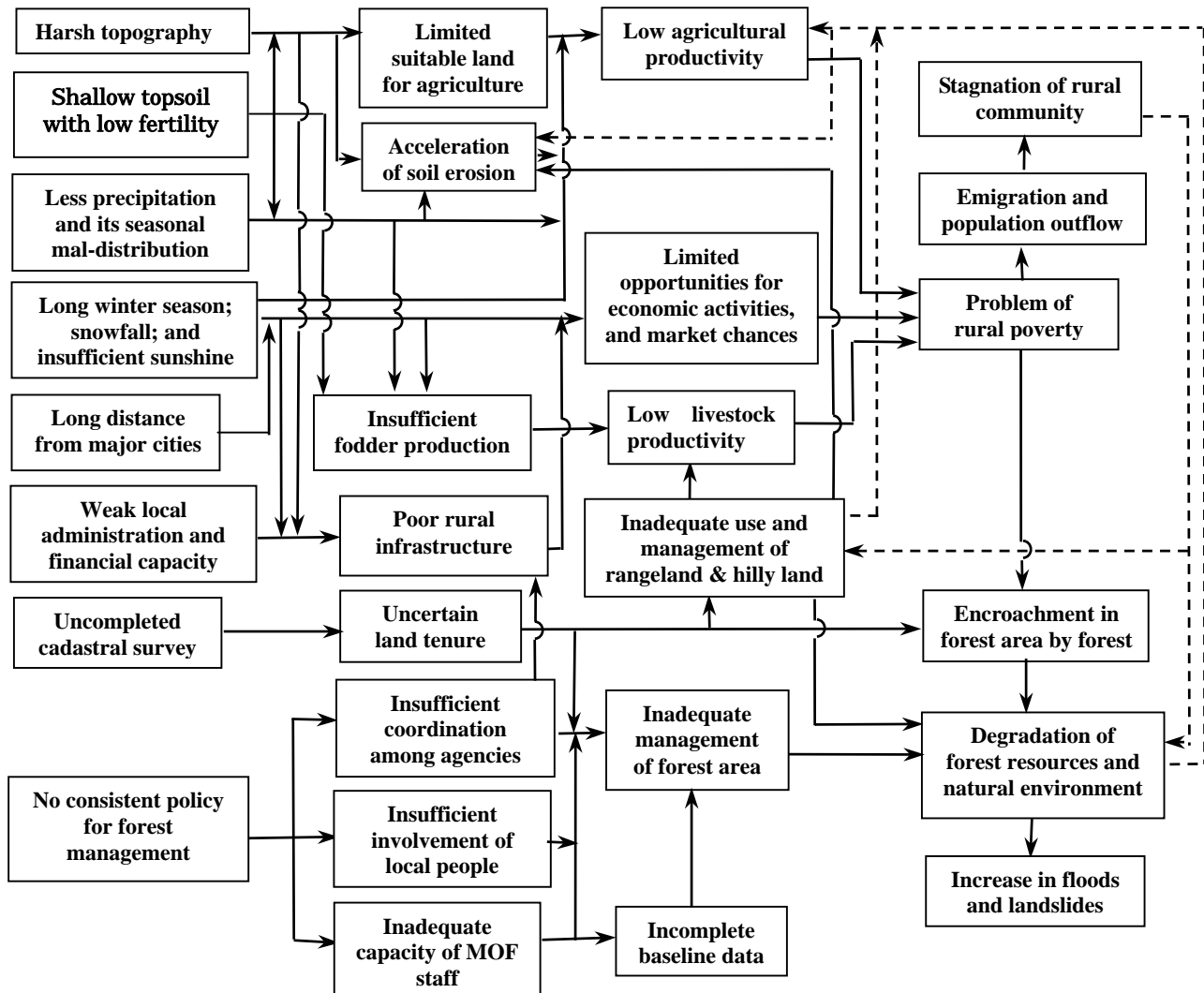
Social conditions: i) rural poverty, ii) uncertain land tenure, iii) limited employment opportunities, and iv) poor social infrastructures.

Economic activities: i) low agricultural productivity, ii) Inadequate silvicultural practices and management planning, iii) little support for potential economic activities such as apiculture and eco-tourism, and iv) Inconsistent marketing systems and poor market information for agricultural products.

Organizations and institutions: i) lack of coordination in and between agencies, ii) insufficient technical capacities and trained field staff, iii) lack of information and applied research on agricultural productivity and complete absence of scientifically-based assessment of the erosion control activities, and iv) insufficient attention against participatory approaches.

4.2 Problem Structure

The problems depicted in the following figure indicates a “vicious spiral of poverty and natural resource degradation”, based on poverty leading to ever-increasing exploitation of natural resources, leading to degraded natural resources, which in turn leads to increasingly severe rural poverty.



Problem Structure of the Study Area

4.3 Potentials for Watershed Rehabilitation in the Study Area

The potentials for watershed rehabilitation in the Study Area are summarized below.

- i) The recent out-migration from the forest villages has reduced grazing pressures.
- ii) AGM personnel have experience in implementation of erosion control and afforestation.
- iii) MEF personnel have experience in participatory watershed rehabilitation.
- iv) Some villagers are voluntarily protecting forest areas and are instituting village-directed forms of controlled grazing.
- v) AGM has been contracting out soil conservation and afforestation work directly to villagers, increasing the levels of interest and awareness.
- vi) NGOs such as TEMA and TKV have been active in the Coruh River catchment.
- vii) There is considerable scope for increasing incomes from agricultural production.
- viii) The wholesale vegetable and fruit markets in Erzurum could be better exploited by farmers in the Coruh River catchment.

4.4 Key Issues for Watershed Rehabilitation

Watershed rehabilitation in the Coruh River catchment should be directed towards comprehensive measures controlling the development pattern which intensively depends on forest and land resources, and towards making effective use of the potentials of forest villages and nature. In this context, the key issues are identified as follows:

- i) Management and rehabilitation of the remaining and degraded forest areas (including rangeland) to conserve and restore/improve natural resources.
- ii) Poverty reduction among forest villagers, which is expected to lessen the pressure on forest resources.
- iii) Development of human resources including in terms of building awareness and capacity of both local villagers and government staff for sustainable resource management.

Chapter 5 Basic Concept for Participatory Watershed Rehabilitation in the Coruh River

5.1 Rationales for Watershed Rehabilitation

(1) Importance of watershed rehabilitation

The natural resources in the Coruh River catchment is under degradation particularly in terms of forest and soil resources. At the same time, the Coruh River catchment is one of the poorest regions in Turkey. The poverty in the area induces further degradation of natural resources, while the poor state of natural resources also accelerates rural poverty. These factors, all closely related, form a vicious spiral of poverty and natural resource degradation. Under these circumstances, comprehensive measures to cut off each side of the vicious spiral is needed. Furthermore, watershed rehabilitation in the Coruh River catchment is expected to contribute to rectifying regional disparities and to conserve natural resources, and benefit for the hydroelectric dams which are under construction or being planned in the catchment.

(2) Importance of participatory approach

The villagers are the actual “managers” of these local natural resources. Therefore, strategies and tactics (project activities, or development instruments) for watershed rehabilitation must recognize their important managerial role. In order to involve local villagers, it is crucial that the villagers understand the connections between their economic and social conditions and the environmental conditions around them. Furthermore, it is also important that proposed activities for watershed rehabilitation that leads to loss of income must be compensated for by some other activity which will produce equivalent (or better) income.

5.2 Overall Goals and Policies for Master Plan

(1) Overall Goals

The overall goal of the Master Plan is “To prevent further progression of the vicious spiral consisting of natural resources degradation and poverty of forest villagers”.

(2) Policies

In order to accomplish the overall goals, the following policies are established.

Policy - A: Natural Resource Rehabilitation, Management and Utilization

- i) Sustainable conservation of existing forests and rehabilitation of degraded forest areas to provide multiple benefits, with particular attention to meeting needs of local populations.
- ii) Undertaking the required soil conservation measures on critical non-forest lands, which

- create serious damage or threaten lands, infrastructures and people of lower catchments.
- iii) Improving conditions, productivity and sustainable utilization of the rangelands.
- iv) Rehabilitation of streambeds and improving water resources utilization.

Policy - B: Livelihood Improvement

- i) Strengthening of livestock sector with regard to its comparative advantages. Increasing productivity mainly through securing winter feed and improved breeding.
- ii) Increasing income from crop production by productivity improvement and introduction of high-profitability crops. Promotion of maintenance of agricultural infrastructures.
- iii) Diversification of agricultural income sources, through promotion of products with high market values such as regional special products.

Policy - C: Human Resources Development

Strengthening the capacities of the stakeholders to understand the linkages relating sustainable natural resource management to human livelihoods, and implementation of effective village-level activities which simultaneously improve both.

5.3 Strategies for Master Plan Policies

List of Strategies for the Realization of the Master Plan Policies

Strategies corresponding to respective policies	Fundamental strategies
<u>Strategies for policy-A: Natural resources rehabilitation, management and utilization</u> - Appropriate/effective management of remaining forest resources with regard to needs of villagers. - Effective management and rehabilitation of rangelands emphasizing controlled grazing - Erosion control and rehabilitation work with priority on high damage and risk areas - Afforestation on sites with suitable conditions - Contracting out natural resources rehabilitation, management and utilization work to local village communities - Riverbed and riverbank rehabilitation	<u>General strategies</u> - Participatory planning, implementation and assessment of development activities - Integration of income generation and livelihood improvement activities with natural resource conservation and rehabilitation activities - Sustainability and expandability
<u>Strategies for policy-B: Livelihood improvement</u> - Development of agricultural productivity - Development of stall feeding and livestock productivity - Development of other income generating activities - Strengthening of support systems	
<u>Strategies for policy-C: Human Resource Development</u> - Strengthening awareness creation, capability raising, training, applied research, demonstration activities and technical assistance	

5.4 Programs and Projects for the Master Plan

Proposed programs and projects are summarized below. As the characteristics of the respective areas of the Coruh River catchment vary significantly in terms of bio-physical and social features, these programs/projects should not be uniformly implemented in all areas of the catchment, but selected in relation to the actual situations and needs of the respective areas. Moreover, since the sole effects of the individual programs/projects are not sufficient for realizing the overall goal of the Master Plan, the implementation of packages of programs/projects, where they are mutually combined and related, will be necessary.

Summary of Proposed Programs and Projects

A. Natural Resources Rehabilitation and Management	
A-1	Multipurpose (functional) forest management planning project
A-2	National parks and protected areas management project
A-3	Nursery expansion and improvement project
A-4	Soil conservation project
A-5	Afforestation project
A-6	Rehabilitation of degraded high forest project
A-7	Rehabilitation of degraded coppice forest project
A-8	Energy forest plantation project
A-9	Rangeland rehabilitation project
A-10	Riverside Plantation project
<hr/>	
B. Livelihood Improvement	
B-1	Development of livestock productivity program
1.1	Breed improvement project
1.2	Transformed grazing system project
1.3	Mechanized hay cutting project
B-2	Development of agricultural productivity program
2.1	Irrigation improvement project
2.2	Greenhouse promotion project
2.3	Marketing improvement project
2.4	Fodder production improvement project
2.5	Fruits orchard rehabilitation project
B-3	Development of diversifying income generating program
3.1	Apiculture promotion project
B.4	Strengthening of support system program
4.1	Small scale mechanization development-assistance project
<hr/>	
C. Human Resources Development	
C-1	Training program
C-2	Awareness creation program
C-3	Research program
C-4	Demonstration program
C-5	Technical assistance program

Chapter 6 Micro-Catchment Planning

6.1 Concept of Micro-Catchment Planning

In order to achieve the overall planning goal, attaching ample consideration to implementing the “Right programs in the Right Micro-Catchment” is critical. To cope with this issue, this Study introduces the concept of Micro-Catchment (MC) planning, which enables the consideration of both micro-scale local conditions and spatial expansion into large areas with diverse characteristics. MC Planning consists of five stages: namely, i) division of the Study area into MCs, ii) classification of the MCs into groups in accordance to its biophysical and socio-economical features, iii) selection of representative MCs from each groups of MCs, iv) preparation of Micro-Catchment Plans (MC Plans) within the selected MCs, and v) expansion of these MC Plans to the groups of MCs having similar features.

On the other hand, while the basic concept of the Master Plan is formed by a “top-down” approach, the MC Plans also takes in to account “bottom-up” approaches, to reflect the needs and ideas of local villagers through participatory methods. While the expansion of MC Plans will effectively cover the whole catchment, activities with plural MCs scope such as National Park Management or research for eco-tourism resources are to be examined separately as “Cross-Catchment plans”.

6.2 Division, Classification and Selection of Micro-Catchments

(1) Division and classification of Micro-Catchments

The Coruh River catchment is divided into 63 MCs by delineating catchment boundaries. The MCs ranging from 10,000 to 80,000 ha, are further classified into six groups with regard to its characteristics and the packages of strategies to be implemented.

Classification of MCs and Packages of strategies to be applied

Classification criteria (parameter)			Classification result	Packages of strategies to be applied
<u>Degree of Forest Degradation</u> (area of existing forests)	<u>Potential for rehabilitation (Reversibility)</u> (erosion class)	<u>Susceptibility to forest/rangeland degradation by villagers' activities</u> (population density)		
Forest area >60%	High	/	Group I	- Multipurpose forest management - Management of National Parks and protected areas - Income improvement
	Low			
Forest area 30-60%	High	High	Group II	- Multipurpose forest management - Rangeland management - Afforestation - Income improvement
		Low		
	Low	High	Group III	- Forest management - Rangeland management - Erosion control - Income improvement
		Low		
Forest area <30%	High	High	Group IV	- Rangeland management - Afforestation - Income improvement
		Low	Group V	- Rangeland management - Income improvement
	Low	High	Group VI	- Rangeland management - Erosion control - Income improvement

(2) Selection of Model Micro-Catchments

Among the six groups of MCs, six "Model MCs" are selected based on the following considerations:

- i) Exclusion of MCs without forest villages
- ii) Clear ownership boundary and no occurrence of use conflicts (=Demarcation)
- iii) Consideration of candidate priority MCs proposed by the Regional Directorates of MEF
- iv) Balance of presence among the three Provinces
- v) Representativeness within the group of MCs
- vi) Accessibility to the MCs, especially in relation to accessibility by villagers to model projects for use in training and extension

6.3 Formulation of Micro-Catchment Plans

(1) Planning approach

Detailed MC Plans are formulated for the selected six Model MCs: namely, Savsat (BT-04) of Group I, Yusufeli (MC-03) of Group II, Uzundere (TR-06) of Group III, Ispir (UC-14) of Group IV, Bayburt (UC-03) of Group V, and Oltu (OL-04) of Group VI.

The Plans are formulated taking the following three steps: i) socio-economic surveys in the selected forest villages in the MC; ii) field reconnaissance and surveys on natural resources and village conditions; and iii) participatory identification of major problems, possible solutions, potentials and required improvement activities.

The Plans are formulated in consideration of the following three subjects: i) Natural resource rehabilitation and management, ii) Livelihood improvement and, iii) Human resource development.

(2) Micro-Catchment Plans

Savsat Micro-Catchment (BT-04): Group I

Description of the MC

The Savsat Micro-Catchment (MC), representing the MCs classified in Group I, covers about 19,203 hectares. The rainfall, at about 700 mm annually, is higher than in the other MCs selected for this Study. The MC has a large proportion (30%) of gentle slopes (<12%) and 49% of the MC has slopes between 12% and 30%. About 46% of the MC exhibits severe soil erosion (Erosion Class 3), but most of the rest is in Class 2 (moderate erosion). The main land uses in the MC are 36% transitional woodland and scrub, 30% rangelands, 26% forests and 7% arable land.

The MC has 15 forest villages with a total population of 3,509. The average annual household income in the selected villages in 2002 was about TL 5,200 million (about US\$ 3,500), derived from crops (including forage crops, potatoes and beans), livestock and pensions.

The priority problems identified are: i) Illicit cuttings and degradation of forests, ii) High costs and inadequate knowledge of alternative energy sources, iii) Low productivity of meat and milk, iv) Inadequate marketing of livestock products, v) Insufficient credit support for livestock, vi) Lack of veterinary services, vii) Insufficient irrigation water supply, viii) Insufficient agricultural knowledge/extension services, and ix) Inadequate marketing of agricultural products.

Proposed activities for natural resource rehabilitation and livelihood improvement

ACTIVITY	QUANTITY	COST OF INPUTS (Billion TL.)
1. Natural Resource Rehabilitation and Management (Area of MC: 19,203 ha)		
1. Afforestation	246 ha	415
2. Rehabilitation of Degraded Coppice Forest	505 ha	296
3. Energy Forest Plantation	653 ha	1,101
4. Rangeland Rehabilitation	498 ha	217
5. Riverside Plantations	(1.5 ha)	9
Sub-total cost		2,038
2. Livelihood Improvement (No. of forest villages: 15)		
1. Irrigation Improvement	Rehabilitation of canal: L=95,200m New canal: L= 3,780m	1,182
2. Livestock Improvement	73 heads	137
3. Fodder Production Improvement	A=2,534 ha	588
4. Fruit Orchard Rehabilitation	A= 98 ha	160
5. Agricultural Mechanization	28 set	840
6. Apiculture	204 units	82
7. Marketing Improvement	A=28,000m ²	840
Sub-total cost		3,829
Total Cost		5,867

Yusufeli Micro-Catchment (MC-03): Group II

Description of the MC

The Yusufeli Micro-Catchment (MC), representing Group II, covers about 22,643 hectares. The MC is characterized by extremely steep, eroded and rocky mountains with active natural erosion and landslides, and about 52% of the land is steeper than 30% slope. The rainfall is very low – about 300 mm annually in Yusufeli – with very cold snowy winters and extremely hot summers. About 65% of the MC exhibits severe soil erosion (Erosion Class 3). The main land uses in the MC are 44% forests, 21% rangelands and 18% arable land.

The MC has 3 forest villages and 1 normal village, with a total population in 2000 of 4,053 in 1,125 households. The proportion of the populations dependent on pensions for annual incomes is as high. The average annual household income in the selected villages in 2002 was about TL 4,830 million (about US\$ 3,220), derived from pensions, livestock, crops.

The priority problems identified are: i) Natural disasters, ii) Soil erosion, de-regulation and losses of water resources, iii) Illicit cuttings and degradation of forests, iv) High costs and inadequate knowledge of alternative energy sources, v) Degradation, low productivity, under-utilization of range resources, vi) Marketing, vii) Low productivity, viii) Lack of veterinary services. For crop production are ix) Lack of irrigation water, x) Low productivity of crops, xi) Damage by pests and diseases, xii) Lack of information on agricultural technology, xiii) No agricultural extension support, and xiv) Lack of machinery.

Proposed activities for natural resource rehabilitation and livelihood improvement

ACTIVITY	QUANTITY	COST OF INPUTS (Billion TL.)
1. Natural Resources Rehabilitation and Management (Area of MC: 22,643 ha)		
1. Soil Conservation	921 ha	704
2. Rehabilitation of Degraded High Forest	929 ha	342
3. Rangeland Rehabilitation	437 ha	192
Sub-total cost		1,238
2. Livelihood Improvement (No. of forest villages: 3)		
1. Irrigation Improvement	Pond: V=1,200m ³ , Pipe line: L= 370m Rehabilitation of canal: L=22,500, New canal: L=1,500m	403
2. Livestock Improvement	264 head of cattle	506
3. Fodder Production Improvement	A=1,000 ha	233
4. Fruit Orchard Rehabilitation	A= 48 ha	79
5. Apiculture	101 units	40
Sub-total cost		1,261
Total Cost		2,499

Uzundere Micro-Catchment (TR-06): Group III

Description of the MC

The Uzundere Micro-Catchment (MC), representing Group III, covers about 31,240 hectares. The MC is characterized by extremely steep and bare rocky mountains with active natural erosion and landslides, and about 60% of the land is steeper than 30% slope. About 36% of the MC exhibits severe soil erosion (Erosion Class 3) and 40% has very severe erosion (Class 4). The main land uses in the MC are 37% rangelands, 19% arable land, 28% forests and 3% transitional woodland and scrub.

The MC has 5 forest villages with a total population of 3,252 in 930 households. The average annual household income in the selected villages in 2002 was about TL 5,570 million (about US\$ 3,700), derived from crops (including vegetables), livestock and pensions. The MC is notable for the large number of greenhouses and intensive vegetable production.

The priority problems identified are: i) Natural disasters, ii) Soil erosion, de-regulation and losses of water resources, iii) Illicit cutting and degradation of forests, iv) High costs and inadequate knowledge of alternative energy sources, v) Degradation, low productivity, under-utilization of range resources, vi) Low productivity, vii) Insufficient labor, viii) Insufficient irrigation water due to water loss from earth canals and lack of irrigation canals, ix) Low productivity, x) Insufficient land available, and xi) Marketing.

Proposed activities for natural resource rehabilitation and livelihood improvement

ACTIVITY	QUANTITY	COST OF INPUTS (Billion TL.)
1. Natural Resource Rehabilitation and Management (Area of MC: 31,240 ha)		
1. Soil Conservation	1,665 ha	1,229
2. Rehabilitation of Degraded High Forest	247 ha	116
3. Rangeland Rehabilitation	251 ha	177
4. Riverside Plantations	0.9 ha	6
Sub-total cost		1,528
2. Livelihood Improvement (No. of forest villages: 5)		
1. Irrigation Improvement	Rehabilitation of canal: L=26,400 m Pipeline:L=3,600 m, Pond: V= 800 m ³	443
2. Greenhouse Construction	A= 46,500 m ² (93 units)	1302
3. Livestock Improvement	221 heads	424
4. Fodder Production Improvement	A= 1,089 ha	253
5. Fruit Orchard Rehabilitation	A= 42 ha	68
6. Marketing Improvement	A=10,000 m ²	300
Sub-total cost		2,790
Total Cost		4,318

Ispir Micro-Catchment (UC-14): Group IV

Description of the MC

The Ispir Micro-Catchment (MC), representing Group IV, covers about 31,934 hectares. The MC has about 43% of moderately steep land and 39% of extremely steep land. About 51% of the MC exhibits moderate soil erosion (Erosion Class 2) and most of the rest has severe erosion (Class 3). The main land uses in the MC are 44% rangelands, 22% arable land, 16% forests and 8% under transitional woodland and scrub.

The MC has 8 forest villages and 16 normal villages with a total population of 4,312. The average annual household income in the selected villages in 2002 was about TL 4,554 million (about US\$ 3,000), mostly derived from pensions and livestock.

The priority problems identified are: i) Natural disasters, ii) Soil erosion, de-regulation and losses of water resources, iii) Illicit cuttings and degradation of forests, iv) High costs and inadequate knowledge of alternative energy sources, v) Degradation, low productivity, under-utilization of range resources, vi) Low productivity, vii) No shepherds, viii) Insufficient irrigation water due to water loss from earth canals and lack of irrigation canals, ix) Low productivity, xii) Insufficient land available, xiii) Marketing, and xiv) Lack of information on agricultural technology.

Proposed activities for natural resource rehabilitation and livelihood improvement

ACTIVITY	QUANTITY OF INPUTS	COST OF INPUTS (Billion TL)
1. Rehabilitation and Management of the Natural Resources (Area of MC: 31,934 ha)		
1. Soil Conservation	1,556 ha	1,334
2. Afforestation	199 ha	336
3. Rehabilitation of Degraded High Forest	336 ha	92
4. Rehabilitation of Degraded Coppice Forest	443 ha	105
5. Energy Forest Plantation	893 ha	1,505
6. Rangeland Rehabilitation	1,407 ha	505
Sub-total cost		3,877
2. Livelihood Improvement (No. of forest villages: 8)		
1. Irrigation Improvement	Pond :V=800m ³ Rehabilitation of canal: L=28,800m Pipeline: L=800m	419
2. Livestock Improvement	623 heads of cattle	1,206
3. Fodder Production Improvement	A= 733ha	170
4. Fruit Orchard Rehabilitation	A= 16ha	26
5. Agricultural Mechanization	14 sets	240
6. Apiculture	69 units	28
Sub-total cost		2,089
Total Cost		5,966

Bayburt Micro-Catchment (UC-03): Group V

Description of the MC

The Bayburt MC, representing Group V, covers about 21,758 hectares. The MC is characterized by relatively gentle topography compared with the other five MCs, with 25% of its land less than 12% slope, 41% between 12% and 30% slope and only 33% steeper than 30% slope. About 62% of the MC exhibits severe soil erosion (Erosion Class 3) and most of the rest has moderate soil erosion (Class 2). The main land uses in the MC are 74% rangelands, 11% arable land and 6% each of forest, and transitional forest and scrub.

The MC has 5 forest villages and 1 normal village with a total population of about 3,204. The average annual household income in the selected villages in 2002 was about TL 6,646 million (about US\$ 4,400), with considerable disparities between the highest (Maden, 8,890 million TL) and the lowest (Heybetepe, 4,250 million TL). Household incomes are largely derived from pensions, livestock and cropping. Nomadic herders are present with large flocks of sheep (up to 6,000) which graze rangelands for about four months each summer under contract with Masat village.

The priority problems identified are: i) Natural disasters, ii) Soil erosion, poor regulation and losses of water resources, iii) Illicit cutting and degradation of forests, iv) High costs and inadequate knowledge of alternative energy sources, v) Degradation, low productivity and poor utilization of range resources, vi) Expensive feed, vii) Low productivity, viii) Insufficient number of animals, ix) No shepherds, x) Insufficient irrigation water, xi) Low productivity, xii) Soil is infertile, xiii) Low price of agricultural products, xiv) Lack of information on agricultural technology, and xv) Marketing.

Proposed activities for natural resource rehabilitation and livelihood improvement

ACTIVITY	QUANTITY	COST OF INPUTS (Billion TL.)
1. Natural Resources Rehabilitation and Management (Area of MC: 21,758 ha)		
1. Soil Conservation	1,055 ha	1036
2. Riverside Plantations	1.6 ha	10
Sub-total cost		1,046
2. Livelihood Improvement (No. of forest villages: 5)		
1. Irrigation Improvement	Rehabilitation of canal: L=8,800m Pond: V=600m ³	151
2. Livestock Improvement	109 heads	209
3. Fodder Production Improvement	A= 745 ha	173
4. Fruit Orchard Rehabilitation	A= 19 ha	31
5. Agricultural Mechanization	7 set	150
6. Apiculture	47 units	19
Sub-total cost		733
Total Cost		1,779

Oltu Micro-Catchment (OL-04): Group VI

Description of the MC

The Oltu Micro-Catchment (MC), representing Group VI, covers about 38,603 hectares. The MC has about 29% of gentle slopes, 42% of moderately steep land and 22% of steep. About 58% of the MC exhibits severe soil erosion (Erosion Class 3) and most of the rest has very severe erosion (Class 4). The main land uses in the MC are 48% rangelands, 21% arable land, 16% forests and 8% transitional woodland and scrub.

The MC has 14 forest villages and 2 normal villages, with a total population of 4,312. The average annual household income in the selected villages in 2002 was TL 5,500 million (US\$ 3,700), derived from pensions, livestock, field crops and vegetables in order of importance.

The priority problems identified are: i) Natural disasters, ii) Soil erosion, poor regulation and losses of water resources, iii) Illicit cutting and degradation of forests, iv) High costs and inadequate knowledge of alternative energy sources, v) Degradation, low productivity, under-utilization of range resources, v) Low productivity, vi) No water troughs and shelters in rangeland, vii) Lack of veterinary services, viii) Insufficient credit for livestock, ix) Insufficient irrigation water, water loss from canals and too few canals, x) Low productivity, xi) Insufficient land, xii) Infertile land, xiii) High costs of inputs such as fertilizer, xiv) Lack of agro-machinery, xv) Lack of information on agricultural technology, and xvi) Marketing.

Proposed activities for natural resource rehabilitation and livelihood improvement

ACTIVITY	QUANTITY	COST OF INPUTS (Billion TL.)
1. Natural Resources Rehabilitation and Management (Area of MC: 38,603 ha)		
1. Soil Conservation	2,101 ha	2,583
2. Afforestation	243 ha	409
3. Energy Forest Plantation	1,073 ha	1,810
4. Rangeland Rehabilitation	5,091 ha	1,820
5. Riverside Plantations	1.2 ha	8
Sub-total cost		6,630
2. Livelihood Improvement (No. of forest villages: 14)		
1. Irrigation Improvement	Rehabilitation of canal: L=65,800 m Pond V=1,680 m ³	1,123
2. Agricultural Land Rehabilitation	224 ha	36
3. Livestock Improvement	84 head	162
4. Fodder Production Improvement	1,050 ha	244
5. Fruit Orchard Rehabilitation	48 ha	79
6. Apiculture	28 units	11
Sub-total cost		1,655
Total Cost		8,285

6.4 Cross-Catchment Planning for Natural Resource Management

(1) Multi-purpose (functional) forest management planning project

Project components

a. Construction of forest inventory GIS database:

A detailed comprehensive inventory of forest resources should be planned and launched as soon as possible. Sub-components of this inventory may include: (i) wood resources, (ii) NWFPs, (iii) degraded forest areas and forest openings, including rangelands within forests, (iv) biodiversity and genetic resources, endemic/threatened species, (v) fauna and wildlife resources, and (vi) water and water product resources. All this information should be accumulated in a forest resource database for efficient use and sharing. Different field units of regional agencies of MEF can be assigned as a task force for the inventory of different sub-components (e.g., OGM for i and ii; AGM for iii; DMPG for iv, v, vi). Close cooperation and collaboration should also be established with universities, research institutions and NGOs for efficient execution.

b. Preparation of model multipurpose (functional) forest resources management plan

After potentials and demands for different functions and uses are determined, different working cycle areas for these purposes should be identified. Appropriate silvicultural practices should be taken in order to maximize the effects. For example, forests for water and soil conservation will emphasize preventing landslides, which jeopardize people's lives and properties, and mitigating floods and supplying good-quality water, which is indispensable for living. Management objectives for such forests should include appropriate tending and selective cutting with careful attention to roots and topsoil conservation, and increasing the felling term and decreasing the felling area. Appropriate silvicultural operations such as multi-storied forest management, and long-rotation felling and prohibition of large-area clear cutting will be implemented.

Project Area

The study area of the project is proposed as the Berta Sub-Catchment Area.

Methodology and Execution Schedule

The Study shall include the following items:

- i) Study of present conditions
- ii) Study of basic Aspects
- iii) Detailed analysis including problems and possible countermeasures
- iv) Classification and mapping of areas
- v) Preparation of study report

Execution Schedule of Multi-purpose forest management planning project

Activities	Year 1		Year 2		Year 3	
	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.
Preparation for the Study including arrangement of finance						
First Field Survey						
Analysis of data and information						
2nd Additional Field Survey						
Data Analysis and Report preparation						

Executing Organization and Related Agencies

In order to understand the current condition of forest ecosystems and their integral values, and to formulate a comprehensive forest management plan, coordination of different General Directorates and regional offices is essential, and the relevant stakeholders, including local

people, should be involved in forest management. All proposed researches and works such as conducting forest inventory surveys to collect a variety of data on forest ecosystems should be executed through collaboration of these General Directorates. Moreover, considering the increasing importance of recognizing the expectations and demands of various stakeholders and interest groups, appropriate planning and management of forest resources should be done through participatory approaches with universities, NGOs, other relevant agencies and local people.

Project Cost Estimation

The total cost of the study is estimated as 834 Billion TL.

(2) National parks and protected areas management project

Project Components

a. Preparation of effective National Park/ Protected Areas management plan

Management plans for National Parks and other protected areas under the mandate of MEF are prepared and implemented by DMPG, in accordance with the National Parks Law. Management plans have not been developed for any National Parks and protected areas in the Study Area due to insufficient institutional and financial capacities of DMPG. Joint efforts with universities, NGOs or private companies are needed for the preparation of plans for National Parks and other protected areas, which is expected to provide significant contribution in building up institutional capacities on participatory planning and management of such areas. Active and effective discussions with forest villagers, especially at the planning stages for Protected Areas, are essential.

b. Participatory planning

Participatory approaches must be used for planning and for making management decisions for Protected Areas. Active and effective discussions with forest villagers, especially at the planning stages for Protected Areas, are essential. Effective Management Plans must be prepared, particularly with the active participation of the villagers.

c. Protection area evaluation

Designation of protected areas and their expansion based on appropriate scientific research and ample consensus building with the local villagers should be further encouraged. Comprehensive evaluation of diversity and richness of forest ecosystems and natural values should be conducted, which must be integrated with forest inventory surveys. Preparation of inventories on important wildlife species will also be promoted.

d. Green corridors planning

Connecting protected areas and thereby creating ecosystem networks would be expected to enhance the effects of forest ecosystem conservation.

e. Eco-tourism potentials research

The potentials for eco-tourism and recreational use of forest areas such as trekking, hunting, rafting and viewing wildlife should be carefully examined. Any eco-tourism activities proposed should be economically viable and sustainable in the long term.

Project Area

The study area of the Project is proposed as the Hatilla National Park (Artvin) and Vercenik Mountain Wildlife Conservation Area (Erzurum, Ispir).

Methodology and Execution Schedule

The Study shall include the following items:

- i) Study of present conditions

- ii) Study of basic Aspects
- iii) Detailed analysis including problems and possible countermeasures
- iv) Classification and mapping of areas
- v) Preparation of study report

Execution Schedule of National parks and protected areas management project

Activities	Year 1		Year 2		Year 3	
	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.	1st Sem.	2nd Sem.
Preparation for the Study including arrangement of finance						
First Field Survey						
Analysis of data and information						
2 nd Additional Field Survey						
Data Analysis and Report preparation						

During the first field survey, the entire area will be surveyed and detailed information and data will be collected. Based on the analysis of data and information, suitable areas will be selected, where more detailed study will be carried out during the second field survey.

Executing Organization and Related Agencies

MEF is the responsible agency. Participatory approaches must be used for making planning and management decisions for Protected Areas. Education, training and awareness-raising must be coordinated with relevant agencies within MEF.

Project Cost Estimation

The total cost of the study is estimated as 2,763 Billion TL.

(3) Nursery expansion and improvement project

The project aims to enhance nursery facilities and their seedling production capacities, thereby producing and distributing tree seedlings necessary for the execution of the projects such as afforestation, erosion control, energy forest plantation. Among other nurseries, this project targets at Ardanuc and Bayburt nurseries as these two will play a key role in production and supply for the future projects.

Project Components

- a. Strengthening nursery facilities to enable a secure supply of planting materials
 - Facilities: Nursery facilities (Store house, garage, germination house, nursery beds), Management Research facilities (including seed storage)
 - Machineries and Equipments: Computer, Vehicles, Tractor etc
 - Maintenance, sustainable management and technical assistance: Technical expert in Forestry
- b. Research
 - Research on introduction of new species or adaptability of tree species to devastated land

Project Area

Ardanuc Gecici Harmanli Nursery

Total area: 39,462 m² Seedling area: 26,100 m²
 Nursery production capability: 1,000,000~1,500,000 seedlings
 Total production as of 1999: 380,850 seedlings

Bayburt Nursery:

Total area: 535,780 m² Seedling area: 439,049 m²
 Nursery production capability: 5,000,000 seedlings

Total production as of 2000: 263,600 seedlings

Methodology and Execution Schedule

The project period is planned to be 2 years. In the project period, soil preparation, nursery establishment, establishment of research and management facilities, acquisition of seeds, equipment and materials etc will be implemented. To secure sustainability, nursery management, production and distribution of seedlings, and technical assistance of the project should be maintained.

Executing Organization and Related Agencies

This Project should be implemented by regional OGM office, with cooperation of regional AGM office.

Project Cost Estimation

The total cost of the study is estimated as 400 Billion TL.

6.5 Human Resources Development

Human resources development programs are supportive programs aiming at facilitating efficient implementation of natural resources rehabilitation and management, livelihood improvement and cross catchment plans.

(1) Training program

This program aims to raise technical capabilities necessary for natural resource rehabilitation and management. This program includes the following 7 activities: i) Technical study tour for engineers, ii) Training of engineers, iii) Training of nurserymen, iv) Training of forest guards, v) Training for engineers and nurserymen, vi) Study tours for MC villagers, and vii) Training course for hunters. The estimated project cost is 100 BTL.

(2) Awareness creation program

This program aims to raise forest villager's awareness of the importance on sustainable natural resource management and environmental conservation. This program includes the following 3 activities: i) Village workshop, ii) Lecture in primary schools, and iii) Material preparation. The estimated project cost is 30 BTL.

(3) Research program

This program aims to accumulate the fundamental data for sustainable natural resource management and livelihood improvement by conducting researches on disaster mechanism and new energy development. The following 8 activities are suggested: i) Research on disaster mechanism, ii) Evaluation of past soil erosion control, iii) Research on local plant species, iv) Rangeland assessment, v) Wildlife inventory, vi) New energy development, vii) Eco- tourism potential, and viii) Non-traditional crop development. The estimated project cost is 100 BTL.

(4) Demonstrations

Through field demonstrations, this program aims at technical improvement and its extension for livestock and crop production, which are main agricultural income sources. The following 2 activities are suggested: i) Field demonstrations on livestock, and ii) Field demonstrations on agriculture. The estimated project cost is 50 BTL.

(5) Technical assistance

This program aims to technically assist in the activities such as soil erosion control, livestock and crop production. The following 4 activities are suggested: i) Soil erosion control, ii) Agricultural extension, iii) Veterinary service, and iv) Pasture improvement. The estimated

project cost is 75 BTL.

6.6 Expansion of the Results of MC Planning to the Coruh River Catchment

The detailed MC Plans, which were designed in correspondence with the characteristics of the selected MCs can be regarded as “Prototypes”. Programs/projects that are suggested feasible in these Prototype MC Plans are presumably replicable to the other MCs classified into the same group. The Direct Project Costs for Natural Resource Rehabilitation and Management are extrapolated by expanding those of the six model MCs respectively into those of the other MCs with the identical classification types, using the area ratio (the area of each Model MC: the area of all MCs with the same classification). Direct Project Costs for Livelihood Improvement are estimated by multiplying the average project cost per village by the number of forest villages within all the MCs which fall in the same classification types. Direct Project Costs for Human Resource Development are estimated in the same way.

When expanded to the whole Coruh River catchment in the abovementioned method, the estimated direct project cost is: i)191,761 BTL for natural resources rehabilitation and management; ii) 138,132 BTL for livelihood improvement; iii) 3,997 BTL for cross-catchment planning and; iv) 31,270 BTL for human resources development. Accordingly, the full direct project cost for the Coruh River catchment is estimated as 365,160 BTL (approx. US\$ 243,000,000).

Chapter 7 The Master Plan for Participatory Watershed Rehabilitation in the Coruh River

7.1 Overall Understanding of the Master Plan

The Master Plan for Participatory Watershed Rehabilitation in the Coruh River consists of a large number of MC Plans expanded up to an appropriate scale. In addition, cross-catchment activities applied to specific areas of the whole catchment are also necessary components of the Master Plan. Furthermore, human resource development should always be strengthened in all places along with all the watershed rehabilitation activities.

In the implementation of the Master Plan, the Prototype MC plans can be regarded as basic units, and should be given priority among implementation, as they will work as model cases which can provide monitoring results of the implemented activities and its implementation structures. This will enable ample and efficient examination when planning for the subsequent rounds of MC Plans. Moreover, the implementation of Prototype MC Plans will also work as demonstrations, raising the interest of the stakeholders and leading to smooth implementation.

7.2 Implementation Plan of the Master Plan

(1) Project Cost-sharing Arrangement

Components	MEF	Relevant agencies (MARA, GDRS,etc.)	Local villagers
Natural Resource rehabilitation	100% of investment cost	-	Operation and maintenance
Cross-catchment plans			Labor contribution
Livelihood improvement	90% of investment cost	-	10% of investment cost
			Operation and maintenance
Human resource development	100% of investment cost	Provision of necessary personnel and equipments	Costs for attending seminars and workshops

(2) Rational Implementation Arrangement of the Master Plan

MEF regards “the Master Plan” as a 6 ~ 7 year Action Plan with a total cost of US\$ 20 ~ 30 million, although a Master Plan usually means a fundamental plan which will guide future bio-physical and socio-economic development of the region over a few decades.

Due to this limited framework, not all the MCs can be implemented; thus, 6 model MC plans are prioritized and selected for implementation. However, immediate implementation of these 6 model MC plans is expected to contribute to the iterative application of programs/projects and expansion to the other MCs, thereby realizing the overall planning goal of the Master Plan. Responsible agencies and all the stakeholders should examine the implementation of the subsequent rounds of the MC plans if they can afford to do them, referring to the experiences gained and lessons learned from the first implementation.

Proposed Implementation Schedule of the Master Plan

Province-MC	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8
Erzurum-OL04	█							
Erzurum-UC14		█						
Erzurum-TR06			█					
Artvin-BT04	█							
Artvin-MC03		█						
Bayburt-UC03	█							

(3) Estimated Project Cost of the Master Plan

The actual project cost for the Master Plan consists of: Direct Costs, Engineering/Consulting Services Fees, and Contingency (Physical Contingency and Price Contingency). The estimated actual project cost for the six MCs and cross-catchment planning to be borne by MEF totals 44,028 BTL (approx. US\$ 29,400,000). On the other hand, the proportion of each project cost by kind are as follows:

- i) Natural Resource Rehabilitation (including cross-catchment Plans) : 60 %
- ii) Livelihood Improvement : 33 %
- iii) Human Resource Development : 7 %

Estimated Project Cost for the Master Plan Borne by MEF

Unit: Billion TL

	Group I Savsat (BT-04)	Group II Yusufeli (MC-03)	Group III Uzundere (TR-06)	Group IV Ispir (UC-14)	Group V Bayburt (UC-03)	Group VI Oltu (OL-04)	Total 6-MCs
1. Natural Resource Rehabilitation and Management	2,038	1,238	1,528	3,877	1,046	6,630	16,357
2. Livelihood Improvement (90%)	3,446	1,135	2,511	1,880	660	1,490	11,122
3. Cross-Catchment Planning	Plan will be implemented in specific areas						3,997
4. Human Resource Development	499	355	355	403	355	499	2,466
Direct Project Cost in Model MCs	5,983	2,728	4,394	6,160	2,061	8,619	33,942
5. Engineering and Consulting Services (10 % of 1+2)	548	237	404	576	171	812	2,748
6. Sub-total (1+2+3+4+5)	6,531	2,965	4,798	6,736	2,232	9,431	36,690
7. Contingency (20% of 6)	1,306	593	960	1,347	446	1,886	7,338
Grand Total (6+7)	7,837	3,558	5,758	8,083	2,678	11,317	44,028

7.3 Implementation Organization

In order to accomplish the aforesaid, the following hierarchical structures for implementation of the Master Plan are proposed as for central, provincial and Village and MC levels organizations.

(1) Headquarters (Central) Level

The implementation organization at the headquarter level consists of the Central Project Management Group (CMG) and Central Steering Committee (CSC). The CMG will consist of the staff of AGM, ORKOY, OGM and DKMP at Ankara level and will be responsible for: preparation of work plans and programs, management of project budget at headquarter level; monitoring, assessment and supervision of the project implementations; providing necessary backstopping to the field implementation units; reporting to higher level authorities and; establishing necessary contacts and collaboration with the foreign donor/partner side. The CSC will consist of higher level representatives of the different units of MEF, and representatives of SPO and Treasury. Participation of NGOs and other relevant government agencies should be provided if possible. The group meeting will assess the project performance, identify major problems and constraints, provide higher level supports, and advice for their solutions and successful conduction of the project.

(2) Provincial Level

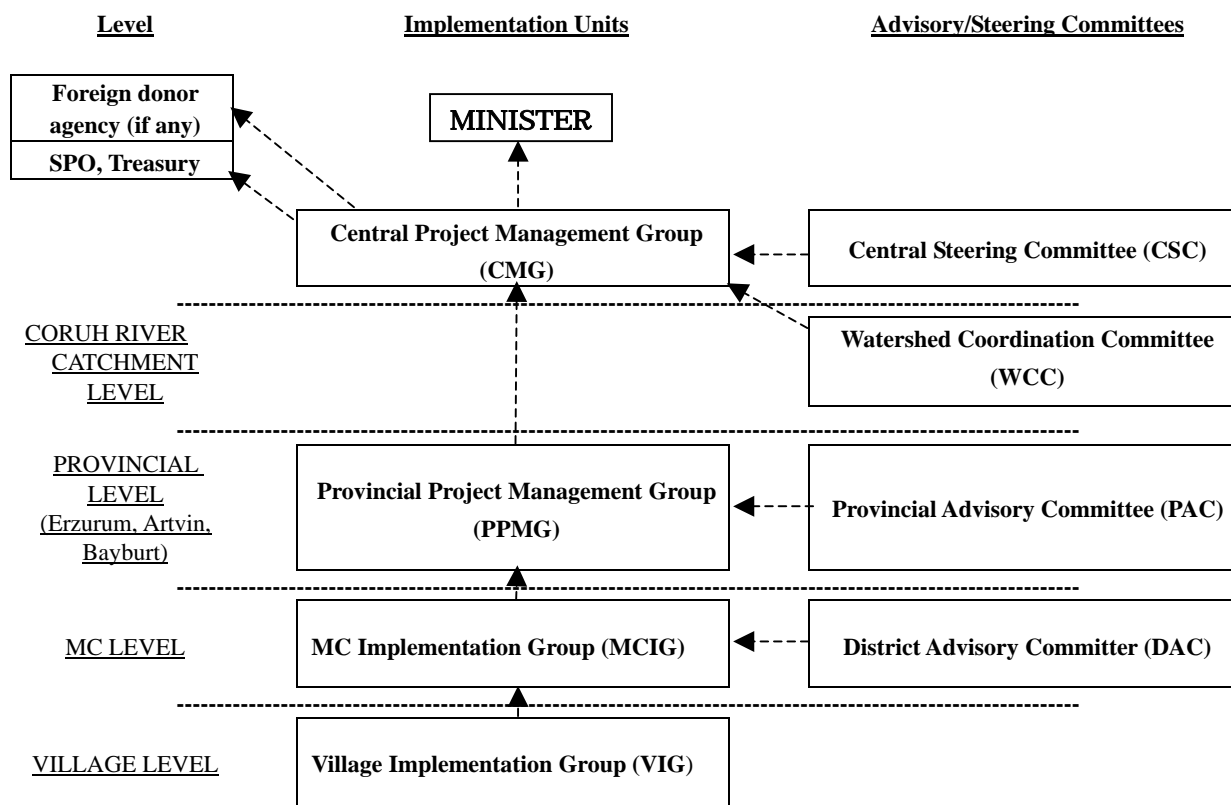
The implementation organization at the provincial level consists of the Provincial Project Management Group (PPMG) and the Provincial Advisory Committee (PAC). The PPMG will consist of chief engineers of AGM, ORKOY, DMPG and District Director of OGM (forest chief at Bayburt). The group will be responsible for: planning, monitoring, assessment of the project implementation at provincial level; providing necessary support for MC level implementation units and; reporting of the field level monitoring and assessment results to the headquarters and Provincial Advisory Committee. The PAC will include Provincial Director of Environment and Forestry, Regional Director of OGM, local NGOs, research institutions and universities. Participation of other relevant government agencies should be provided, if possible. PAC should review project progress and provide relevant advice and higher level support for solving the encountered problems.

(3) Village and MC levels

The implementation organization at the village level consists of MC Implementation Group (MCIG), Village Project Implementation Group (VIG) and the District Advisory Committee (DAC). The MCIG will consist of local AGM, ORKOY, OGM, DMPG engineers. AGM engineer will be the group coordinator. The VIG will comprise, under the head of village, the representatives of different interest groups in the village, and will be in charge of active participation of the village community in planning, implementation, monitoring and assessment stages of MC Plan. DAC will consist of OGM District Director, representatives of the other government agencies, NGOs and mayors at the district. DAC is headed by the district governor. Local AGM engineer will act as the secretary of DAC.

(4) Coordination and Collaboration between the Provinces

This will be provided by the Watershed Coordination Committee (WCC) which will include PPMG members of the three Provinces. WCC meetings should be combined with the field trips to jointly examine and assess project progress and to exchange reports of experiences gained. Findings and recommendations of WCCs will be reported to the headquarters unit (CPMG). Participation of the members of the CMG at these meetings is recommended.



Suggested Implementation Structure for an Implementation Project of the Master Plan

(5) Monitoring Systems

MCIG, along with VIG shall regularly collect/record relevant data/information and periodically (twice a year) assess the project implementations at the MC levels in accordance to relevant performance criteria to be developed. These results shall be regularly reported to PPMG. Furthermore provincial-level participatory assessment meeting shall be organized once a year, under the coordination of PPMG with participation of the representatives selected from relevant MCIGs. The results of these activities shall be periodically reported to CMG and CSC. Since evaluation sometimes requires a more objective perspectives, evaluation should be done by CSC or other agencies including VIG, MCIGs and donor agencies.

7.4 Financial Resources

(1) Financial Resources

The programs/projects included in the Master Plan components are divided into two types: investment and financing. In consideration of the limited Government budget and public enterprise investment, it is necessary to examine the possibility of utilizing external resources to the maximum possible extent. Funding must be examined at the stage of detailed design in consideration of various financial sources including the annual budget of MEF and funding by international organizations.

The utilization of credits is indispensable for implementation of livelihood improvement projects, and credits provided by ORKOY and TKK (Agricultural Credit Cooperation) are considered suitable. Although ORKOY credits maintain low interest rates (annual rate of 8-10%), the financial source is insufficient and needs to be expanded. The credits provided by TKK, which owns a nationwide system, have higher interest rates (30%) compared to ORKOY, but is still lower than commercial banks (75%). From this point, the expansion of TKK credit for forest villagers should be promoted.

The keys to ensure credit repayment are the successful implementation of the programs/projects proposed for livelihood improvement. Active support, development and extension of techniques such as irrigation, crop production and animal husbandry/breeding by the relevant agencies (MARA, GDRS) are also essential for its realization.

(2) International Financing

There are various international organizations that may support the implementation of the Master Plan. These include multilateral financial agencies such as IBRD, international programs for financial cooperation such as IFAD and GEF, bilateral financial institutions such as the Japan Bank for International Cooperation (JBIC), and other external cooperation organizations. In the case of bilateral financing, it is necessary to consider a possible loan framework of the government for the attaining of the national guarantee for receiving loans. Although there are systems of national finance, this Master Plan proposes consideration of international resources with lower interest rates and longer grace periods.

7.5 Evaluation of the Master Plan

The realization of natural resource management and livelihood improvement in the course of the implementation of the Master Plan will enable sustainable watershed management and degraded forest rehabilitation in the Coruh River catchment, in harmony with environmental conservation and economic activities of the forest villagers. Moreover, the implementation of the Master Plan will largely contribute to environmental conservation, poverty alleviation of the forest villagers and the stabilization of social welfare.

Consequently, it is estimated that further progression of the degradation of the catchment will be reduced through ripple effects. The EIRR calculated from all project costs and tangible benefits at economic prices is 4.5 %. This figure is below the social discount rate (10%) and thus the projects are judged to be economically invalid. However, ample effects are expected for socio-economic factors when considering intangible benefits brought by the implementation of the Master Plan. Moreover, as major adverse environmental impacts were not identified in its assessment, the Maser Plan can be evaluated as a plan aiming at environmental improvement/conservation. The project risks are also considered manageable, and the plan is also valid in terms of its technical feasibility and in organizational institutions. Thus the implementation of this Master Plan is judged to be valid.

Chapter 8 Conclusions and Recommendations

8.1 Conclusions

Forest lands in Turkey total 20.7 million ha, accounting for 26% of the area of the country, have about 8 million people, or 12% of the total population, living in forest villages located inside or near forest areas. However, employment opportunities as well as resource capacity in the forest villages are insufficient, and the income level of the inhabitants is generally very low. To meet their daily needs, people often encroach into the forest areas to graze animals, collect non-wood forest products and cut trees in an unsustainable manner. Hence, the forest areas in the Coruh River catchment are under rapid degradation. The Coruh River catchment lies in the northeast of the eastern Anatolia region, spreading among the three Provinces of Artvin, Erzurum and Bayburt. The area of the catchment reaches some 2,000,000 ha. The natural characteristics include steep topography, harsh climate with seasonal mal-distribution of precipitation, soils and geography showing characteristics of high erodibility, and flash torrents, lead to severe sedimentation in the catchment especially due to floods in the spring season. The forest villagers generally live in poverty due to

reasons such as their high dependency on natural resources, low productivity of land, limited economic activities, out-migration and insufficient social infrastructures.

Poverty leads to the degradation of natural and social environment, which consequently propels further poverty. Therefore, a comprehensive watershed rehabilitation plan including environmental conservation and poverty alleviation is needed in order to prevent the further progression of the “vicious spiral of poverty and natural resource degradation”. As the living of forest villagers are deeply related to watershed degradation, adequate watershed rehabilitation is not realizable without their participation. Therefore, it is essential to obtain villagers participation in all the stages of planning, implementation and operation/maintenance through participatory methods. Furthermore, direct measures for watershed rehabilitation must be implemented combined with measures for livelihood improvement in order to promote the participation of local villagers. The conservation of the environment needs to be realized through supporting various livelihood/economic activities to establish a sustainable system for watershed rehabilitation with villager participation, with the vitalization of forest villages as incentives.

On the other hand, the implementation of rehabilitation plans corresponding to the features of the Micro-Catchments (MCs) is necessary for achieving the goal of the Master Plan. Therefore, six Model MCs were selected as “Prototypes” from the groups of MCs classified by their features and the strategies to be implemented. MC Plans were prepared among these selected MCs and the prioritized implementation of these Plans was judged to be valid in terms ability to produce ripple effects.

The implementation of this Master Plan enables the rehabilitation of degraded areas in the Coruh River catchment through sustainable watershed management harmonizing environmental conservation and economic activities of local villagers. Consequently, this will sever both ends of the vicious spiral of poverty and natural resource degradation. Furthermore, the implementation of the MC Plans proposed in this Master Plan will bring about ripple effects and can be expanded to the whole catchment, and will largely contribute to the rehabilitation of the whole Coruh River catchment as a participatory watershed rehabilitation model. Thus, it is important for this Master Plan for participatory watershed rehabilitation to be promptly implemented.

8.2 Recommendations

(1) Prompt Implementation of the Master Plan

The achievement of the expected effects of the Master Plan deeply depends on the active cooperation between MEF and relevant agencies towards implementation of the proposed programs/projects. In order to realize this situation, the Project Implementation Plan (PIP), which is one of the necessary procedures, must be promptly prepared under the responsibilities of MEF. Moreover, issues such as project scale and methods of budget acquisition must be decided in order to start consultation with necessary government organizations such as the Ministry of Treasury and SPO.

The MC Plans formulated for the six MCs aim not only at the rehabilitation and management of the respective MCs, but also at working as “Prototypes” for the group of MCs. Therefore, and also in order to withdraw the expected display effects, implementation of these MC Plans must be prioritized and performed as soon as possible.

(2) Cost Procurement

Considering the limited financial resources of MEF, the Government of the Republic of Turkey needs to consider alternative measures of financing for the implementation of the

Master Plan for Participatory Watershed Rehabilitation in the Coruh River. Consideration should be made not only among budgets of relevant Government agencies, but also among loans through bilateral aid or by international organizations. Efficient use of international loans with preferential treatment for the environment sector should be carefully examined.

On the other hand, respective projects with high urgency or priority must be examined for their implementation at early stages. In order to do so, measures for financing such as usage of domestic budgets and or through technical assistance by developed countries should be considered.

(3) Strengthening of Implementation Organizations

In order to realize prompt and efficient implementation of the Master Plan with the MEF as the implementing agency, the Government of the Republic of Turkey must make the necessary adjustments between relevant agencies at central, local, and village levels. Moreover, the cooperation of relevant agencies and organizations such as MARA, GDRS, DSI and NGOs in the respective projects/programs of the Master Plan are essential. Strengthening of personnel relevant to management of the projects/programs, technical assistance and installation of necessary equipment are required in order to enhance the implementing capabilities of these agencies and organizations, and to have them responsibly perform their duties.

(4) Human Resource Development and unionization

Ample abilities of the implementing organization and relevant personnel are essential for the efficient implementation of the Master Plan, and therefore, empowerment must be promoted. Moreover, to place personnel that are capable of making necessary adjustments between the complicated connections of relevant organizations is of importance.

On the other hand, the introduction and fixation of new agricultural techniques are required for introducing new crops for forest villagers who are the main targets for income improvement projects. Therefore, the training of villagers is essential. In order to achieve this situation, active operation of the relevant agencies is necessary. Training of extension officers and acquisition of necessary numbers of personnel must also be done at early stages.

(5) Active participation of Local Villagers and Provision of Incentives

The lifestyles of forest villagers are deeply related to the watershed degradation, and therefore, the problem cannot be solved without the participation of these villagers. The forest villagers must participate in the Master Plan with ample understanding of their roles in watershed management, and in order to achieve this state, awareness must be created within the minds of the villagers through activities such as environmental education.

The basic point of attention from the economic standpoint when formulating “bottom-up” projects is if whether ample incentives can be provided to the stakeholders. For example, when looking at local villagers as the target group, the balance of costs and benefits of the project from the viewpoint of the villagers must be considered. When villagers understand that the benefits derived from the projects exceed the costs, and that it is profitable compared to other activities, they will autonomously participate in the projects by these incentives. On the other hand, if the incentives are not sufficient, the willingness of the villagers for participation will decrease and the project will not be sustainable.

Other factors such as production equipment with flexible functionality, improvement of systems to deliver market information to farmers in order to facilitate their reaction, maintenance of roads for supporting transportation of agricultural products, farmer education,

and strengthening the ability of negotiation by forming producer organizations should also be regarded for the incentives provided to the villagers.

On the other hand, the procedure for selecting beneficiaries in the livelihood improvement projects should be carefully examined. The communities, which will have negative effects by application of natural resource rehabilitation projects, should be put as top priority. For example, grazing area will become narrow and animal husbandry will be negatively affected if afforestation projects are implemented. In such a case, the owners of livestock should get benefits as the first priority.

(6) Agricultural Credit and Rural Infrastructure

Activities for improving income of the forest villagers is a precondition for the efficient implementation of the Master Plan. However, as financial abilities of forest villagers are limited, villagers are unable to implement new activities for income improvement with their own funds. Furthermore, existing agricultural credits have difficulties in actual management. Also since the Master Plan includes activities such as orchards, which require long terms to bear benefit, credits corresponding to long-term and low interest-rate is required. Thus, the construction of an agricultural credit system capable of providing loans to forest villagers in advantageous conditions is necessary for the implementation of the Master Plan. The annual farming costs required for new activities for livelihood improvement in the six Model MCs totals 2,296BTL/yr (approx. US\$ 1,533,000).

On the other hand, in order to efficiently implement the project/programs for watershed rehabilitation and income improvement, which are the main constituents of the MC Plans, implementation/ maintenance of rural infrastructures are essential. Infrastructures strongly demanded by the villagers such as rural roads and water supply facilities are of particularly high priority. Active measures are necessary for the implementation/maintenance of these rural infrastructures which is outside of the mandates of MEF.

(7) Measures for Cadastral Problems

The ambiguousness of cadastre in the Coruh River catchment is a setback for the mid/long term investments for the area, and is already working as an obstacle for watershed rehabilitation. Therefore, appropriate measures for addressing this problem must firstly be taken for the implementation of watershed rehabilitation. The formulation of a “cadastral information/ boundary database” will enable the provision of basic conditions for the implementation of the programs/projects, and thus is very important. Therefore, prompt action to solve land tenure problems is required for the implement of the Master Plan. The installation of necessary equipment and technical assistance of system construction and management is of particular importance.

(8) Possibilities for Continuous Research and Development and Technical Assistance

As rangelands, which hold a large portion of the Coruh River catchment, are one of the major factors contributing to soil erosion, continuous research and development of appropriate management techniques for rangelands is important. Techniques should be developed for management requiring low economic and labor inputs, appropriate grazing methods, low cost fences that enable rotational grazing, and methods for economically viable utilization of rangelands. Moreover, it is also necessary to promote measures such as diversification of pasture grass including annual species for facilitating the introduction of leguminous pasture grass for rotation, post harvest technology for pasture grass, and improvement of marketing systems.

Extension of new conservation techniques and measures through preparation of soil erosion

control manuals and technical training courses are also necessary. Development, extension and guidance of practical applied technologies that lead to increased productivity are also important. In this context, technical cooperation from developed countries with ample experience is desirable.

THE MASTER PLAN STUDY ON PARTICIPATORY WATERSHED REHABILITATION IN CORUH RIVER IN THE REPUBLIC OF TURKEY

FINAL REPORT

CONTENTS

Preface	
Transmittal Letter	
Location Map of the Study Area	
Photos	
Summary	
Contents	
List of Tables	
List of Figures	
Abbreviations	
Abbreviations of Measures	

CHAPTER 1 INTRODUCTION

1.1	Background to the Study	1- 1
1.2	Objectives and Scope of the Study	1- 2
1.3	The Study Area	1- 2
1.4	Guide to the Final Report	1- 2

CHAPTER 2 NATIONAL DEVELOPMENT POLICIES ON MAJOR ISSUES

2.1	National and Regional Development Policies	2- 1
2.2	National Forest Policies and Strategies	2- 2
2.3	National Policies for Supporting Agricultural Development	2- 7
2.4	Participatory Natural Resource Management in relation to the Demands and Expectations of a Wide Range of Stakeholders	2- 8
2.5	Integrated Area Development Projects	2-10

CHAPTER 3 PRESENT CONDITIONS IN THE STUDY AREA

3.1	Natural Conditions and Soil Conservation	3- 1
3.2	Socio-Economic Conditions and Forest Villages	3- 4
3.3	Land Use	3-10
3.4	Forest Resources and Forest Management	3-11
3.5	Agriculture	3-15
3.6	Livestock and Rangeland Management	3-20
3.7	Infrastructure	3-25
3.8	Institutional and Legal Framework, and Extension	3-28
3.9	Environmental Considerations	3-32

CHAPTER 4 PROBLEMS, CONSTRAINTS AND POTENTIALS FOR WATERSHED REHABILITATION AND MANAGEMENT IN THE STUDY AREA

4.1	Problems and Constraints	4- 1
4.2	Problem Structure	4- 3
4.3	Potentials for Watershed Rehabilitation in the Study Area	4- 5
4.4	Key Issues for Watershed Rehabilitation	4- 7

CHAPTER 5 BASIC CONCEPT FOR PARTICIPATORY WATERSHED REHABILITATION IN THE CORUH RIVER

5.1	Rationales for Watershed Rehabilitation	5- 1
5.2	Overall Goals and Policies for Master Plan	5- 2
5.3	Strategies for Master Plan Policies	5- 3
5.4	Programs and Projects for Master Plan	5- 6

CHAPTER 6 MICRO-CATCHMENT PLANNING

6.1	Concept of Micro-Catchment Planning	6- 1
6.2	Division into Micro-Catchments	6- 1
6.3	Classification of Micro-Catchments	6- 2
6.4	Selection of Model Micro-Catchments	6- 4
6.5	Formulation of Micro-Catchment Plans	6-10
6.6	Cross-Catchment Planning for Natural Resource Management	6-41
6.7	Human Resources Development	6-49
6.8	Expansion of the Results of Micro-Catchment Planning to the Coruh River Catchment	6-55

CHAPTER 7 THE MASTER PLAN FOR PARTICIPATORY WATERSHED REHABILITATION IN THE CORUH RIVER

7.1	Overall Understanding of the Master Plan	7- 1
7.2	Implementation Plan of the Master Plan	7- 1
7.3	Implementation Organization	7- 4
7.4	Financial Resources	7- 7
7.5	Evaluation of the Master Plan	7- 8

CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

8.1	Conclusions	8- 1
8.2	Recommendations	8- 2

ANNEXES

1.	List of Members	
2.	Scope of Work (April 19, 2002)	
3.	Minutes of meeting on Scope of Work (April 19, 2002)	
4.	Minutes of meeting on the Inception Report (October 4, 2002)	
5.	Minutes of meeting on the Interim Report (May 20, 2003)	
6.	Minutes of meeting on the Draft Final Report (November 19, 2003)	

APPENDIX

- A **Natural Conditions and Soil Conservation**
- B **Forest Resources and Forest Management**
- C **Socio-Economic Conditions**
- D **Agriculture**
- E **Livestock and Rangeland Management**
- F **Institution**
- G **Environmental Considerations**
- H **Geographical Information Systems**
- I **Project Monitoring and Evaluation**
- J **Micro-Catchment Planning and the Master Plan**

List of Tables

	Page
Table 3.1-1	Distribution of Slope Classes in Sub-Catchments 3- 1
Table 3.1-2	Hydrological Features of the Coruh River at Selected Measuring Stations 3- 2
Table 3.1-3	Climatic Features of the Coruh River at Selected Measuring Stations 3- 2
Table 3.2-1	Demographic Features of Coruh River Catchment 3- 5
Table 3.2-2	Median Age and Dependency Ratio by Province 3- 6
Table 3.2-3	Major Income Sources of Rural Households in the Coruh River Catchment 3- 8
Table 3.2-4	Summary of Forest Village Inventory 3-10
Table 3.3-1	Land Use of the Coruh River Catchment by Sub-Catchments 3-10
Table 3.4-1	Forest Conditions in the Coruh River Catchment 3-11
Table 3.4-2	Existing Protectec Areas in the Coruh River Catchment 3-13
Table 3.4.3	Non Wood Forest Products Produced in the Study Area 3-15
Table 3.5-1	Cultivated Area by Crop Categories as of 2000 3-15
Table 3.5-2	Farm Gate Price of Major Products 3-19
Table 3.6-1	Changes in the Size of Livestock Herd 3-20
Table 3.6-2	Pasture and Meadow Area 3-23
Table 3.6-3	Area Distribution under Different Quality Levels of Rangeland 3-23
Table 3.6-4	Number of Villages and Households with Beehives by Type of Apiculture Activity and Beehives 3-25
Table 3.7-1	Province Roads Conditions 3-26
Table 3.7-2	Drinking Water Facility Conditions 3-26
Table 3.7-3	Electricity Usage in the Study Area 3-27
Table 3.7-4	Number of Clinics and Sanitary Stations 3-28
Table 3.8-1	Field Level Structures of MEF in the Study Area 3-30
Table 3.9-1	Sensitive Areas Located in the Study Area 3-33
Table 6.2-1	Numbers and Sizes of Micro-Catchments 6- 2
Table 6.3-1	Characterization and Classification of Micro-Catchments 6- 7
Table 6.3-2	Classification of Micro-Catchments 6- 8
Table 6.8-1	Direct Project Cost in the Coruh River Catchment 6-56
Table 7.2-1	Proposed Implementation Schedule of the Mater Plan 7- 3
Table 7.2-2	Estimated Project Cost for the Master Plan Borne by MEF 7- 4

List of Figures

Figure 3.1-1	Slope Map	3-35
Figure 3.1-2	Geology Map	3-36
Figure 3.1-3	Soil Map	3-37
Figure 3.1-4	Land Capability Map	3-38
Figure 3.1-5	Soil Erosion Map	3-39
Figure 3.2-1	Distribution of Forest Villages	3-40
Figure 3.3-1	Land Use Map	3-41
Figure 3.5-1	General Cropping Season in the Study Area	3-17
Figure 4.2-1	Problem Structure of the Study Area	4- 5
Figure 6.2-1	Micro-Catchments Map	6- 6
Figure 6.3-1	Location of Selected Micro-Catchments	6- 9
Figure 7.3-1	Suggested Implementation Structure of the Master Plan	7- 6

ABBREVIATIONS

AGM	General Directorate of Afforestation and Erosion Control
DAP	Eastern Anatolia Project
DHKD	Association for the Protection of Natural Resources
DMPG	General Directorate of Nature Conservation, National Parks, Game and Wildlife
DOKAP	Eastern Blacks Regional Development Plan
DSI	General Directorate of State Water Works
EIA	Environmental Impact Assessment
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GAP	Southeastern Anatolia Project
GDP	Gross Domestic Product
GDRS	General Director of Rural Service
GEF	Global Environmental Facility
GIS	Geographic Information System
GRDP	Gross Regional Domestic Products
GTZ	German Technical Cooperation Organization
IBRD	International Bank for Reconstruction and Development
IEE	Initial Environmental Examination
IFAD	International Fund for Agricultural Development
IUCN	International Union for Conservation of Nature and Natural Resources
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
MARA	Ministry of Agriculture and Rural Affairs
MEF	Ministry of Environment and Forestry
MOC	Ministry of Culture
MOF	Ministry of Forestry
MOT	Ministry of Tourism
MTA	General Directorate of Mineral Research and Exploration
NGO	Non-Governmental Organization
NWFP	Non-Wood Forest Product
OGM	General Directorate of Forests
OR-KOOP	Forestry Cooperatives Central Union
ORKOY	General Directorate for Forest Village Relations
SA	Social Assessment
SIS	State Statistics Institute
SPO	State Planning Organization
TEMA	The Turkish Erosion Combating and Natural Resources Protection Foundation
TKK	Agriculture Credit Cooperative
TKV	Turkish Development Foundation
UN	United Nations
UNDP	United Nations Development Programs

Abbreviation of Measures

Extent

m² = Square-meters
km² = Square-kilometers
ha. = Hectares (10,000 m²)

Volume

m³ = Cubic-meters
l = Liter

Length

m = Meters
km = Kilometers (km = 1,000m)

Weight

kg = Kilograms
t = ton (metric tonne)

Others

% = Percent
°C = Degree Celsius

Chapter 1 Introduction

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Forest lands in Turkey total 20.7 million ha, accounting for 26% of the area of the country. About 8 million people, or 12% of the total population, are living in forest villages located inside or near forest areas. However, employment opportunities as well as resource capacity in the forest villages are insufficient and the income level of the inhabitants is generally very low. To meet their daily needs, people often encroach into the forest areas to graze animals, collect non-wood forest products and cut trees in an unsustainable manner. These activities result in serious degradation of forests and natural resources. At present, only half of the forestland is classified as productive.

Several state organizations are responsible for rural development and natural resource management in Turkey, including the Ministry of Agriculture and Rural Affairs (MARA), the General Directorate of Rural Services (GDRS), and the Ministry of Environment and Forestry (MEF) which is responsible for sustainable utilization and conservation of forest resources. However, because of insufficient coordination and integration among these organizations and the poor involvement of local people, numerous development efforts by the Government over many years have not brought about satisfactory results. In order to address rural poverty and natural resource degradation, especially in the forest areas, an integrated planning approach with active participation of local people is necessary.

Under such circumstances, MEF, through the Government of the Republic of Turkey, requested the Government of Japan to provide technical assistance to prepare a watershed rehabilitation plan in one of the three candidate river catchments.

In response to this request, the Government of Japan dispatched a preparatory study team to the Republic of Turkey from April 8 to April 20, 2002, through the Japan International Cooperation Agency (JICA), which is the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan.

After a series of discussion, both Turkish and Japanese partners agreed to select the Coruh River catchment as the Study area for the following reasons.

- i) Three dams which are currently under construction on the lower Coruh River urgently require watershed rehabilitation to reduce siltation into the dam reservoirs.
- ii) The Coruh River catchment is one of the poorest and most severely degraded areas in Turkey, partly due to its harsh topography and climate.
- iii) Unsustainable exploitation of natural resources by forest villagers should be mitigated according to the prioritized policy of the Turkish Government.

The Scope of Work was agreed upon and signed by both sides on April 19, 2002.

1.2 Objectives and Scope of the Study

The objectives of the Study are:

- i) To formulate a Master Plan on Participatory Watershed Rehabilitation in Coruh River in the Republic of Turkey in order to contribute to natural resource management, erosion control and improvement of livelihood of local people.
- ii) To transfer relevant technology to counterpart personnel through on-the-job training in the course of the Study.

1.3 Study Area

The Study Area covers the Coruh River catchment which has a total area of about 2 million ha. The catchment is located in the northeast of Turkey, south of the Black Sea and next to the national border with Georgia. The last few kilometers of the Coruh River flow through Georgia and then into the Black Sea.

1.4 Guide to the Final Report

The Final Report is composed of this main report and Appendix (supporting report). The organization of this Main Report is as follows: Chapter 2, reviews national development policies on major issues relevant to the Study. Chapter 3, describes present conditions in the Study Area with respect to its natural resources including forests, socio-economic conditions, agriculture and livestock, and institutions regarding forestry. Characteristics of the Study Area are clarified and some salient features are highlighted. Chapter 4, presents the problem structure of the Coruh River catchment and analyzes potentials for development.

Chapter 5, based on the analysis results in Chapter 4, establishes the overall goal, policies and strategies for Participatory Watershed Rehabilitation in Coruh River. Chapter 6, selection of Micro-Catchments (MCs) are worked out based mainly on GIS outputs. The whole catchment is divided into 63 MCs and each MC is categorized into several categories based on three classification criteria. Six MCs representing the whole catchment are selected, also taking several other factors into consideration. Development activities for each of the Six MCs are planned and their expansion to the whole catchment is examined.

Chapter 7 describes the contents of the Mater Plan on Participatory Watershed Rehabilitation in Coruh River. Projects and programs are presented with implementations structure and other factors such as assumed financial resources. Costs and benefits of the contents of the Master Plan are analyzed along with its possible risks and environmental impacts, and overall

evaluation is made. Finally, Chapter 8 presents conclusions of the overall Study with sectoral recommendations made in the course of the study.

Regarding terminology the term “Sub-Catchments (SCs)” is introduced to describe the general characteristics of natural conditions of the whole catchment. Hence, in addition to three SCs naturally recognized by three tributaries (Tortum, Oltu and Berta), the mainstream of the Coruh River is divided into three SCs (Upper Coruh SC, Middle Coruh SC, and Lower Coruh SC). The term ‘Micro-catchments (MCs)’ is also introduced to characterize the catchment more in detail and to select representative MCs for planning.

Chapter 2 National Development Policies on Major Issues

CHAPTER 2

NATIONAL DEVELOPMENT POLICIES ON MAJOR ISSUES

2.1 National and Regional Development Policies

2.1.1 National Development Policies and Strategies

Among the National Development Policies and strategies given in the VIIIth Five Year Development Plan, the following are relevant to natural resource management and livelihood improvement in rural communities.

- i) Conservation of natural and cultural values will be given increased attention and support.
- ii) Utilization of natural resource potentials in the development of low-income rural populations will be strengthened.
- iii) Participation of local communities in natural resource management will be promoted, and roles and contributions of NGOs and rural communities' institutions will be strengthened for these purposes.
- iv) Proportion of rural population and the share of agriculture in the national economy will decrease.
- v) Authorities and responsibilities of the government agencies will be decentralized.
- vi) Development disparities among different regions of the country will be reduced.
- vii) regulatory, supportive and inspectory roles of the state agencies will be strengthened, while their roles for implementation are decreased. Accordingly, budget allocations for implementation activities of the state agencies will be reduced;
- viii) Liberalization in economy and competitiveness at domestic and international markets will be strengthened.
- ix) Efforts and measures for the integration with the European Union will be continued.

2.1.2 Regional Development Policies and Strategies

There are two objectives in the Government's regional development policy and there have been little changes in them over the last 40 years. The prime objective is to reduce the disparity in income and welfare levels between different regions in Turkey. This is to be achieved by attaining higher levels of growth in the less developed regions of the country.

Concerning this objective, industry and specialized services in Turkey are largely concentrated in the Marmara Region which contains the major development centers of Istanbul, Izmit, Bursa and Adapazari, while the eastern and southeastern regions of the country are relatively less developed. The developed regions continue to receive a large influx of migrants which results in growth of urban slums, urban poverty and other social problems.

The second objective of the regional development calls for implementing a set of policies and

development programs to maximize the utilization of the potentials of different regions for development. Thus, each region will contribute to National Development to the maximum extent. This will be achieved by viewing sectoral and spatial linkages within a specific geographic area, and accelerating the growth of the region by full utilization of these linkages within the region.

The Government is trying to reduce regional disparities by promoting growth of income and employment opportunities in the less developed regions through regional development.

There are two elements of the strategy to promote growth in the less developed regions. One of the instruments is the provision of incentives for investments, where all investments in the less developed regions meet a very loose set of sectoral and size requirements. The available incentives under this category have the following components:

- i) Exemption from customs duties and various fund charges.
- ii) Investment tax credits.
- iii) Exemption from VAT for imported and domestically procured machinery.
- iv) Exemption from stamp duty.
- v) Allocation of Treasury lands for new investments free of charge.
- vi) Special credits for investments in R&D, techno-parks, environment projects and science and technology investments.

All these incentives are designed to lower the cost of new investments and are expected to encourage private sector investments to locate in the less developed regions. No incentives are available for existing firms, and none to reduce operating costs. Additional investment and operating incentives are available for the southeastern region which is subject to special security considerations. These additional incentives lower the cost of payroll taxes and energy, but are not available for companies in the Coruh River catchment area.

The other instrument used by the government is provision of subsidies for production infrastructure. The infrastructure requirements of private industry are given priority in the less developed regions. The main subsidies are provided for building Organized Industrial Estates and Small Industry Districts which assist small enterprises. There is, however, less locational and sectoral selectivity in these incentives compared with those provided under investment incentives.

2.2 National Forest Policies and Strategies

2.2.1 Conventional Forest Policies Implemented in the Past Periods

Traditional forest policies formulated in different documents (e.g. the national development plans, forest legislation, forestry master plans, government programs, forestry faculties' publications) and implemented during the past can be summarized as follows:

- i) Protection of forest against damage/destruction of different anthropogenic and natural factors.
- ii) Improvement of the conditions and productivity of the normal forests to supply wood products in order to meet domestic demand and needs on a sustainable basis.
- iii) Reforestation of degraded forest areas to utilize their potential for producing wood and for combating erosion and natural resource degradation.
- iv) Expansion and management of National Parks, Nature Parks, Nature Reserves, Wildlife Reserves and Forest Recreation areas for conservation of natural values and for providing social, environmental and economic benefits.
- v) Supporting forest dependent local populations (forest villagers), by meeting their wood and non-wood forest products needs, providing employment in forest activities and credit assistance for small scale income-generation activities in order to improve their living standards and to reduce their destructive pressures on forest lands and resources.
- vi) Acceptance of forests as public good, keeping them under the state ownership, planning and managing them exclusively by the state forestry organization.
- vii) Financing of the state forestry programs and activities mainly from wood sale revenues.

2.2.2 Forest Principles and Policies Identified in the Recently Prepared National Forest Program

(1) National forest principles

The following principles have been accepted for Turkish Forestry:

- i) Sustainability
- ii) Conservation of biological diversity and natural structures of the forests
- iii) Multi-purpose (multi-functional) management and utilization of the forests
- iv) Equitable distribution of forest benefits
- v) Participatory management of forest resources
- vi) Respecting rights and protecting cultures and traditions of local communities
- vii) Coordination, collaboration and integration within the forestry sector as well as with the other related sectors
- viii) Productivity/cost effectiveness
- ix) Fulfilling global responsibilities

(2) Forest policies

i) Policies related to conservation and protection of forests

- i-1 Completion of cadastre surveys, border delineation and registration works for the forest lands as soon as possible, by providing adequate attention and care on the conservation of the integrity of forest ecosystems, and the rights of local communities.
- i-2 Expansion of the protected areas network to adequately cover the special biological

diversity values of the national forests. Development and implementation of suitable participatory management systems and methodologies for the protected areas.

- i-3 Integration of issues of biological diversity conservation into forest inventory, planning, implementation and assessment systems.
- i-4 Natural rehabilitation of the forests to the extent possible, provision of adequate attention and care for the conservation of biological diversity during reforestation and other forest rehabilitation implementations.
- i-5 Creation of adequate awareness in local communities and other interest groups about the causes and consequences of the damages on the forests by biotic and abiotic agencies, and for strengthening the responsibilities and contributions in combating against such damage.
- i-6 Strengthening institutional capacities and resources of the forestry organization in combating fires and other damage by biotic and abiotic agencies.
- i-7 Giving prime importance and priority to preventive measures in combating threats and damage of harmful biotic and abiotic agencies. Conservation/restoration of the natural structures and the integrity of the ecosystem of the national forests to increase their natural resistance against harmful agencies.
- i-8 Provision, within the capacity of the forests, of the wood and NWFP needs of forest villagers at adequate amounts, in order to prevent illicit utilization and its damage to the forests.

ii) Policies related to improvement of forests

- ii-1 Wherever possible, natural regeneration and rehabilitation of the degraded forest areas by protection and reducing pressures. Implementation of suitable reforestation and rehabilitation techniques in other degraded areas. Provision of adequate attention to ecological, social and economic impacts during planning and implementation of forest rehabilitation activities.
- ii-2 Strengthening involvement and contributions of local people, NGOs, other government agencies and interest groups in the reforestation and rehabilitation of degraded forestlands. With this purpose, strengthening awareness creation programs and encouragement measures (e.g. land allocation, low-interest credit, technical assistance, etc.).
- ii-3 On the reforestation and rehabilitation of areas around forest village settlements, using local multi-purpose trees, shrubs and other plant species suitable for rehabilitation activities and appreciated by local residents.
- ii-4 Establishment of fast growing industrial forest plantations on suitable degraded lands for closing wood supply deficit and reducing pressures on natural forests.
- ii-5 Encouragement and support of the establishment of forest plantations on suitable non-forest Treasury lands by the forestry organization as well as by local people, private sector and other interest groups.
- ii-6 Promoting establishment of poplar and other fast growing tree species plantations and agro-forestry plantings on suitable private lands, and supporting these activities by

suitable measures (e.g. credit, research and development, technical assistance, seedling, etc.).

- ii-7 Planning and implementation of watershed rehabilitation activities (e.g. soil conservation, erosion control, flood prevention, range improvement, etc.) under a participatory-integrated watershed management approach, which combines natural resource conservation and rehabilitation with rural development activities.

iii) Policies related to utilization of forest resources

- iii-1 Strengthening silvicultural implementations in the forest areas assigned primarily for wood production, increasing the quantity, quality and value of wood production from such areas, in order to meet the local and national demands and to built-up competitiveness at domestic and international markets.
- iii-2 Providing adequate attention to appropriate management and utilization of NWFP resources during planning and implementation of forest management plans. Involvement of local communities and strengthening support of NGOs and other interest groups for this purpose.
- iii-3 Strengthening institutional capacities of the forestry organization in marketing of forest products, improvement of dialogue and collaboration between the forestry organization, forest industry and major consumer groups.
- iii-4 Strengthening knowledge, skills and capacities in the harvesting, processing, and marketing of wood and non-wood forest products for forest villagers.
- iii-5 Development of standardization and certification systems for wood and non-wood forest products and expansion of their applications.
- iii-6 Strengthening awareness and interest in the forestry organization and amongst other interest groups about the increasing importance and value of the social and cultural services of the national forests. Determination of the present and future demand and expectations of the society for social and cultural services of the forests (e.g. recreation, landscape, wildlife, hunting, sport fishing, environmental education, etc.).
- iii-7 Development and implementation of multi-functional and participatory management planning that provides proper attention to identification and appropriate management of the forest areas that are suitable for social and cultural services. Preparation and implementation of specific management plans/projects for such areas, with close collaboration of the forestry organization, local people and other interest groups.
- iii-8 Sustainable utilization of the social and cultural services of the forests without causing any damage to the natural environment. Strengthening of institutional capacities, implementation, training, awareness creation and research programs, and monitoring and evaluation systems with the participation of interest groups.
- iii-9 Development of political commitment, public awareness and support of protective and environmental functions and services of the forests (e.g. conservation of soil and water resources, prevention of natural resource degradation, floods and other natural disasters, carbon sequestration, air cleaning, etc.).

iii-10 Identification and expansion, during multi-functional and participatory forest management planning, of the forest areas to be assigned and managed for protective and environmental functions, preparation and implementation of specific management plans for these areas.

iii-11 Within forest areas as well as on suitable non-forest lands, planning and implementation of flood, landslide, torrent and other natural disasters combating activities with close collaboration and integration of the programs and activities of the related state agencies, local people and other interest groups. Implementations, by giving priority to the critical catchment areas where serious threats exist on the lives, basic infrastructures and agricultural lands.

iv) Policies related to poverty alleviation and livelihood improvement in the forest villages

iv-1 Incorporation of the local needs and better utilization of the benefits and revenue opportunities of the forest resources for local populations, through the development and implementation of multi-functional and participatory forest management.

iv-2 Development and implementation of appropriate forest utilization models that adequately respect the rights and needs of local communities and strengthen their participation in the utilization and sharing of the benefits from the forests within the borders of their own villages. With this purpose, strengthening institutional capacities of the forest village communities, forestry organization and other interest groups and introduction of relevant legal and financial arrangements.

iv-3 Supporting projects and activities of forest village cooperatives in order to strengthen their capacities and contributions in the development of forest village communities. Providing better wages for forest works and social security rights for forest workers through improved productivity.

iv-4 Appropriate utilization of the limited resources of MEF (ORKOY) allocated for supporting income generation and rural development activities in the forest villages. With this purpose, identification of truly poor villages that are dependant on forest resources and have destructive interventions in the forests, and that have interest for participatory works. Concentration of ORKOY assistance and activities in those villages. Development of forestry organizations dialogue and collaboration with the NGOs, other state agencies and interest groups for strengthening their involvement and contributions in poverty alleviation and rural development activities in the low-income forest village communities in remote areas.

iv-5 With joint initiatives of the forestry organization, forest villagers, NGOs, relevant government institutions and other stakeholders, the establishment of the political commitment, appropriate national policies, institutional capacities, legislation and support systems for the development and implementation of appropriate models (e.g. *Central Village Development Model, Integrated Watershed Development Model*, etc.) for poverty alleviation and rural development giving special attention to the low-income forest and mountain village communities.

(3) Alternative development scenarios and strategies for Turkish forestry

Alternative development scenarios and strategies for Turkish forestry that are provided under the Draft National Forestry Program (2002) show that the development of forest resource management in the country has in the following two stages.

Stage 1 (short-term scenario/strategy): Development of multipurpose and participatory management of forests by preparation and implementation of integrated forest resource management plans on watershed basis by integration of programs and activities of different units of the MEF, and by participation of the local people and other stakeholders.

Stage 2 (medium/long-term scenario/strategy): Planning and implementation of all Natural resource management and rural development activities on integrated watershed basis, and planning and implementing of Forest resource management as a major component of the integrated watershed management-rural development program.

2.3 National Policies for Supporting Agricultural Development

The main government support program for the agricultural sector is the ongoing direct income support for the farmers. The program was started in 2001 and will continue for five years with the financial support from the World Bank. The farmers are currently receiving TL. 135 million per ha of land that they operate. The subsidy is paid up to a limit of 50 ha, regardless of the ownership status: i.e., payment is made to tenant operators, and those who claim to have operated a piece of land continuously even if they do not have title deeds.

This system of payment has two main impacts on land use and on erosion. First, marginal plots of farmlands, that were abandoned when the young male population migrated to the cities, are now operated again to receive the subsidy. This will contribute to increased soil erosion. The second unintended consequence of the new support payment is conversion of pastures into cultivated land. Farmers plow up the pastures and produce witnesses who state that the land has been continuously farmed. The government commissions established to verify such claims are not able nor willing to counter such claims.

There are four programs that support the livestock sector. The support provided through these programs is summarized below as of Mid-2002.

(1) Subsidy for forage crop production support

The government provides a subsidy equivalent to 20% of the production cost for annual forage crops. The costs include all production inputs and the cost of machinery services. The subsidy increases to 30% in the case of perennial fodder crops. A similar level of support may also be provided for the purchase of agricultural machinery when the land area devoted to forage crops is large enough.

(2) Subsidy for artificial insemination

This subsidy is paid to enterprises with cattle pedigree records. It covers 50% of the costs for artificial insemination in first priority provinces and 25% in other provinces. The program will continue for a period of 5 years with a target of 10 million cows to be inseminated. Qualified veterinarians who wish to acquire the necessary equipment to start private practice also receive subsidies.

(3) Subsidy for breeding stock

This subsidy is paid for pregnant heifers purchased from state farms or from licensed establishments. The subsidy is 30% of the procurement price for pedigree cattle, and 15% for purebred cattle.

(4) Milk subsidy

A subsidy of TL. 10- 20,000 is paid to the farmers per liter of milk delivered to licensed milk processing plants. The amount of subsidy varies with the technical characteristics of the processor. Deliveries to fully equipped modern processors receive more subsidy per liter of milk. Deliveries to small informal processors, and cottage industries are not qualified to receive subsidies.

2.4 Participatory Natural Resource Management in Relation to the Demands and Expectations of a Wide Range of Stakeholders

Different stakeholders and interest groups of the society (e.g. local village communities, urban dwellers, NGOs, local administrations, politicians, different government agencies, private sector institutions, academicians, future generations, global society) have different types and priorities of the demands and expectations (e.g. fuel wood, round wood, NWFPs, forage, soil resource conservation, water resource regulation and utilization, natural disaster prevention, carbon sequestration, air cleaning, biological diversity conservation, landscape, eco-tourism, wildlife conservation, hunting) from the natural resources and their management.

It should be noted that, on a piece of natural resource (e.g. forest, range) in a certain location, not only the local people but also urban populations or various other interest groups, who live far away from the site, are increasingly claiming rights and imposing demands and expectations.

Types and priorities of the demands and expectations are also changing over time, in line with the demographic, economic, social, cultural and ecological changes occurring in the society. In this regard, contribution of high rates of out-migration from rural areas and rapid urbanization of the society are particularly significant. Therefore, during formulation of natural resource management and rural development policies and preparation of medium-long term strategies, proper attention has to be paid to the fact that Turkey will become a predominantly urbanized

society within 20 years. According to the VIIIth Five Year Development Plan's estimates, about 85-90 percent of the population will be living in urban areas by 2023.

Since meeting all demands and expectations for the limited natural resources is not possible, serious competitions and conflicts may occur between different functions and benefits expected from the forest resources, such as: (i) between local, regional and national levels; (iii) between short and long term benefits and utilizations; (iv) between as well as within stakeholder groups (e.g. different priorities and attitudes of livestock owners and other groups within a village).

The results of a study given in the National Forestry Program about the demands and expectations from the forest resources in Turkey shows that:

- *While the first priorities of the low income rural populations living within or near forest areas are for providing goods for their subsistence (e.g. fuel wood for energy, round wood for housing, fodder and grazing for livestock and employment in forest works for income), rural populations living in lower catchments attach higher priorities for protective functions of forests (soil and water conservation, flood and other natural disasters prevention).*
- *Priorities of the urban populations living away from forest areas are for social and cultural services (e.g. recreation, landscape) and protective and environmental functions (e.g. soil conservation, water regulation, biological diversity conservation).*
- *Finally, interests and priorities of the global society concentrate more on environmental functions (e.g. conservation of biological diversity, carbon sequestration).*

It should be noted that different combinations of such multiple and competing demands and expectations are also valid in relation to rehabilitation and management of the natural resources in different areas of the Coruh River catchment, depending on the variations and trends in the site specific ecological, social and economic conditions. As a matter of fact, this situation has also been confirmed by the results of the socio-economic surveys carried out with the households and key informants, and focal group discussions and problem and solution identification workshops held at different villages. Hence, appropriate planning and management of the natural resources in a catchment area requires:

- (i) A good survey, analysis and understanding of different demands and expectations of different stakeholders.*
- (ii) Participation of different stakeholders and interest groups of the society in the planning decisions and implementations.*
- (iii) Appropriate mechanisms, methodologies, institutional capacities and regulatory frameworks for the management of the conflicts and identification of the optimum combination of the goods, services and functions to satisfy different expectations and demands in a balanced way, through sustainable management of the natural resources, in the overall interest of the society.*

2.5 Integrated Area Development Projects

2.5.1 Overview of Integrated Area Development Projects in Turkey

Integrated area development planning in Turkey has evolved to cover three different types of regional development plans. The first type of regional development plans in Turkey, following the adoption of Five-Year Development Plans in 1963, were plans for special resource regions. The first two regional development plans (Marmara Industrial Development Plan, and the Cukurova Region Development Plan) were prepared to promote further industrial growth in the developed regions.

These were followed by two other special resource plans: the Zonguldak coal region special plan and the Karabuk-Bartın area development plans. These last two were prepared to reduce the dependence of the two regions on coal mining and on a single steel mill. Another regional development plan was prepared for all coastal areas and aimed at formulating development plans (with a heavy emphasis on physical infrastructure) for special areas for tourism development.

All subsequent regional development plans in Turkey were prepared to accelerate the development particularly of less developed regions. One of the most ambitious regional development plans in Turkey is the Southeast Anatolia (GAP) Project. This started as a resource development project involving about 14 major hydropower dams. Other projects were added to the initial components and the project evolved into a comprehensive regional development program.

Other regional development projects were also prepared particularly for the less developed Eastern Anatolia, and the Eastern Black Sea Regions. The main emphasis of these plans for the less developed regions was to identify main priority projects for implementation by the government, and formulation of support measures to encourage private investments.

The transition from special resource plans to less developed regions has now changed to preparation of plans for watersheds. The first example of the integrated watershed planning is the Eastern Anatolia Watershed Rehabilitation Plan supported by the World Bank. Two other major plans have already been prepared for Central and Eastern Anatolia, and the Yesilirmak River catchment. This shift to preparation of watershed plans reflects the change in regional development priorities. The resource development plans basically aimed at promoting industrial and tourism development. Those for the less developed regions tried to increase the per capita incomes in these regions relative to the rest of the country. The new plans for watersheds reflect the concern with environment and sustainability.

Although not explicitly stated, the main function of the plans prepared for the less developed areas was to identify priority projects which government agencies could implement. It was

expected that this will lead to an accelerated pace of public investment in these regions. Another expected benefit of these plans was to provide a framework for coordinating all public investments in the region.

There was no special funding associated with these plans for the less developed regions. Thus, the preparation of these plans was not necessarily accompanied by implementation under a special agency or funding mechanism. In contrast, the integrated rural development plans had a single funding source. These were multi-sectoral but tended to concentrate on agriculture due to the prominence of this sector in the less developed areas.

2.5.2 Integrated Agricultural/Rural Development Projects

All integrated agricultural/rural development projects tend to cover relatively large geographic areas--generally of more than five million ha and over 10 provinces. The first two integrated rural development projects were implemented in Eastern (Erzurum), and Central East Turkey (Cankiri-Corum). Both were implemented with funding support from the World Bank.

Furthermore, three of such projects were implemented by support from IFAD, with UNDP as the executive agency on behalf: in Ordu-Giresun, in Yozgat, and in Mus-Bingol. These agricultural development plans have tried to identify areas of agriculture that have substantial growth potential. They have also tried to identify support measures that the government should implement to realize the development potential. This has generally involved identification of new production technologies, strengthening agricultural extension and input delivery systems, and credit support to allow uptake of the recommended practices. All of these plans also tried to introduce new production activities: in agriculture, rural crafts, and agro-processing. These new activities have tended to be of minor importance and have not continued after the project support was terminated.

The rural development projects identified above all received external assistance for implementation. Beginning in 2001, the Ministry of Agriculture and Rural Affairs started a new initiative to prepare agricultural development plans for each of the 82 provinces in Turkey. These do not have a special implementation component but are expected to guide the activities of the Ministry in each province. They provide a broad overview of development conditions in agriculture and identify some of the priority projects that the Ministry would like to implement in each province.

2.5.3 Area Development Plans

Development plans prepared for the special resource regions (tourism, diversification of economic base from coal or a single steel plant and hydro-power generation) are very specific and the development measures contained in these are not relevant for the integrated watershed plan being prepared for the Coruh River catchment. The three provinces of the catchment are

among ‘the first priority development areas’. This entitles all new investments in the three provinces to the investment incentives granted to such areas under the general scheme.

The plan being prepared for the Coruh River catchment is similar to the new area development plans which are prepared for specific catchments. The most relevant plan, for comparative purposes, is the Eastern Anatolia Project implemented with support from the World Bank. The two most recent integrated rural development plans implemented in Yozgat and Ordu-Giresun are also relevant, because the problems faced in these two project areas are similar to those in the Coruh River catchment.

(1) Components of area development plans

The components of all area development projects implemented in Turkey, including the most recent Eastern Anatolia Project, are similar. They all have three components: namely, (i) natural resource rehabilitation, (ii) rural income generation, and (iii) rural infrastructure. All projects are planned and implemented by the agencies of the central government in a top-down approach, but all claim to be implemented in a participatory and sustainable manner.

The natural resource conservation component consists of erosion control, reforestation, and rangeland management. Development of alternative energy sources for cooking, and more efficient use of energy are treated under this heading. The rural infrastructure components vary. They include rural roads, village water supply schemes, and small-scale irrigation projects.

Income-generation projects include a very wide variety of activities. Some of these introduce new income-generation activities such as bee-keeping, poultry and silk production. Mainly, the emphasis is on increasing incomes from production already undertaken in the villages. The projects provide funding for extension services to advise farmers on improved farming and husbandry practices. All rural development projects include financing schemes at interest rates well below the prevailing market rates. Subsidized production inputs are also provided to encourage farmers to adopt new or improved practices. These subsidized inputs vary from forage crop seeds, agricultural machinery, to improved animal breeds.

Subsidized credit is a key ingredient to support small rural development projects. These support breeding animals, beehives, and simple processing activities. The interest rates on these credits are always negative after the adjustment for inflation. The interest rates are one-third to one-fourth of the market rates. One condition for the credits for financing simple processing (e.g. saw mills, dairy plants, feed mills) is that the villagers form a cooperative. This is generally imposed on the reluctant farmers as a credit condition and the ventures all invariably fail.

(2) Implementation arrangements

Area development plans are multi-sectoral. In practice, this has meant that different project

components are implemented by the Ministry of Agriculture and Rural affairs, Environment and Forestry, and Public Works. Development banks and other ministries may also be involved. The standard implementation arrangement is a key for a ministry taking the lead role and involving the other agencies in a steering committee.

All recent projects have made an attempt to involve the local people as well. In the case of the Ordu-Giresun Project, villagers were required to establish development committees in each village. However, none of the projects have seriously involved the special provincial administrations. These will become critical under the public administration reforms that the present government is keen to implement.

(3) Experience with area development plans

Area development projects implemented in small geographic areas, with external funding support, have a common characteristic. They bring a concentration of financial and manpower resources into an area. This concentrated effort may produce some benefits during the project implementation but rarely have long-term impacts. Three specific problems are common to all area development projects.

Firstly, all recent projects only act as though they involve participation of local people. Projects implemented by the central government agencies, being subject to the budgetary rules and regulations, can not be flexible enough to respond to the local priorities or demands. Central government agencies cannot transfer the allocated funds to new projects which may be formulated by the local people. At best, the local participants are given a menu from which they can choose.

The second major problem in the area development projects is the lack of sustainability, despite all claims to the contrary. The financial evaluation of economic activities introduced by the Ordu-Giresun project showed that none of the recommended economic activities were sustainable without the subsidized inputs. Many projects were viable only because of the access to funding at negative interest rates, free distribution of forage crop seeds, or differential access to forest resources (special logging privileges). Some activities that were expected to become commercially viable after the initial period (i.e., milk collection centers) failed to become financially self-supporting.

One major omission appears to be the failure to distinguish between production activities undertaken for self-consumption versus those to be undertaken for the market. These two are driven by different forces and this has not always been recognized. As a result, farmers have resisted intensification of input use in products used for self-consumption, while the marketing component was not properly appreciated in commercial activities. The resource conservation component of these projects is not expected to be financially viable under market conditions.

This also seems to be the case for the income enhancement projects as well, although the

projects have not been formally evaluated in any of the area development projects. All three rural development projects are reported to have spread project resources too thinly over a very large area with no noticeable economic impact on the project areas.

The third is the failure to address the underlying institutional and legal issues. Overgrazing is a result of common ownership. Reforestation and protection of forest areas is difficult without demarcation of forest boundaries and settlement of ownership disputes. Local participation in decision-making is not meaningful when there is complete subordination and dependence on central government handouts. Under these conditions, these development efforts become part of routine central government operations.

Chapter 3 Present Conditions in the Study Area

CHAPTER 3

PRESENT CONDITIONS IN THE STUDY AREA

3.1 Natural Conditions and Soil Conservation

3.1.1 Topography

The topography of the Study Area demonstrates significant spatial distribution of different slope classes. In general, the downstream part of the Study Area is much more mountainous than the upstream area. More specifically, steep land is concentrated in the three northeastern Sub-Catchments (SCs) of Berta, Lower Coruh and Middle Coruh. The area between Yusufeli and Artvin is particularly steep. The gentlest topography is found in the southern and western part of the catchment, notably in the SCs of Oltu, Tortum and Upper Coruh. The Upper Coruh SC has the least steep land, and many of the areas have inclines of less than 6%, which are presumably suitable for irrigation. (Fig. 3.1-1)

Table 3.1-1 Distribution of Slope Classes in Sub-Catchments

Sub-Catchment	0-2%	2-6%	6-12%	12-30%	30-45%	Over 45%
Berta	1.5	5.6	10.6	40.1	27.6	14.6
Lower Coruh	0.7	2.4	4.0	28.9	38.6	25.4
Middle Coruh	0.5	2.3	4.0	26.7	38.6	27.9
Oltu	6.3	11.3	17.5	43.0	15.5	6.5
Tortum	3.6	8.5	13.2	37.4	23.5	13.7
Upper Coruh	10.1	11.9	14.2	40.2	17.8	5.8
Total Study Area	5.5	8.6	12.3	37.9	23.4	12.3

Source: JICA Study Team calculation using GIS based on DEM; Military

3.1.2 Hydrology

The Coruh River rises in the western part of the catchment at altitudes of about 2,000 m, and flows some 300 km distance to the Black Sea via Georgia. Extreme ranges between maximum and minimum discharges are seen in the River, especially in its tributaries. Particularly in Oltu SC, the ratio of minimum and maximum discharge ranges up to 220 times. They are very “flashy” streams, subject to extreme storm events, which will produce rapid, massive, very erosive flows. The discharge of the River demonstrates a clear seasonal pattern, with the highest discharges during the period of roughly March to June due to snowmelt, very low discharges in Summer, and generally low flows in Autumn and Winter.

Suspended sediments demonstrate strong correlations with river discharge. The annual average sediment discharges measured at stations within the Study Area range from as low as 61 ton/km² and as high as 653 ton/km².

Table 3.1-2 Hydrological Features of the Coruh River at Selected Measuring Stations

Station	Altitude (m)	Discharge (m ³ /sec)				Average Sediment Discharge (t/km ² /yr)	R ² of log daily average SS* on log daily average discharge
		Mean	Max	Min	Max/Min		
Coruh Nehri, Karsikoy	57	209	1,211	38	32	401	0.67
Coruh Nehri, Altinsu	201	160	994	26	38	422	0.85
Coruh Nehri, Ispir Bridge	1,170	44	350	7	50	92	0.78
Berta Suyu, Baglik	366	26	99	5	30	109	0.81
Berta Suyu, Ciftehanlar	570	22	84	4	21	61	0.82
Murgul Cayi, Erenkoy	213	12	59	1.5	39	653	0.11
Deviskel Deresi Gundogdu	500	5	19	0.5	28	65	0.71
Oltu Suyu, Coskunlar	1,004	17	182	1.3	140	433	0.79
Oltu Suyu, Asagikumlu	1,129	7	67	0.3	223	485	0.77

Note: SS* indicates Suspended Sediments.
Source: DSI records

3.1.3 Climate

One of the major characteristics of the Coruh River catchment is its harsh climate. The Study Area has extremely low temperatures in Winter, but is generally hot in Summer. Precipitation in the area is generally low, with occasional high intensity storms. There are five meteorological stations located within the Study Area.

The meteorological station of Artvin, located in the most downstream area and with the lowest elevation, records the mildest climate with only 18 days of frost per annum and the annual precipitation of 660 mm. The more downstream parts of the Coruh catchment, north and east of Artvin town, are reported to have more annual rainfall although there are few reliable records.

Table 3.1-3 Climatic Features of the Coruh River at Selected Measuring Stations

Station	Elevation (m)	Temperature			Rainfall (mm)	Days of frost
		Mean	Max	Min		
Artvin	628	12.2	25.9	-0.4	662.9	18.4
Bayburt	1,584	6.5	26.7	-11.4	426.2	36.0
Yusufeli	611	15	42.5	-	295.8	57.0
Tortum	1,550	8.3	35.4	-20.8	434.9	125.3
Oltu	1,275	10.2	36.6	-20.1	382.3	125.3

Sources: Reports on soil fertility and fertilizer requirements in the Study Area; GDRS, Statistical Yearbook of Turkey 2000; SIS, OGM (Artvin, Erzurum)

3.1.4 Geology

A wide variety of rock types are found in the Coruh River catchment, although the area is dominated by volcanic rocks of different types and ages. Areas near Tortum and the eastern and northern boundaries of the catchment contain basalts and related rock types. There are some areas of serpentines (ultrabasic rocks with high manganese contents) around Yusufeli and Narman. The gypsiferous rocks around Narman are notable for their extremely eroded bare slopes. The only reasonably large extensive deposits of recent alluvia in the catchment are found on flat or gently undulating plains west of Bayburt. (Fig. 3.1-2)

3.1.5 Soils

The most common soils in the Study Area are Basaltic Soils, Brown Forest Soils, Brown Soils, Chestnut Soils and High Mountain Pasture Soils. These soils cover about 77% of the whole catchment, while the other soils cover only about 13%. However, some of the less common soils may be locally important– such as Alluvial Soils, which are not common in terms of area, but are very important to villagers as they are highly productive. In addition, some SCs have locally high occurrences of particular soils. (Fig. 3.1-3)

Most of the soils are moderately or strongly erodible, especially on steep slopes. Most of the soils possess only moderate fertility, and present severe constraints such as shallowness and stony sub-soils.

3.1.6 Land Capability

Most of the Coruh River catchment falls into Land Capability Classes VI, VII and VIII, reflecting its steep topography. About 85% of the land is in Classes VI to VIII, with Class VII predominating at 59%. Apart from areas in the western end of the catchment, the small proportion of lands within Classes I, II and III indicates the generally limited potential for intensive agriculture and horticulture. On the other hand, there are some reasonably extensive areas of Class IV land in the south and east of the catchment. (Fig. 3.1-4)

3.1.7 Soil Erosion

The soil erosion map of the Study Area clearly indicates that a very large proportion of the catchment has suffered severe and extreme degrees of soil erosion. Over the whole catchment, the proportion of Class 1, which represents “none or very little soil erosion”, is only 3.8%. Given that Class 2 is “moderate” erosion, the Coruh River catchment in fact has, on average, only about 4% of its land (about 77,000 ha) in a satisfactory state from the standpoint of soil erosion. With the exception of Upper Coruh SC, all the SCs have virtually no land within Class 1, but on the other hand, all of them have between about 56% and 82% of their land in Classes 3 and 4. (Fig. 3.1-5)

The office of the Erzurum AGM Chief Engineer has (to the end of 2002) completed a total of 11,558 ha of erosion control works within a total project area of 57,124 ha. Measures for erosion control such as erosion control planting, contour terraces, water discharge control, check dams for gully plugging, gabions and roadside drainage were seen in the Study Area. Riverside terraces and planting of poplar and willow were also commonly seen.

3.1.8 Flora and Fauna

The Lower and Middle Coruh River catchment (Ispir, Artvin, Savsat, Oltu, Narman) are in the Dry Forest-Shrub region; the Kackar and Yalnizcan Mountain ranges are in the Mountain

Grass region; and Bayburt and Tortum are on the Dry Forest-Anthropogene Steppe region. The vegetation of Dry Forest-Shrub region has abundant vegetation communities and plant species owing to such factors of favorable amount of humidity carried from the Black Sea, sufficient solar radiation amount, and topographical aspects.

The mountainous sites of the Dry Forest-Shrub regions are dominated by coniferous species such as *Pinus sylvestris*, *Pinus brutia*, *Abies nordmanniana* and *Picea orientalis*, along with broadleaf (hardwood) tree species such as *Fagus* sp., *Quercus* spp. and *Alnus*.sp.. Plantings of *Populus nigra* are common around settlements, arable areas and riversides.

Numerous species of animals are reported in the Study Area. The inventory for Karagol-Sahara National Park lists 128 bird and 35 mammal species, with several endangered species. The Coruh Catchment Tourism and Recreation Development Project Report has noted the presence of 21 mammals, 50 birds and 4 fish species. The Study Area plays a significant role as a habitat for important animal species, since 5 of the 21 mammal species and 13 of the 50 bird species listed in the abovementioned report are identified as protected animals according to the Land Hunting Law (No. 3167).

3.2 Socio-Economic Conditions and Forest Villages

3.2.1 Socio-Economic Conditions

(1) Area and population

Study Area and administrative boundaries

The Coruh River catchment largely coincides with the administrative boundary of 17 Districts of the three Provinces of Artvin, Erzurum and Bayburt: 6 Districts in Artvin(Artvin, Ardanuc, Borcka, Murgul, Savsat and Yusufeli), 8 Districts in Erzurum(Ispir, Narman, Oltu, Olur, Pazaryolu, Senkaya, Tortum and Uzundere), and 3 Districts in Bayburt (Bayburt, Aydintepe and Demirozu) as shown in the location map. The area of their catchment accounts for some 55% of the total area of the three provinces.

Population and its growth

The population in the whole Coruh River catchment totals 432,259 as of year 2000 with a rural population of 268,459. The population in the catchment shares 35% of total population of the three provinces or 1,226,681 people. Urbanization rate is 38% compared to 65% in Turkey as a whole. Population density in the Study Area is as low as 21.8 people/km² compared to 33.7 people/km² for the three provinces and 88 people/km² for the whole Country. Population density does not vary much among the Districts ranging from 12.8 people/km² in Yusufeli of Artvin to 34.6 people/km² in Borcka of Artvin.

During the last decade the population decreased by 49,275 or 10.2% from 481,534 in 1990. Annual average population growth rate in the last decade was -1.1% on average. In contrast to the increase in urban population at 1.6% per annum on average, rural population has decreased at 2.4% annually on average during the same period. Population decrease occurred rapidly in Murgul, Savsat and Yusufeli Districts of Artvin and in Olur, Oltu and Ispir Districts of Erzurum with annual average population growth rate of -3.5% or less.

On the other hand, population in the three provinces as a whole increased by 58,317 or 5.0% during the last decade with the average annual growth rate of 3.0% for urban and -2.0% for rural areas, respectively. Population decrease has been dominantly attributed to out-migration from rural areas to urban centers, not only within the catchment, but also regional centers and mega cities such as Ankara and Istanbul.

There are only two Districts (Tortum of Erzurum and Demirozu of Bayburt) where rural population increased during the last decade, while urban population in three Districts (Murgul of Artvin, Bayburt and Demirozu of Bayburt) decreased during the same period.

Table 3.2-1 Demographic Features of Coruh River Catchment

Province	Population as of 2000			Annual average growth rate (1990-2000; %)			Area (km ²)	Pop. density (no./km ²)	
	District	Urban	Rural	Total	Urban	Rural			Total
Artvin		84,198	107,736	191,934	2.45	-3.04	-1.03	7,367	26.1
<u>Coruh River catchment</u>		<u>54,674</u>	<u>85,329</u>	<u>140,003</u>	<u>2.07</u>	<u>-3.28</u>	<u>-1.55</u>	<u>6,856</u>	<u>20.4</u>
Artvin (Center)		23,157	11,415	34,572	1.32	-1.96	0.10	1,085	31.9
Ardanuc		5,278	9,199	14,477	0.44	-3.20	-2.04	989	14.6
Borcka		9,008	18,646	27,654	3.97	-2.58	-0.92	799	34.6
Murgul		3,801	4,742	8,543	-1.18	-4.70	-3.30	336	25.4
Savsat		7,325	18,299	25,624	4.21	-3.97	-2.28	1,377	18.6
Yusufeli		6,105	23,028	29,133	4.44	-3.56	-2.38	2,270	12.8
Erzurum		560,551	376,838	937,389	3.41	-1.70	1.00	25,323	37.0
<u>Coruh River catchment</u>		<u>67,770</u>	<u>127,128</u>	<u>194,898</u>	<u>2.19</u>	<u>-2.03</u>	<u>-0.77</u>	<u>9,265</u>	<u>21.0</u>
Ispir		11,188	18,149	29,337	3.37	-3.58	-1.51	2,012	14.6
Narman		9,025	18,590	27,615	2.59	-0.06	0.72	903	30.6
Oltu		23,064	16,473	39,537	0.56	-3.85	-1.55	1,394	28.4
Olur		3,271	7,600	10,871	1.89	-5.07	-3.48	798	13.6
Pazaryolu		4,826	4,827	9,653	4.44	-3.16	-0.13	747	12.9
Senkaya		3,676	23,956	27,632	1.94	-2.17	-1.72	1,536	18.0
Tortum		7,905	30,792	38,697	3.98	0.69	1.27	1,467	26.4
Uzundere		4,815	6,741	11,556	3.24	-2.57	-0.58	408	28.3
Bayburt		41,356	56,002	97,358	0.01	-1.63	-0.97	3,739	26.0
<u>Coruh River catchment</u>		<u>41,356</u>	<u>56,002</u>	<u>97,358</u>	<u>0.01</u>	<u>-1.63</u>	<u>-0.97</u>	<u>3,739</u>	<u>26.0</u>
Bayburt (Center)		32,285	38,982	71,267	-0.42	-2.02	-1.33	2,655	26.8
Aydintepe		7,010	5,604	12,614	3.10	-2.70	0.06	473	26.7
Demirozu		2,061	11,416	13,477	-1.72	0.49	0.12	611	22.1
Provinces total		686,105	540,576	1,226,681	3.04	-1.98	0.49	36,429	33.7
Coruh catchment total		163,800	268,459	432,259	1.55	-2.37	-1.07	19,860	21.8
TURKEY		44,109,336	23,735,567	67,844,903	2.74	0.40	1.85	769,604	88.2

Note: Urban population is the total population of Province and District centers, while rural population consists of the population in Sub-districts and villages.

Source: JICA Study Team based on Census of Population 2000, Artvin, Erzurum and Bayburt; SIS

Age structure

Median age in Artvin, Erzurum and Bayburt has increased during the past decades. In Artvin it has increased from 20.6 in 1980 to 29.4 in 2000, also from 17.6 to 21.4 in Erzurum during the same period and from 20.3 in 1990 to 23.1 in 2000 in Bayburt. The dependency ratio of the population with ages of 65 and over to the population with the age between 15 and 64 (dependency ratio on 65+) has increased while that of 0-14 has decreased. The dependency ratio of 65+ showed a tendency to be higher in rural areas.

Table 3.2-2 Median Age and Dependency Ratio by Province

Census year	Median age			Dependency ratio					
	Artvin	Erzurum	Bayburt	Artvin		Erzurum		Bayburt	
				65+	0-14	65+	0-14	65+	0-14
1960	19.4	19.3		8.6	81.6	5.7	79.8		
1970	18.8	18.2		9.9	80.1	6.8	83.8		
1980	20.6	17.6		11.1	65.3	6.4	84.0		
1990	24.8	19.0	20.3	12.4	50.1	6.5	73.5	8.3	65.2
2000	29.4	21.4	23.1	17.1	38.2	8.0	58.5	12.6	56.5

Note: Dependency ratio is calculated by dividing the population at 65 years of age and over, or 0-14 age group by the population at 15-64 age group.

Source: JICA Study Team based on Census of Population 2000, Artvin, Erzurum and Bayburt; SIS 2001

Composition of population by sex

The population of males and females in the whole catchment is almost even: 216,995 for males and 215,294 for females respectively, but the female population surpasses the male population in rural areas (129,084 for males and 139,375 for females, respectively). There is a common tendency for all three Provinces for more males in urban areas and more females in rural areas. In Erzurum Province particularly, the urban male population is 14% more than the urban female population.

(2) Economic structure

Labor force and employment

The labor force totals 486,022 in the Provinces of Artvin, Erzurum and Bayburt. In urban areas, the labor force totals 174,400 of which 153,518 are male. On the other hand, in the rural areas the labor force totals 311,622, with more than half of them female. The majority of women in urban areas stay at home as housewives while most rural women work in the field.

Employment opportunities in urban areas are limited in the three Provinces. Urban unemployment rates are 14% for Artvin, 22% for Erzurum and 18% for Bayburt respectively. While the unemployment rate for males in urban area ranges between 11% and 21%, employment opportunities for urban females are very limited, with unemployment rate of over 30%. On the other hand, most of the labor force, both male and female in rural areas is employed.

Occupation

In all three Provinces, nearly half of those employed in urban areas are engaged in community, social and personal services including public administration. Other important occupations are wholesale and retail trade, restaurants and hotels, construction, manufacturing, transport and communication and storage. On the other hand, self-employment in the agricultural sector is dominant in rural areas. Some 80% of males and almost all females are engaged in agriculture including livestock. Actually in most cases women are employed as unpaid family labor.

The agriculture sector absorbs 63% of the total employment in the three Provinces, followed by community, social and personal services with 19%, wholesale and retail trade, restaurants and hotels with 5.6%, construction with 4.1%, manufacturing industry with 3.0%, transportation, and communication and storage with 2.3%.

Gross Regional Domestic Products

Gross Regional Domestic Products (GRDP) in the three Provinces totals TL. 935.071 Billion accounting for 0.8% of the GDP. Major sectors contributing to GRDP in the Provinces include trade with 22.9%, agriculture with 21.9%, transportation and communication with 16.7%, industry with 12.9%, and government services with 12.0%. Compared with the GDP, the composition of GRDP in the three Provinces as a whole is characterized by a higher share in agriculture and government services, and a lower share in manufacturing industry.

In Artvin, the mining and quarrying sector provides more than 10% of the provincial GRDP due to a large copper mining operation in Murgul. The forestry sub-sector accounts for 4.4% of the GRDP, compared to 0.5% in Erzurum and 0.1% in Bayburt. In Erzurum, wholesale and retail shares 23.5% of the GRDP compared with 12.8% in Artvin and 15.3% in Bayburt. Government services in Erzurum contribute much to GRDP with 15.2%. In Bayburt, transportation and communication (25.7%) and agriculture and livestock (24.5%) produce 50% of the GRDP, followed by wholesale and retail trade (15.3%) and government services (11.6%).

Rural economy

The rural economy mostly depends on the agriculture sector. Among sub-sectors, cropping and livestock are the major income sources.

More than 80% of all households in the Coruh River catchment earn income from both crops and livestock, some 13% earn from crops alone and 2.5% from livestock alone. Less than 5% of the households live on non-agricultural activities.

Table 3.2-3 Major Income Sources of Rural Households in the Coruh River Catchment

Province	District	Nos. of household	Agricultural household (%)				Sub-total	Non-agric. Household (%)
			Crop/livestock	Crop	Livestock	fishery/hunting		
Artvin	Merkez	3,105	75.4	19.5	1.1	0.1	96.1	3.9
	Ardanuc	2,875	80.6	15.8	0.2	0.0	96.6	3.4
	Borckca	3,600	82.3	16.4	0.0	0.0	98.7	1.3
	Murgul	734	89.6	9.5	0.0	0.0	99.2	0.8
	Savsat	6,008	80.4	16.7	1.6	0.0	98.7	1.3
	Yusufeli	6,131	83.7	11.4	0.5	0.0	95.6	4.4
	Coruh catchment	22,453	81.2	15.3	0.7	0.0	97.2	2.8
	Province total	27,842	77.2	18.7	0.7	0.0	96.6	3.4
Erzurum	Ispir	4,269	91.0	4.0	1.0	0.0	96.0	4.0
	Narman	2,797	85.2	6.3	1.9	0.0	93.4	6.6
	Oltu	3,615	87.1	9.2	0.6	0.0	96.9	3.1
	Olur	3,405	84.1	11.7	0.2	0.0	96.1	3.9
	Pazaryolu	1,031	89.4	8.5	1.7	0.0	99.7	0.3
	Senkaya	5,206	81.0	10.9	1.5	0.0	93.4	6.6
	Tortum	4,733	65.8	22.4	8.1	0.1	96.3	3.7
	Uzundere	1,621	60.3	32.5	1.2	0.0	94.1	5.9
	Coruh catchment	26,677	80.6	12.5	2.3	0.0	95.5	4.5
Province Total	61,635	80.1	8.9	4.5	0.0	93.5	6.5	
Bayburt	Merkez	6,536	77.1	6.9	7.5	0.0	91.5	8.5
	Aydintepe	1,055	73.4	6.2	10.0	0.0	89.6	10.4
	Demirozu	1,674	81.8	4.8	3.0	0.0	89.7	10.3
	Coruh catchment (Province total)	9,265	77.6	6.4	7.0	0.0	91.0	9.0
Coruh catchment total		31,818	80.4	12.6	2.5	0.0	95.4	4.6
Provinces total		37,207	79.0	11.4	3.7	0.0	94.1	5.9

Source: Village inventory 1997, Artvin, Erzurum, Bayburt; SIS

Cereal crops and livestock are the two major earners in agriculture in the villages of the Coruh River catchment. Of all the villages in the catchment, some 42% earn most from cereal crops such as wheat, barley and maize. Another 38% earn most from livestock/poultry activity. Fruits are the major income source for 11% of the total, and each of vegetables and forest products for 2% of the total, respectively.

(3) Social aspects

Household

Average household size is 4.5 for Artvin, 5.7 for Erzurum and 5.6 for Bayburt, respectively. In all Provinces, average household size is the smallest in the Province center. Average household size in the District centers and rural areas of Erzurum and Bayburt is more than 6.0 due to a higher percentage of the households with more than 10 members. Noteworthy is the higher percentage of the households with only 2 persons in rural areas of all the Provinces, which may suggest the presence of out-migration of younger generations leaving older couples behind. Particularly in Artvin, 18% of the households in the rural area have only 2 members.

Housing facilities

More than 90% of the urban houses are equipped with housing facilities such as toilets, baths, kitchens and piped water, but the provision of these facilities differs considerably in rural areas among the Provinces. In Bayburt rural houses are well equipped: 97% with toilet; 87% with bath; 93% with kitchen and 96% with piped water. However, in Erzurum only 81% have toilet, 60% have bath, 71% have kitchen, and 58% have piped water. In rural houses of Artvin, provision of housing facilities is intermediate, except toilet with which almost all rural houses are equipped.

Literacy and education

The literacy rate of the populace six years old and over in the three Provinces is 84.4% with males having a higher literacy rate of 92.7% while the rate for females are 75.7%. There is little difference in literacy rate among urban areas of the three Provinces. Literacy rates in rural areas are lower than in urban areas: 90% in urban and 78% in rural. The literacy rates of women in rural areas are much lower than in urban areas.

Educational attainment of literate population varies among Provinces. Those who did not finish school but are literate account for 22% in Artvin and 30% in Erzurum and Bayburt, and those who attained high school education and higher, in the respective provinces are 22%, 21% and 15%. It is noteworthy that in Artvin, some 15% of the literate finished higher education (high school and higher), compared to 8% in Erzurum and Bayburt.

In general, women do not attain higher education in both urban and rural areas. Males who attained high school education or higher are 21 to 27% in three Provinces, but only 7 to 15% of females attained the same education level. Particularly in rural areas of Erzurum and Bayburt, not more than 3% of females finished high school or higher education.

3.2.2 Forest Village Inventory

According to the Forest Villagers Development Fund Regulations prepared in 1977 by ORKOY, a forest village is defined as “a village that has forest within its boundaries”. Forest villages are classified into two categories: (i) “within forest villages” and (ii) “forest neighboring villages”. A “within forest village” is defined as “a village that has forest within its boundaries and its lands around village settlement is surrounded by forest in four directions”. A “forest-neighboring village” is defined as “a village that has forest within its boundaries and its land around village settlement is surrounded by forest in at least one direction”. According to the census of population 2000 and ORKOY, there are 832 villages in the Coruh River catchment, 62% of which or 515 are forest villages.

In Artvin, 250 out of the total 254 villages are forest villages, while in Bayburt only 37 out of 175 are forest villages. In Erzurum, 228 out of 403 are forest villages. During the last decade,

the population in the forest villages has decreased at a higher rate than in non-forest villages, at 3.14% per annum compared with 2.27% per annum. (Fig. 3.2-1)

Table 3.2-4 Summary of Forest Village Inventory

Province	District	Within forest village			Forest neighboring village			Forest village total		
		Nos.	Population 2000	Annual growth 1990-2000 (%)	Nos.	Population 2000	Annual growth 1990-2000 (%)	Nos.	Population 2000	Annual growth 1990-2000 (%)
Artvin	Artvin (Center)	22	6,332	-1.26	14	5,083	-1.12	36	11,415	-1.20
	Ardanuc	12	2,228	-2.72	37	6,971	-3.34	49	9,199	-3.20
	Borcka	32	13,946	-3.13	2	1,142	12.72	34	15,088	-2.54
	Murgul	8	1,906	-5.56	2	295	-	10	2,201	-4.19
	Savsat	61	18,120	-4.36	1	179	0.82	62	18,299	-4.32
	Yusufeli	20	6,493	-4.28	39	13,876	-3.73	59	20,369	-3.91
	Sub-total	155	49,025	-3.64	95	27,546	-2.72	250	76,571	-3.32
Erzurum	Ispir	13	2,636	-3.72	34	7,105	-3.72	47	9,741	-3.72
	Narman	4	1,051	-2.90	10	4,150	-0.85	14	5,201	-1.30
	Oltu	12	3,397	-4.49	40	11,002	-3.44	52	14,399	-3.70
	Olur	2	973	-4.80	25	5,660	-4.73	27	6,633	-4.74
	Senkaya	12	5,045	-0.89	44	12,673	-2.74	56	17,718	-2.25
	Tortum	0	0	-	22	8,674	-1.89	22	8,674	-1.89
	Uzundere	0	0	-	10	6,741	-2.57	10	6,741	-2.57
Sub-total	43	13,102	-2.99	185	56,005	-2.97	228	69,107	-2.97	
Bayburt	Bayburt (Center)	0	0	-	31	9,423	-2.67	31	9,423	-2.67
	Aydintepe	0	0	-	3	284	-4.09	3	284	-4.09
	Demirozu	2	530	-4.37	1	215	-5.95	3	745	-4.86
Sub-total	2	530	-4.37	35	9,922	-2.80	37	10,452	-2.89	
Total	200	62,657	-3.51	315	93,473	-2.88	515	156,130	-3.14	

Source: JICA Study Team based on Census of Population 2000, Artvin, Bayburt, Bayburt; SIS 2001 and ORKOY, MOF

3.3 Land Use

Land use of the Coruh River catchment was analyzed from Landsat images taken in September 2001. The results indicate that about 4,402 km² or 21.7 % of the total catchment are forests. Other land uses include: transitional woodland shrub (2,365 km² or 11.7 %), rangeland (9,352 km² or 46.2 %), arable land (2,808 km² or 13.9 %), and other areas (1,316 km² or 6.5 %).

Table 3.3-1 Land Use of the Coruh River Catchment by Sub-Catchments

Sub-Catchment	Total	Forest	Unit: km ²			
			Transitional woodland and shrub	Rangeland	Arable land	Others
Berta	2,285	782	456	835	183	29
Lower Coruh	1,781	1,270	188	267	38	18
Middle Coruh	2,594	992	222	671	518	191
Oltu	5,023	704	700	2,532	711	376
Tortum	2,039	288	273	924	360	193
Upper Coruh	6,522	365	527	4,123	999	509
Total	20,244	4,402	2,365	9,352	2,808	1,316

Source: JICA Study Team based on Landsat photo images.

The forest area is mainly found in the lower and middle reaches of the Coruh River, the whole of Berta River catchment and part of the middle reach of Oltu River. On the other hand, agricultural lands extend mainly over the plains in the upper reaches of the Coruh and Oltu Rivers. Transitional woodland and shrub are found mainly in the middle and upper reaches of the Coruh, and parts of Tortum and Oltu Rivers, and rangeland occupies the upstream area of the Coruh and major parts of the Oltu and Tortum Rivers. (Fig. 3.3-1)

3.4 Forest Resources and Forest Management

3.4.1 Area and Conditions of the Forests

According to Landsat image analysis carried out by the Study Team, the area of Forest in the Coruh River catchment is estimated at some 440,000 ha or 22% of the total catchment area. If the area of Transitional Woodland and Shrub (e.g. degraded forest lands) is included, it exceeds 677,000 ha, which corresponds 33% of the total catchment area. On the other hand, according to OGM forest management plans the total forest area within three Provinces is about 786,000 ha. According to these figures, while the forests and woodlands (degraded forests) together make about 40% of the catchment, normal forests alone cover only 16%. Normal forests cover 28%, 13.6% and 1% of the catchment areas of Artvin, Erzurum and Bayburt provinces respectively. These figures show that the forest areas in Erzurum and particularly in Bayburt provinces are far from adequate and there is an urgent need for rehabilitation of degraded forests and expansion of forest areas by afforestation on suitable non-forest lands.

Table 3.4-1 Forest Conditions in the Coruh River Catchment

unit: ha

	Artvin			Erzurum			Bayburt			Total		
	Normal	Degraded	Total	Normal	Degraded	Total	Normal	Degraded	Total	Normal	Degraded	Total
High Forest	184,929	92,721	277,650	120,360	85,323	205,683	570	4,635	5,205	305,859	182,679	488,538
Coniferous	106,507	59,861	166,368	120,134	53,671	173,805	570	4,238	4,808	227,211	117,770	344,981
Broad-leaved	38,566	14,150	52,716	115	16	131	0	97	97	38,681	14,263	52,944
Mixed	39,856	18,710	58,566	111	31,636	31,747	0	300	300	39,967	50,646	90,613
Coppice	6,995	105,804	112,799	5,869	170,340	176,209	3,286	5,672	8,958	16,150	281,816	297,966
Total	191,924	198,525	390,449	126,229	255,663	381,892	3,856	10,307	14,163	322,009	464,495	786,504

Source: JICA Study Team based on data of MOF, 1997 and OGM regional offices of Artvin and Trabzon, 2002

High forest accounts for 62% of the forests in the catchment. Coniferous forests are dominant in the high forests with the share of 71%, followed by mixed forests with 19% and broad-leaved with 10%. The major species in the high forests are Scotch pine (*Pinus sylvestris*), spruce (*Picea orientalis*), fir (*Abies nordmandiana*), juniper (*Juniperus orientalis*) for coniferous, and beech (*Fagus orientalis*), oak (*Quercus* sp.), alder (*Alnus* sp.), aspen (*Populus tremula*) for broad-leaved forests, respectively. Coppice forests are dominated by oak species. Shrub and plant species on the forest lands also show a rich diversity throughout the Coruh River catchment (Capparis species, Rose hip, wild sainfoin sp., etc.).

The high forests and coppice are further classified into “normal (productive)” and “degraded (unproductive)” forest by crown density (canopy closure). The forests with 0-10% of crown density are regarded “degraded” and with 11-100% are defined as “normal”. Based on this definition, about 59% of the forest areas are classified as degraded and unproductive. The share of degraded forest area in the total forest by Province is: 51% for Artvin, 67% for Erzurum and 73% for Bayburt. About 37% of high forests and 95% of the coppice forests, which are normally utilized for firewood production basically for meeting local demand are degraded. The total standing volume of the productive high forest is estimated at 41 million m³ in Artvin and 20 million m³ in Erzurum. The average standing volumes per hectare are 149 m³ for Artvin and 100 m³ for Erzurum.

The Site Classes⁽¹⁾ of the normal forests in the Study Area are generally over Class III, and indicate the low potentials for wood production. In regard of the difficult site conditions on most areas, afforestation activities should be carried out under the basis of “selecting appropriate areas”.

Most of the trees in the forests of Artvin are from 31 to 50 years old, while the forests in Erzurum are even younger, and consist of trees aged from 31 to 40 years. Since the standard cutting ages of major wood species for the Study Area generally indicates 100 to 120 years, the majority of the forests in the Study Area are considered too young for harvesting, and require many years for maturing.

All the forests in the Coruh River catchment are owned by the state. However, cadastral surveys and delineation works have been completed only for a very small portion of the forests (i.e. 11.6% of the forests in Artvin and for less than 10% in Erzurum and Bayburt).

3.4.2 Forest Resources Management Activities and Achievements

(1) Management planning

Forest management activities are carried out in accordance to the Forest Resource Inventories and Management Plans prepared/renewed every 10 years by the Central Forest Management Planning Teams of OGM or by private firms on contract basis. These activities are planned and coordinated by the Management Planning Department of OGM in Ankara. Despite the prevalence of the harsh and difficult site conditions that strongly limit forest production, the majority of forests in the Study Area are still managed with the aim of production under the current management plan. There are only limited amounts of protected forests (2%) and forests assigned for protective functions (15%). However, the areas of forests assigned for protective functions (mainly for soil and water conservation) has significantly increased in the

⁽¹⁾ A classification indicating potential wood productivity. The criteria for classification regard natural conditions such as climate, soil and topography. Site Classes are described in numbers, where larger numbers indicate lower productivity.

Forest Management Plans prepared during recent years and this positive trend is expected to continue during coming periods.

(2) Forest rehabilitation and management activities

Degraded forest areas are shown as potential reforestation and rehabilitation sites in the Management Plans. AGM carries out site surveys and assessments on such areas, prepares and implements reforestation, erosion control and range improvement implementation projects for their appropriate rehabilitation and sustainable utilization. AGM undertakes erosion control and other rehabilitation activities also on non-forest lands where such measures are urgently needed.

Afforestation activities undertaken with fast growing tree species (mainly poplar) by villagers have also been supported by low interest credit by MEF/AGM. 71 persons established such plantations of 180 ha in Erzurum, by receiving TL. 45 billion credit assistance from AGM during the last 10 years.

(3) The development and management of National Parks and other protected areas

Awareness and expectations in the region communities for conservation, sustainable management and appropriate utilization of the rich biological diversity, wildlife and landscape resources have shown a significant increase during recent years. Under MEF, the General Directorate of Nature Conservation and National Parks (DMPG) is the main government agency responsible for undertaking of these activities. Existing protected areas in the Study Area of which are established and managed by the DMPG are shown below. Besides these sites, there are also a number of candidate areas (e.g. Tortum Lake Area in Erzurum, Karcal Mountain, Murgul Valley Areas in Artvin) for which assessment and establishment works are continuing.

Table 3.4-2 Existing Protected Areas in the Coruh River Catchment

No	Name of the area	Location	Status	Area (Ha.)
1.	Karagol-Shara National Park	Artvin-Savsat	National Park	3,766
2.	Hatilla National Park	Artvin	National Park	17,104
3.	Camili Efeler Ormanı	Artvin-Borcka	Nature Reserve	1,453
4.	Camili-Gorgit	Artvin-Borcka	Nature Reserve	490
5.	Karagol-Nature Park	Artvin-Borcka	Nature Park	368
6.	Coruh Valley Wildlife Conservation Area	Artvin-Yusufeli	Wildlife Conservation Area	21,821
7.	Oltu Wildlife Conservation Area	Erzurum-Oltu	Wildlife Conservation Area	5,400
8.	Vercenik Mountain Wildlife Conservation Area	Erzurum-Ispir	Wildlife Conservation Area	50,435
9.	Pazaryolu Wildlife Conservation Area	Erzurum-Pazaryolu	Wildlife Conservation Area	20,326
TOTAL			2 National parks, 2 Nature reserves, 1 Nature park, 4 Wildlife conservation areas	20,870 1,943 368 97,982
				121,163

Source: MEF

(4) Nursery

There are six nurseries established in the Study Area and its vicinity: two are in Artvin (Harmanli, Susuz), three are in Erzurum (Erzurum, Horasan, Sarikamis) and one is in Bayburt.

The seedling production capacities of these nurseries ranges from 1,000,000 seedlings per year at Harmanli nursery up to 5,000,000 seedlings per year at Bayburt nursery. However, the actual production has been far below the production capacities ranging from 1/3 to 1/20 of the capacities in all nurseries. This is due to obsolete facilities, inadequate maintenance, insufficient budget, and decrease in demand due to the stagnation of forestry activities. Interviews with local officers of the OGM indicated that among the numerous factors inducing stagnation of forest activities, budget deficiency was the largest problem. Furthermore, research activities such as introduction of new species or adaptability of tree species to devastated land are hardly done.

3.4.3 Forest Products

(1) Wood products

The production of industrial wood in Artvin decreased from 176,600m³ in 1996 to 92,400m³ in 1999. On the other hand, production of fuel wood shows no tendency to increase or decrease with the average production of some 145,000 m³ during the same period. Although wood production in the other Provinces in the Study Area is not recorded, the annual fuel wood production in Bayburt is reported to be around 1,500 sters on average (estimated as nearly 1,000 m³). However, considering illegal cutting which has been reported to be practiced, the actual consumption of fuel wood is thought to be more than the reported production amount.

On the assumption that the monthly fuel wood requirement per family is 25 sters, and that consumption of fuel wood occurs when the monthly average temperature drops to 10°C or less, the estimated annual average fuel wood consumption of the Study Area reaches more than 3,000,000 m³. On the other hand, a rough estimation of the increment of the standing volume of coppice is less than 200,000 m³/year. Although the estimation of consumption will vary largely with the assumptions used, it is obvious that the consumption amount largely exceeds the amount of increment (annual demand/increment ratio calculated from the estimations is less than 1%).

Insect damage is one of the problems for the forests in the Study Area, since great amounts of unexpected harvest due to this damage is reported in Artvin. Unexpected harvest in Artvin due to insect damage, once decreasing in 1998, has adversely increased up to 42% of the total wood harvest. Unexpected harvest due to other factors such as storm damage and forest fires is about 20% of the total unexpected harvest of the three Provinces of the Study Area and also influence the condition of the forests.

(2) Non Wood Forest Products

There is a variety of Non Wood Forest Products (NWFPs) in the Study Area, though in relatively small scale. Although differing in value, major NWFPs in terms of production includes rose hip, cornelian cherry and rhododendron flowers. In addition, the production and utilization of ‘kapari (*Capparis ovata*)’ is also seen in the Study Area although statistical information was not available.

Table 3.4-3 Non Wood Forest Products Produced in the Study Area

Province	unit: kg/year									
	Bay-leaf	Thyme	Linden	Mushroom	Rose hip	Cornelian cherry	Black berry	Terebinth tree	Rhodo-dendron flowers	Others
Artvin	600	-	60	-	805	1,400	-	-	11,000	-
Erzurum	-	75	100	2,388	34,498	31,660	50	2,500	N.D	11,250
Bayburt	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
Total	600	75	160	2,388	35,303	33,060	50	2,500	11,000	11,250

Source: 1997 Village inventory; SIS and OGM

3.5 Agriculture

3.5.1 Cultivated Area and Main Crops

The total cultivated area for the three provinces, Artvin, Erzurum and Bayburt is 308,798ha (2000), where 62% of which or 193,000 ha are by cereals such as wheat and barley, followed by fodder crop (18 % of the total). The majority of these crops are cultivated in the Provinces of Bayburt and Erzurum, which are located in the middle and upper reaches of the Coruh River. In Artvin, which is located in the lower reaches, fruits centering on hazelnut, and tea occupy 42% of the total cultivated area, followed by cereals (31%) and fodder crops (17%). Artvin also has the largest share of planted area for vegetables among the three Provinces.

Table 3.5-1 Cultivated Area by Crop Categories as of 2000

Category	Province	Artvin		Erzurum		Bayburt		Total	
		Area	%	Area	%	Area	%	Area	%
Cereals		11,309	31.0	150,810	69.8	30,882	55.3	193,001	62.4
Pulses		917	2.5	11,299	5.2	3,596	6.5	15,812	5.2
Industrial & oil crops		25	0.1	9,658	4.5	1,470	2.7	11,153	3.6
Tuber crops		1,366	3.7	6,935	3.2	1,399	2.4	9,700	3.1
Fodder		6,071	16.6	34,819	16.0	17,289	30.8	58,179	18.9
Vegetables		1,633	4.6	1,630	0.8	1,261	2.2	4,524	1.5
Fruits, olives, tea, etc.		15,179	41.5	1,183	0.5	67	0.1	16,429	5.3
Total		36,500	100.0	216,334	100.0	55,964	100.0	308,798	100.0

Source: Prepared based on the Agricultural Structure, 2000, SIS

The yields of major crops are generally lower than the national average. The yield of wheat, which is the main product of the area, is 1.1 tons/ha, which presents only 48% of the national average. While the decrease of production of major crops during the past decade has occurred due to decrease of cultivated area, there has been very little improvement of yield per hectare during this period. The total production value of the major crops for the three provinces is TL.

93,176,617 million for the year 2000, 55% of which are produced in Erzurum, followed by Artvin with 40%. On the other hand, the production of Bayburt amounts to only 5% of the total.

3.5.2 Agricultural Features by Sub-Catchments

Each of the Sub-Catchments in the Study Area may be characterized in terms of type of agriculture as follows:

Upper Coruh (UC)

The UC Sub-Catchment is dominated by relatively large-scale agriculture. The main crops cultivated include wheat, barley and fodder crops. Wheat production comprises 43% of the total of the Coruh River catchment and 13% of the total of the three Provinces. Fodder crop production accounts for 70% of the Coruh River catchment and 28% of the total of the three provinces. Recently, strawberry cultivation with mulching and irrigation has been introduced through a project implemented by TEMA under the financial cooperation of GTZ.

Middle Coruh (MC)

Crops are more diversified in the MC Sub-Catchment. The important crops are cereals followed by fruits, vegetable, tuber crops and fodder crops. Yusufeli District has the largest agricultural area in Artvin province, accounting for 50% of the planted area of wheat and barley, and 30% each of tuber crops, dry beans, vegetables and fodder crops. This District is also a main production area of rice. However, about 40% of the total agricultural land area will be submerged in the future due to the influence of dam construction in Yusufeli.

Tortum (TR)

The TR Sub-Catchment also produces various kinds of crops. Cereals are the most important crops, followed by tuber crops, fodder crops, and vegetables. The planted area of maize shares 50% of the Erzurum Provincial total.

Oltu (OL)

The OL Sub-Catchment mainly produces cereal crops such as wheat and barley, and fodder crops. The production of tuber crops is also large, having 32% of the total production of the catchment.

Berta (BT)

A wide range of crops including fruits, vegetables and tuber crops are produced by small-scale farmers in the BT Sub-Catchment. 50% of the total planted areas in Artvin Province are in Ardanuc District.

Lower Coruh (LC)

The LC Sub-Catchment produces various crops such as fruits, vegetables, tuber crops and beans. The planted area of fruits including tea and hazelnut accounts for 23% of the whole catchment. Furthermore, the planted area of maize shares 70% of the whole catchment.

3.5.3 Agricultural Management

Wheat, which is one of the major crops in the Study Area, is grown both in the summer cropping season (planting: May-Jun., harvest: Sep.-Oct.) and in the autumn/winter cropping season (planting: Nov.-Dec, harvest: May). Since vegetables are easily damaged by frost in general, open culture is limited to the summer cropping season. Since frost occurs from October to May, facilities such as greenhouses are indispensable to prolong growing period of summer vegetables such as cucumber, tomatoes, and green pepper, in early spring and late autumn. Furthermore, although summer is the suitable season for cultivating most crops, rainfall is scarce. Thus for stable production, watering is indispensable.

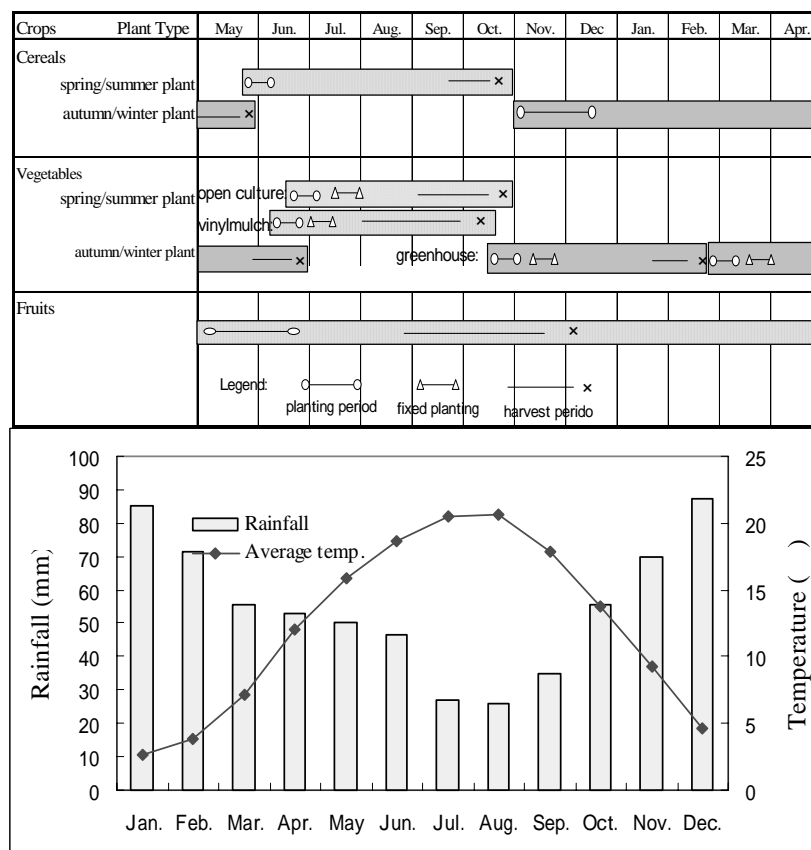


Fig. 3.5-1 General Cropping Season in the Study Area

The usage of chemical fertilizers as of 2000 is 31.9 kg/ha in Artvin Province, followed by 19.7 kg/ha for Erzurum and 13.7 kg/ha for Bayburt. These usages are all below the national average. The small amount of fertilizer application, coupled with infertile soils may be one of the reasons for lower yield of major crops.

The greenhouses in the Study Area have been developed mainly for vegetable production. The scale of greenhouses averages some 318 m², and tends to be larger as it approaches the lower catchments. The Districts where greenhouses are well developed correspond to the areas having irrigation facilities. Many of the greenhouses established are dependent on ORKOY credit.

3.5.4 Irrigation

Two organizations (GDRS and DIS) are involved in the irrigation programs in Turkey. GDRS is the responsible agency for development of small-scale irrigation facilities smaller than 500 liter/sec. After construction is completed by GDRS, the irrigation facilities are transferred to the Muhtars and the villagers become responsible for operation and maintenance. However, GDRS does not provide any technical extension services including advice on operations and maintenance for irrigated agriculture, and MARA does not have any responsibility for construction of irrigation facilities. Therefore, there are no agencies responsible for the extension of irrigation techniques.

Many streams flow in the Study Area. Existing irrigation facilities utilize these streams and water springs as their sources. In the Study Area, GDRS constructed irrigation facilities such as intake structures and main canals during the period from the 1980s to mid-1990s, but these have generally not been properly maintained and are now becoming less functional. Concrete canals may be damaged, and earth canals lose large amounts of water through seepage. Insufficient and unreliable supplies of irrigation water seriously decreases the areas effectively irrigated thus decreasing crop production and limiting the efficient usage of the limited areas of cultivable land.

On the other hand, GDRS in cooperation with ORKOY is implementing small-scale irrigation facilities. The scope of small-scale irrigation facilities managed by ORKOY is under 4 liter/sec with a pond capacity of up to 300 tons and an irrigation area of under 50 ha. GDRS is in charge of constructing irrigation facilities and primary arterial water canals, and ORKOY is responsible for developing intake facilities from the water canals to the respective farm households.

3.5.5 Marketing

Marketed amounts of agricultural products produced in the Study Area are limited to a small extent. For example, the 403 villages within the Coruh River catchment in Erzurum Province, which is a major production area for cereals, sold only 10% of their production through cooperatives. The factors making marketing difficult include: long distance from major markets, poor conditions of roads, difficulty in securing stable supply amount, inefficient marketing systems such as collection and shipping, and problems in quality of products as market merchandise.

The farm gate prices of cereals and fruits do not fluctuate much throughout the year in the Black Sea region (including Artvin and Erzurum). On the other hand, the price of vegetables largely rises in the off-farm season, which is from November to May.

Table 3.5-2 Farm Gate Price of Major Products

	2001						2002						Ave.
	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	(2001)
Cereals	3,191	3,353	3,407	3,565	3,743	4,159	4,339	4,586	5,062	5,119	5,323	5,421	3,378
Vegetables	5,426	6,596	3,916	4,358	6,532	6,814	7,332	8,715	10,213	11,061	5,525	8,393	4,760
Fruits	4,358	4,361	4,363	3,810	3,691	4,169	4,383	4,293	4,365	4,256	4,009	4,213	3,776

Source: Prepared by farm gate price data of MARA Regional Office, Artvin, Erzurum, 2003

Erzurum has the only vegetable-fruits wholesale market (Erzurum Hali) in the Three Provinces. Some features of trading in the Erzurum Hali are:

- Annual average handling amount: 15,000 tons
- Seasonal change in handling amount: 1,200 tons for May–July, 2,200 tons for August–October, 700 tons for November – April.
- Wholesale price: The price differential reaches two to three times. Rises steeply during November–April and decreases during July – August.
- Merchandise resources: 80 to 90% of the fruits and vegetables come from other Provinces. The rate of products supplied by the farmers in Erzurum Province is only about 10%.

The fruits and vegetables handled in Erzurum Hali are distributed within and outside Erzurum and also reach Bayburt, where there is no wholesale market for fruits and vegetables. The increasing demand for fruits and vegetables has been recently outgrowing the capacity of the present wholesale market in Erzurum. This has encouraged the City of Erzurum to build a new wholesale market of which is currently under construction. Artvin Province located in the LC Sub-Catchment, has no wholesale market. The largest supermarket in the Province (MODI supermarket) obtains 70% of the fruits and vegetables from the adjacent Rize Province. Moreover, from autumn to winter, the price of vegetables rises up to more than double of the price in summer.

3.5.6 Agricultural Credit

ORKOY assistance for farm households in forest villages mainly consists of credit activities. The aim is to improve the income of farming households by increasing agricultural production, to alleviate the negative pressure on natural resources, and to reduce the outflow of the rural population. Financial assistance consists of individual credit and cooperative credit. Credit provided by ORKOY is focused on cooperative credit, where the ripple effect is large. The total amount of credit provided for forest villages throughout the country for FY2002 was about US\$7,880,000 (13 trillion TL). The total amount of credit provided in Artvin, Erzurum, and Bayburt provinces in the Study Area was about 4 % of this total amount

or US\$2,360,000 (390 billion TL). The annual interest for credit provided by ORKOY was 10 % (actual credit for FY2002).

The interest rate of the Agricultural Bank of Turkey (TCZB) fluctuates due to monthly inflation, and the annual interest rate for FY2002 alternated between 65% to 75%. The farmers in the forest areas may not benefit from the credit of TCZB. This is because they can not provide any security for the credit to be extended. On the other hand, there is Agricultural Credit Cooperative (TKK). TKK is an organization of a nationwide network, and the interest rate is about 30 to 35% (FY2002). Farmland and other collateral are required by agricultural and private banks loans, but individual credit extended by ORKOY does not require collateral. However, many farmers are forced to rely solely on credit from ORKOY since the majority of farmers do not have formal land ownership rights because a survey on land ownership rights (land registration) of forest villages has not been conducted.

In the case of cooperative credit, loans of up to 90% of business costs are provided. Another characteristic of this credit is that goods and commodities are accepted as repayment for both individual and cooperative credit as well as cash. Agricultural production activities that are eligible for ORKOY credit are beekeeping, livestock, fisheries, crop cultivation (vegetables, olives, mushrooms, etc.), development of organic farming, small-scale irrigation, construction of greenhouses, and others.

3.6 Livestock and Rangeland Management

3.6.1 Herd size, composition, and production

(1) Livestock herd size

Nearly all farm families in the Coruh River catchment own some livestock. More than half of the villages in the catchment report livestock as the primary source of income. The number of animals has declined in all three Provinces for all types of livestock. The herd size has declined from 321,043 livestock units (LUs) in 1991 to 216,273 LUs in 2001.

Table 3.6-1 Changes in the Size of Livestock Herd

		Artvin	Erzurum*	Bayburt	Total catchment
1991	Sheep	165,780	314,261	248,753	728,794
	Goat	27,710	32,903	7,580	68,193
	Cattle	104,823	186,439	87,970	379,232
	LUs				321,043
1995	Sheep	102,128	213,455	122,565	438,148
	Goat	15,041	30,236	2,818	48,095
	Cattle	89,946	210,950	62,951	363,847
	LUs				320,524
2001	Sheep	70,965	84,095	100,432	255,492
	Goat	10,660	24,716	2,481	37,857
	Cattle	64,778	163,729	62,990	291,497
	LUs				216,273

Note: * The value for Erzurum refers to 1992 for the first group of entry.
Source: Provincial Agricultural Offices of Artvin, Erzurum and Bayburt

Cattle have always been the dominant livestock type and this dominance has increased in recent years. The sheep/goat herd in the Study Area is small, in terms of LUs, and its size has declined steadily over the last decade. The share of sheep and goats in livestock is smallest in Artvin, intermediate in Bayburt and relatively more significant in Erzurum. The size of sheep/goat herd in 2001 is less than half of what it was in 1991. The decline is similar in all three Provinces in the Coruh River catchment.

The decline in sheep/goat herd size is a response to a number of factors. The change in demand favors beef over mutton and cow milk over sheep/goat milk. A large part of mutton output was traditionally exported to Middle Eastern countries, and the markets have declined with the problems on the Iraqi border on the south. This has caused a decline in the mutton price and the farmers have reduced the size of their sheep herds.

Another factor responsible for declining sheep/goat herd size is the closure of some areas of pastures in the Eastern and Southeastern Anatolia Regions for security reasons during the last decade. The farmers reduced the sheep herd dramatically when their access to pastures was curtailed. In cattle, cut hay and forage production have been substituted for this loss of pastures but such shift is not possible for sheep/goats.

(2) Changes in herd composition

Significant changes have occurred in the composition of cattle herds. Available data on the breed composition of cattle herds show a large decline in the number of native cattle. The available data for Bayburt in 2001 shows that there are nearly no native cattle left. The situation is similar in Artvin and to some degree also in Erzurum.

Cross breeding programs using both natural and artificial insemination of native cows have resulted in conversion of the native cattle herds into cross breeds at various crossing levels. The number of pure-breed cattle has fluctuated during the last decade. During the years when there were large subsidized government programs for imports and distribution of purebred (1995-1997), the number of pure breed cattle increased. Many farms, which could not achieve the required productivity levels, lost money and sent the pure bred breeding stock for slaughter.

(3) Herd size and production

Cattle is the dominant source of both milk and meat production. In 1998, cattle produced 88.6% of all milk and 61.5% red meat production in Turkey⁽¹⁾ and these shares are increasing steadily. Cattle production systems may be considered to vary from a wide span covering extensive pasture based systems with low productivity to intensive in-stall production systems. The differences in productivity between the extensive pasture based systems and intensive practices are a result of large differences in productivity parameters. Productivity in livestock

⁽¹⁾ The Report of Specialized Committee of Eighth Five-Year Development Plan. pp.49-50.

is a result of a number of interrelated parameters including the proportion of productive cattle in the herd and production per head of productive cattle. The proportion of productive cattle, in turn, is affected by the livestock practices, breed types, and feeding systems. All of these differ largely between extensive and intensive livestock practices.

The milk yield from the local cows under the traditional pasture based systems is estimated to be 816 liters per year, while that of pure breed cows under intensive management is estimated at 4,080 liters per year. Average milk production at present in Turkey is 2,002 liters per cow⁽¹⁾. Also, the proportion of milking cows in the herd varies between intensive and pasture based systems. This results from intermediate parameters on: age at first pregnancy; length of period of which the cow remains dry; and other production related parameters.

There are large differences in meat production between the two different systems, although the difference in this parameter is not as large as that of milk yields. Average carcass weight of cattle slaughtered was 158 kg in Turkey in 1998. The carcass weight of native cattle is estimated to be around 110 kg and over 250 kg for purebred cattle. Development of cattle under extensive systems is very slow due to poor breed, insufficient feeding and lack of veterinary service. Cattle reach slaughter weight in three years of age in traditional systems. In contrast, cattle raised in intensive systems reach mature weight at around 20 months. These differences in herd parameters lead to different off-take rates and thereby to large differences in herd productivity.

The intensive systems are more efficient in converting the feed base into meat and milk production. The differences in feed conversion efficiency can have a very large impact on total feed demand. Furthermore, the type of forage demanded is also different between the different systems. The only source of feed under the extensive systems during summer is pasture. Animals are put out to pastures as soon as snow melts and are kept there until it begins to snow again. Intensive systems, in contrast, are totally dependent on cut hay and concentrates. Further information on the variants of these systems and their feed demand is given in the following paragraphs.

For sheep, all farm types rely on pastures. It is not possible to raise sheep without grazing. Factors such as quality of pastures, feeding practices during the winter, veterinary care and supplemental feeding during grazing period lead to some difference in productivity. However, the room for productivity improvements in sheep is more limited. Given the more intensive use of pastures in sheep production, the static or declining herd size in sheep/goats will help reduce the pressure on pastures.

⁽¹⁾ SPO, Livestock Sector Report, Ankara 2001

3.6.2 Productivity of Pastures and Pasture Hay Production

(1) Productivity of pastures and meadows

Livestock production practice, forage production, and use of pastures are closely interrelated. All forage production in the Coruh River catchment is self consumed with very little specialization in forage production for the market. Almost all forages marketed are shipped from Erzurum and Bayburt to the Black-sea Coast.

The livestock population has declined in all parts of the catchment over the last 20 years. Still though, overstocking and overgrazing is reported for all parts of the catchment. The pastures are reported to provide only 60 to 80% of the feed requirements for the existing herd during the grazing period that is actually practiced.

This situation of degraded pastures due to overgrazing does not seem to be the case in all parts of the catchment. Some villages in the catchment have excess grazing resources. These are rented to nomadic herders who migrate from adjacent regions in the grazing season.

(2) Pasture and meadow hay production

The area of pasture and meadows in the Study Area is about 716,000 ha and 66,000 ha respectively. The production of hay from the given area depends on pasture quality. Fieldworks have indicated fairly accurate results on hay production in different pastures.

Table 3.6-2 Pasture and Meadow Area

Province	Pasture (ha)	Meadows (ha)
Artvin	98,860	25,729
Bayburt	216,362	31,338
Erzurum	400,753	9,070
Total	715,974	66,137

Note: Data presented are for the Coruh River catchment area only.

According to the Rangeland Survey undertaken by MARA Research Institute of Erzurum, four levels are identified for the existing conditions in the rangeland. In Berta Sub-Catchment, rangeland in very good or good condition is dominant, while the rangeland in Oltu and Tortum Sub-Catchment is relatively in poor quality.

Table 3.6-3 Area Distribution under Different Quality Levels of Rangeland

Sub-Catchment	Rangeland			
	Range1 (Poor)	Range2 (Moderate)	Range3 (Good)	Range4 (Very Good)
Berta	3%	9%	49%	39%
Lower Coruh	4%	33%	42%	20%
Middle Coruh	9%	25%	40%	26%
Oltu	15%	33%	39%	13%
Tortum	13%	29%	48%	10%
Upper Coruh	9%	38%	38%	15%
Whole Catchment	10%	30%	41%	19%

Source: Rangeland / Pasture Survey by MARA Research Institute of Erzurum

The dry matter yield in each rangeland class is estimated at around 500 kg/ha for “Poor”, 800 kg/ha for “Moderate”, 1200 kg/ha for “Good” and 1500 kg/ha for “Very Good”. Based on the area given above and estimated productivity, the total dry matter production of pasture hay in the Coruh River catchment is estimated at around 760,000 tons. Only parts of these grasses are palatable and would be actually consumed by the grazing animals. This share varies depending on the pasture quality. The share of this part increases with the quality of pastures and may be assumed at between 50% to 70%. Meadow hay obtained from a single cut is reported to vary from 3.5 to 5 tons/ha. Assuming an average of 4 tons, the production of cut hay from pastures is 264,000 tons. In addition to the cut hay, there is some hay production during early spring and late autumn grazing. This is disregarded at this stage.

3.6.3 Pasture Management

One quarter of the land area of Turkey is regarded as pastures. The poor state of pastures has been an important national concern for decades. Overgrazing has also been long recognized as the main cause of degradation. After decades of debate, a rangeland law was enacted in 1998. The law gives sweeping powers to the Ministry of Agriculture and Rural Affairs (MARA) to delineate and manage the pastures in a sustainable manner. This authority is given to the Ministry of Environment and Forestry for rangelands located around forest villages and in and above forestlands. The application of the law requires three steps: namely, identification, delineation and recording of the pasture area. Delineation is to be done on 1/5,000 scale maps. Less than 5% of the pasture area has been delineated as required by the law between 1998 – 2000, and it will take a considerable amount of time for completion at the present pace.

There are two critical steps following the registration. These are determination of the carrying capacity of the pastures and allocation of this capacity to individual farmers. Carrying capacity is not a static concept and it will vary with annual climatic changes as well as in response to better management practices. The law has no provisions for periodic review. The MARA is asked to take the necessary steps for the effective implementation of the law. Once the carrying capacity is determined, this needs to be allocated to individual farmers. Under the Law, all allocations carry a charge even if the farmer who receives the grazing rights has no animals. These revenues are kept in a special account that may be used only for pasture improvement. The grazing fees will be determined by the local officials in the light of local conditions.

3.6.4 Apiculture

Apiculture is one of the income sources in rural households in the Coruh River catchment. As of 1997, apiculture is seen at 598 villages or 72% of the total villages in the catchment. Total number of beehives in the catchment was 94,876.

Table 3.6-4 Number of Villages and Households with Beehives by Type of Apiculture Activity and Beehives

Province	Locality	Nos. of village	Nos. of village doing apiculture	Fixed apiculture				Migrating apiculture		Total beehives
				Clay beehives		Scientific beehives		hhs*	beehives	
				hhs*	beehives	hhs*	beehives			
Artvin	Coruh catchment	251	206	563	4,442	1,552	23,508	296	12,338	40,288
	Province Total	311	258	645	5,165	1,853	30,882	339	15,045	51,092
Erzurum	Coruh catchment	403	289	105	893	1,395	28,142	17	1,605	30,640
	Province Total	1,046	461	137	1,177	1,917	40,649	177	8,596	50,422
Bayburt	Coruh catchment (Province total)	175	103	9	124	502	17,642	47	6,182	23,948
Coruh catchment total		829	598	677	5,459	3,449	69,292	360	20,125	94,876
Provinces total		1,532	822	791	6,466	4,272	89,173	563	29,823	125,462

Note: *hhs; households

Source: Village inventory 1997, Artvin, Erzurum, Bayburt; SIS

In the Coruh River catchment, Artvin is the most active in apiculture of the three Provinces. In Artvin Province, apiculture activity is seen at 206 villages or 82% of the total villages, with 40,288 beehives. In Erzurum 289 villages or 71% of the total villages in the catchment have apiculture activity with 30,640 beehives, and in Bayburt, 103 villages practice apiculture with 23,948 beehives.

Migrating apiculture is more common in Artvin, while fixed apiculture with scientific or modern beehives is more popular in Erzurum. In Artvin, traditional clay beehives are still used in significant amounts. Apiculture activity in the Coruh River catchment has been promoted by various agencies such as MARA and MEF with credit facilities and technical assistance, and by NGOs including TEMA with financial assistance from foreign organizations. It is noteworthy that the pure Caucasian Bee (*Apis Mellifera Caucasia*) that thrives naturally in Borcka and Savsat Districts of Artvin has been becoming popular due to its character of being hardworking and having high production capacity.

3.7 Infrastructure

3.7.1 Road conditions

Only 5.7% of roads of the three Provinces are paved in asphalt or concrete. The rest are unpaved but generally stabilized and graded. The density of the road network in the three Provinces is 3.18 m/ha, which is almost equivalent to the national average of 3.74 m/ha. The rate of road improvement is much higher in Artvin than in the other two Provinces. On the other hand, Erzurum Province, being very large with many restrictions in geographical features, has a road network density of only 2.49 m/ha. Regarding village roads under the administration of GDRS, the ratio of road extension per village is 11.8 km in Artvin, 8.2 km in Bayburt, and 6 km in Erzurum. The same ratio for Turkey is about 7.8 km, indicating that Erzurum is still behind the national standard.

Table 3.7-1 Province Roads Conditions

Province	Asphalt road	Concrete road	Stabilized road	Graded road	Others	unit: km
						Total extension
Artvin	96	123	3,046	426	1,447	5,138
Erzurum	386	0	3,318	2,603	633	6,940
Bayburt	164	0	905	365	83	1,517
Total	646	123	7,269	3,394	2,163	13,595
	4.8 %	0.9 %	53.5 %	25.0 %	15.9 %	100.0 %
Turkey	85,563	1,717	131,817	60,623	11,497	291,217
	29.4 %	0.6%	45.3 %	20.8 %	3.9 %	100.0 %

Source: Service Implementations General Inventory; GDRS, 2002

In the Study Area, 336 villages, which correspond to 41% of the total number, have distances of more than 100 km to the Province centers. In Artvin, the ratio of villages located further than 100 km from the Provincial center is 12%, while the ratios reach 76% in Erzurum. On the other hand, 93% of the villages in Bayburt are located within 50 km from the Provincial center. Obstructions for road transportation often occur, particularly in winter. The most critical obstruction is snow, followed by flooding and consequent road damage. These obstructions often occur for non-asphalt roads and interfere with the access to trunk roads from forest villages, preventing villagers from marketing farm products and carrying on daily activities.

3.7.2 Drinking Water

For drinking water facilities, 81% of the 674 villages in the Study Area have facilities such as water service facilities and wells. However, there are 30 villages that have neither of these facilities, 53% of which are distributed in Artvin Province. There are many regions with steep inclination in Artvin, scattering the villages in various places on hillsides where water resources are limited. This limits the improvement of drinking water facilities compared with the other Provinces.

Table 3.7-2 Drinking Water Facility Conditions

Province	Locality	Drinking water facility	Non-drinking water facility
		No. of villages	No. of villages
Artvin	Coruh catchment	190	16
	Province total	230	16
Erzurum	Coruh catchment	333	13
	Province total	913	41
Bayburt	Coruh catchment (Province total)	151	1
Total Coruh River catchment		674	30
Province total		1,294	58

Source: Prepared from Village Inventory, Artvin, Erzurum, Bayburt, 1997; SIS

According to the Village Inventory of 1997, there are 164 villages in Erzurum, which suffer from water pollution. This number corresponds to 15% of the total villages in the Province. In

Artvin and Bayburt, water pollution is occurring in 8% (25 villages) and 12% (22 villages) of the villages, respectively. The water service facilities in forest village are reservoirs, which collect river and groundwater in tanks, and use it with natural flow. Individual farmers also dig their own wells on their properties.

The forest villages in the Study Area suffer from severe scarcity of drinking water in the summer season. This is due to the seasonal bias of precipitation with less rainfall in summer, and the increase of village population by increasing tourists and migrants returning to their villages for vacation or labor for the harvest season.

3.7.3 Other Infrastructures

(1) Electricity and energy

Almost all of the villages in the Study Area have access to electric power supply. Accordingly, the ownership of electric appliances such as television and radios is also considerably high. The rate of households with access to electricity is also generally high.

Table 3.7-3 Electricity Usage in the Study Area

	No. of villages with access to electricity	No. of settled households	No. of households using electricity	Rate of household using electricity (%)
Artvin	251	22,453	20,501	91.3
Erzurum	399	26,677	26,324	98.7
Bayburt	175	9,265	9,037	97.5
Total	825	58,395	55,826	95.7

Source: Prepared from Village Inventory, Artvin, Erzurum, Bayburt, 1997; SIS

Fuel wood is the main energy source for heating and cooking in the Study Area, as nearly 85% of the villages (709 villages) in the Study Area mostly depend upon fuel wood for heating. The remainder is dominated by coal and cow dung.

(2) Schools

There are 1,615 Elementary Schools in the three Provinces (FY1997/98). The number of junior High Schools is significantly less than elementary schools, as only 45 are located in the three Provinces. Both Elementary Schools and High Schools are highly concentrated in Erzurum, where nearly 75% of them are located. The number of vocational schools in the three Provinces is 65. The tendency of distribution for vocational schools is somewhat different from the others, as 34% of them are located in Artvin, while Erzurum has about 54%. Due to this physical distribution, the forest villagers can attend Elementary Schools in or near their villages, but must go to urban areas for further education. This is one of the factors causing to out-migration of younger generations, as attending High-Schools from forest villages is often difficult in terms of time and transport.

(3) Health care

There are 117 clinics and 178 sanitary stations in the Study Area. The ratio of villages and these medical facilities in the Study Area is highest in Artvin, reaching 47 %. This is followed by Bayburt and then by Erzurum. There are no hospitals capable of executing operations, thus patients in the Study Area must be transported to the general hospital in Erzurum city for such treatment. although there are two hospitals in Erzurum city, transportation is assumed to be difficult as road failures frequently occur due to natural disasters and winter snow.

Table 3.7-4 Number of Clinics and Sanitary Stations

		Clinics		Sanitary stations		Total medical facilities	
		No. of facilities	Rate of villages with facility (%)	No. of facilities	Rate of villages with facility (%)	No. of facilities	Rate of villages with facility (%)
Artvin	Province	49	15.7	91	29.2	140	45.0
	Study Area	42	16.5	77	30.3	119	46.8
Erzurum	Province	130	12.4	134	12.8	264	25.2
	Study Area	50	12.4	66	16.3	116	28.7
Bayburt	Province	25	14.2	35	20.0	60	34.2
	Study Area	25	14.2	35	20.0	60	34.2
Total	Province	204	13.1	260	16.9	464	30.2
	Study Area	117	14.0	178	21.4	295	35.4

Source: Prepared from Village Inventory, Arvin, Erzurum, Bayburt, 1997; SIS

3.8 Institutional and Legal Framework, and Extension

3.8.1 Institutional Framework

(1) Main government agencies involved in watershed rehabilitation

The Ministry of Environment and Forestry (MEF), which was organized in May 2003 by merging the former two ministries of Forestry and Environment, is the main government agency working on watershed rehabilitation in Turkey. These activities are mainly carried out by what was the four General Directorates of the former Ministry of Forestry. Other agencies that are working on similar activities include: the Ministry of Agriculture and Rural Affairs (MARA); the General Directorate of Rural Services (GDRS); and the General Directorate of State Hydraulic Works (DSI).

The main activities of MEF concerning watershed rehabilitation along with its concerning agencies are:

- i) Planning and implementation of relevant rehabilitation activities (e.g. erosion control, reforestation, range improvement) in forest areas and other state lands with urgent needs for such action by the General Directorate of Afforestation and Erosion Control (AGM).
- ii) Protection, regeneration and improvement of forests for sustainable utilization of its products by the General Directorate of Forestry (OGM).

- iii) Designation, establishment and management of protected areas, and conservation and management of wildlife resources by the General Directorate of Nature Conservation and National Parks (DMPG).
- iv) Supporting social and economic development of the populations in forest villages to improve relations and collaboration between the villagers and forestry organization and to facilitate conservation and sustainable development of national forest resources by the General Directorate of Forest-Village Relations (ORKOY).

As for other organizations, MARA is responsible for delineation, rehabilitation and sustainable use of the range lands outside of forest areas in the catchment; GDRS is in charge of undertaking soil conservation measures on agricultural lands, small scale civil engineering works and rehabilitation of agricultural lands in lower catchment areas; and DSI undertakes flood prevention, bank stabilization and land rehabilitation measures on lower catchment areas.

(2) Institutional structure of the Ministry of Environment and Forestry (MEF)

MEF was organized by merging the previous Ministries of Forestry and Environment, under Law no. 4856, dated 8.5.2003. The central structure of MEF is composed of the main service, consultancy and assistance. Apart from these units, there are also three connected units. Concerning the agencies responsible for watershed rehabilitation activities, AGM, DKMP and ORKOY are under the main service unit, while OGM is one of the connected units.

Due to the recent merging of the two ministries, the field level organizations of MEF is currently under reorganization. However, organizational structure is expected to consist of: i) Provincial Directorates of Environment and Forestry and their sub-units, ii) Regional Directorates of Forestry and their sub-units, and iii) Forestry Research Directorates and Forest Soil Laboratories. The division directorates (e.g. environmental conservation, afforestation and erosion control, survey and planning, nature conservation and national parks, forest-village relations division, and administrative and financial works) and the engineer units at district levels under them are expected to be under the Provincial Directorates.

(3) Situations of local institutional structures

The implementation of field activities in the Study Area is under the jurisdiction of three Regional Directorates of OGM and three Provincial Directorates of Environment and Forestry. The number of administrative and other staffs highly exceed the number of technical staffs in the Provincial levels. The number of technical staff is insufficient in all three Provinces, prominently in Bayburt. This situation is resulting in administrative and technical problems such as lack of budget and insufficient provision of extension services to the local people.

Table 3.8-1 Field Level Structures of MEF in the Study Area

	Artvin	Erzurum	Bayburt
Organizational Structure Under OGM	Forestry Regional Directorate of Artvin - Artvin Forest District Dir. - Borcka Forest District Dir. - Ardanuc Forest District Dir. - Savsat Forest District Dir. - Yusufeli Forest District Dir.	Forestry Regional Directorate of Erzurum - Erzurum Forest District Dir. - Oltu Forest District Dir. - Senkaya Forest District Dir.	Forest Chief Unit, under the Gumushane Forest District Directorate of the Forestry Regional Directorate of Trabzon.
Organizational Structure Under Provincial Environment and Forestry Directorates *	Provincial Environment and Forestry Directorate of Artvin -AGM Division Directorate -ORKOY Division Directorate -DMPG Division Directorate - Environmental Protection DD -Administrative and Financial Works DD	Provincial Environment and Forestry Directorate of Erzurum - AGM Division Directorate -ORKOY Division Directorate -DMPG Division Directorate -Survey and Project DD -Environmental Protection DD - Administrative and Financial Works DD	Provincial Environment and Forestry Directorate of Bayburt - AGM Division Directorate - - - -Environmental Protection DD -Administrative and Financial Works DD
Research Directorates, Forest Soil Laboratories	-	- Eastern Anatolia Forestry, Research Directorate, Erzurum. - Eastern Anatolia Forest Soils Laboratory Directorate.	-
Tech. Staff	54	75	3
Admin. And Other Staff	581	224	10
Total Staff	635	299	13

* Expected structure to be officially announced. Source: MEF (July,2003)

(4) Other Related Organizations and Stakeholder Institutions in the Study Area

Government Agencies: General Directorate of Land Cadastre, Ministry of Culture and Tourism (MCT), Ministry of Education (MOE) and Agriculture Bank are directly or indirectly involved and play roles in watershed rehabilitation. They have their organizational structures at both provincial and district levels in the Study Area.

Village Institutions: Main village institutions include the village headman (muhtar), elders council, village cooperatives (e.g. forest village development cooperatives, Natural Resources and Culture Conservation Associations: NRCCA). The number of existing forest village cooperatives in the three provinces of Artvin, Erzurum and Bayburt 80, 32 and 1 respectively. The Forest Village Cooperatives Union in Artvin coordinates and supports the activities of 42 cooperatives with 4,642 members. NRCCA established in few villages have not been very active up to present.

NGOs: Turkish Erosion Combating and Natural Resources Protection Foundation (TEMA) and Turkish Development Foundation (TKV) have been well known in the Study Area. TEMA has been implementing the “TEMA-MACAHEL Rural Development Project for the Conservation of Natural Heritage”, aiming to create income for the local community. It has also been implementing “The Erosion Control Project in the Bayburt Region” with GTZ.

Universities and Research Institutions: These include, Forestry Faculty of Kafkas University in Artvin and Agriculture and Veterinary Faculties of Ataturk University, Eastern Anatolia Forestry Research Directorate and Eastern Anatolia Agriculture/Range Research Institute in Erzurum.

Private Sector Institutions: These include small scale companies involved in forest products processing and trading, eco-tourism (e.g. tour operators, hotels, pensions, etc.), and in conducting erosion control, afforestation and other land rehabilitation activities on contract given by the related government agencies (MEF, GDRS, DSI, etc.).

Local Administrations: The new parliament is now discussing a decentralization law which is expected to be approved in the near future. This law is expected to reinforce the authorities of the local administrations and will also increase the roles and responsibilities of the local governments in the fields of natural resource management and watershed rehabilitation.

3.8.2 Legal Framework

At present, there is no specific Watershed Law in Turkey. Joint initiatives have been undertaken by NGOs, universities, MOF, MOE, MARA, GDRS and other stakeholders for the preparation and enactment of a Watershed Law. Studies on the draft are continuing at the Parliament. This law is expected to serve for sustainable management of watersheds as well as for improved land use and soil resource utilization in the country.

The current legal framework concerning watershed rehabilitation comprises several different laws and regulations including the Forest Law, National Afforestation Mobilization Law, National Parks Law, Forest Villagers Development Support Law, Range Law, Environment Law, Land Cadastre Law, Village Law, Organic Law, and laws for different government agencies (MEF, OGM, MARA, DSI, GDRS, etc.), as well as the by-laws, instructions and circulars issued for the implementation of the laws.

The current *Forest Law no. 6831* is one of the laws relating to watershed rehabilitation and includes descriptions concerning:

- i) Provision of forest products to forest villagers at subsidized prices
- ii) Prioritized employment of local cooperatives and individuals for forest activities
- iii) Allocation of degraded state forest land to village communities and individuals for plantation establishment and utilization
- iv) The role of state forestry organization for preventing erosion, floods and landslide problems
- v) The role of village headman (muhtar) and elders committee in protecting state forests

Other laws concerning watershed rehabilitation are as follows.

The National Afforestation Mobilization Law deals with the encouragement and involvement of relevant public institutions and agencies, local communities, individuals and private agencies in reforestation and forest rehabilitation activities on suitable degraded forest areas, non-forest state lands and private lands.

The National Parks Law deals with the establishment, planning and management of National Parks and other protected areas on forest or non-forest lands. Accordingly, catchments with special natural, historical or cultural values should be taken under the protected area status and managed according to special management plans to be prepared for this purpose.

The Law for Supporting Development of Forest Villagers deals with development support to forest village communities in order to improve their livelihood, to reduce dependency and pressure on forests and to improve relations between villagers and the forestry organization.

The Environment Law includes sections on banning of certain kinds of operations polluting the environment, requirements for environmental impact assessment, defining special environmental protection areas, and providing sanctions to prevent pollution. The EIA Regulation, under the Environment Law, defines the administrative and technical procedures for the implementation of EIA.

The Range Law, enacted in 1998, regulates activities and measures for delineation and registry of borders, and protection, improvement and sustainable utilization of range, pasture and meadowlands. The law delegates heavy responsibilities and authorities to MARA on the government side. Village communities are also expected to be involved in range conservation and management through the establishment of rangeland unions at village levels.

3.8.3 Extension

AGM, OGM, ORKOY and DMPG of MEF, the General Directorate of Organization and Support (GDOS) of MARA, GDRS, DSI and Forest Cooperatives Central Union (OR-KOOP) are the main agencies providing extension service. Concerning extension service for income generating activities such as forest product market development, milk production, handicrafts, beehives, ORKOY supports forest villagers mainly through financial support.

However, in the Study Area with the population of 156,130, ORKOY has only six personnel (four in Erzurum, two in Artvin, and none in Bayburt) capable of providing extension service. Therefore, in most cases ORKOY requests MARA, GDRS and DSI for actual extension services, but these organizations cannot always respond. Furthermore, ORKOY cannot hire external personnel such as consultants including marketing specialists or retired staff who were experts of the aforementioned agencies due to budget constraints.

3.9 Environmental Considerations

3.9.1 The Turkish Environmental Impact Assessment Regulation

Turkey's environmental legislation consists mainly of the Environment Law (No. 2872) based on Article 56 of the Constitution. The Law includes sections on banning of certain kinds of operations polluting the environment, requirements for environmental impact assessment, defining special environmental protection areas, providing sanctions to prevent pollution, promoting incentives for reducing pollution, creating an environmental fund, and securing

participation in decision making bodies such as councils and committees. The Environmental Impact Assessment Regulation under the Environment Law defines the administrative and technical procedures for the implementation of Environmental Impact Assessment (EIA) and Initial Environmental Examinations (IEE). In terms of environmental considerations, EIA plays an administrative role for regulating the environmental impacts from development activities. In relation to the present Study, transformation of forestland to areas for different use is described in Annex II of the regulations, which is a list of activities obligated to IEE.

3.9.2 Sensitive Environmental Aspects within the Study Area

(1) Protected areas

The EIA Regulations nominates various areas defined under various Laws as “Sensitive areas” and “Other areas to be protected”. These areas include National Parks, Nature Parks, Natural Monuments and Nature Protection Areas.

Table3.9-1 Sensitive Areas Located in the Study Area

Name	Location	Kind	Area
Karagol-Sahara Milli Parki	Savsat/Artvin	National Park	3,766 ha
Hatila Vadisi Milli Parki	Merkez/Artvin	National Park	16,988 ha
Camili-Efeler Ormani	Borcka/Artvin	Nature Conservation Area	1,453 ha
Camili-Gorgit	Borcka/Artvin	Nature Conservation Area	490 ha
Borcka Karagol	Borcka/Artvin	Nature Park	368 ha
Tortum Golu*	Uzundere/Erzurum	Candidate for Nature Park	-

*Note: Tortum Golu is not defined as a sensitive area as it does not have the status of “nature park”

Source: Forests and Turkish Forestry, DMPG datasheet

(2) Wildlife

As for important plant species, the Red Data Book of Turkish plants compiled by the Society for the Protection of Nature (DHKD) has 70 plant species listed for the three Provinces in which the Study Area is located. Although the Study Area is said to be rich in rare and endemic species, neither comprehensive inventories nor measures for the protection of these species have been taken by MEF.

In regard to animal species, the Study Area plays an important role as habitats for important animal species, as 5 mammal species and 13 bird species that are found in the area are identified as protected animals in reference to the Land Hunting Law (No. 3167). Furthermore, being located on one of the major birds migration routes, the Study Area is also important for birds migrating between the continents of Eurasia and Africa.

(3) Cultural and natural sites

In the Study Area, The Ministry of Culture (MOC) has registered more than 200 cultural and natural sites including 16 natural sites, 24 archeological/historical sites, 116 cultural/religious sites, and 66 administrative/military sites and others. However, the actual value and situations of many of these assets are at this point unidentified, as investigation of the respective assets

has not yet been done by MOC. As for registered sites of apparently high importance, there are six first-degree archeological sites, three first-degree natural sites, one second-degree natural site and one third-degree natural site in the Study Area.

(4) Natural disasters

Natural disasters are one of the most serious environmental problems of the Study Area. Floods are the most frequent of natural disasters, and occur twice as often as other disasters such as landslides and avalanches. During 1997, there were 22 casualties from floods. With precipitation in the Study Area being generally low, but with occasional high intensity storms, the existence of degraded forest areas and rangelands accelerate surface run-off with soil erosion causing these disasters. Intense storms also lead to the occurrence of landslides, which is another major disaster in the Study Area.

3.9.3 Other Aspects

(1) Environmental awareness of local people

Environmental awareness and/or knowledge among the forest villagers in the Study Area appears to be generally low, as demonstrated by activities such as unsustainable management of rangelands and dumping of solid waste into small streams. However, an exceptional case was observed where villagers voluntarily controlled grazing and cutting of trees near their settlements to prevent damage from landslides, indicating their strong intention in prevention of disasters.

(2) Eco-tourism

Much of the Coruh River catchment is notable for its rugged topography and beautiful scenery. Capitalizing on these resources, various tourism developments, such as the establishment of rafting tours and the use of traditional village-style houses for tourist accommodation are seen in the Study Area. The number of tourists visiting Artvin and Erzurum for year 2000 was 318,422 nationals and 26,673 foreigners, and represent only 1.6% and 3.3% respectively of the national total. Although MEF has been showing interest in the field of eco-tourism, there are no major activities being enforced for its promotion.

(3) Present plans of dam construction

The Government of Turkey may eventually construct as many as 15 major dams on the Coruh River and some of its tributaries, together with a large number of accessory structures. These dams, being constructed or planned on the lower reaches of the Coruh River, will affect one District, 79 villages and two mahalesi, affecting approximately 20% of the population of which are currently living in these areas. Some 40% of the land which produces fruit and vegetables will eventually be under water which, among other effects, strongly discourages new investments in horticultural production. The construction of these dams will also bring about significant effect to the natural environment of the area.

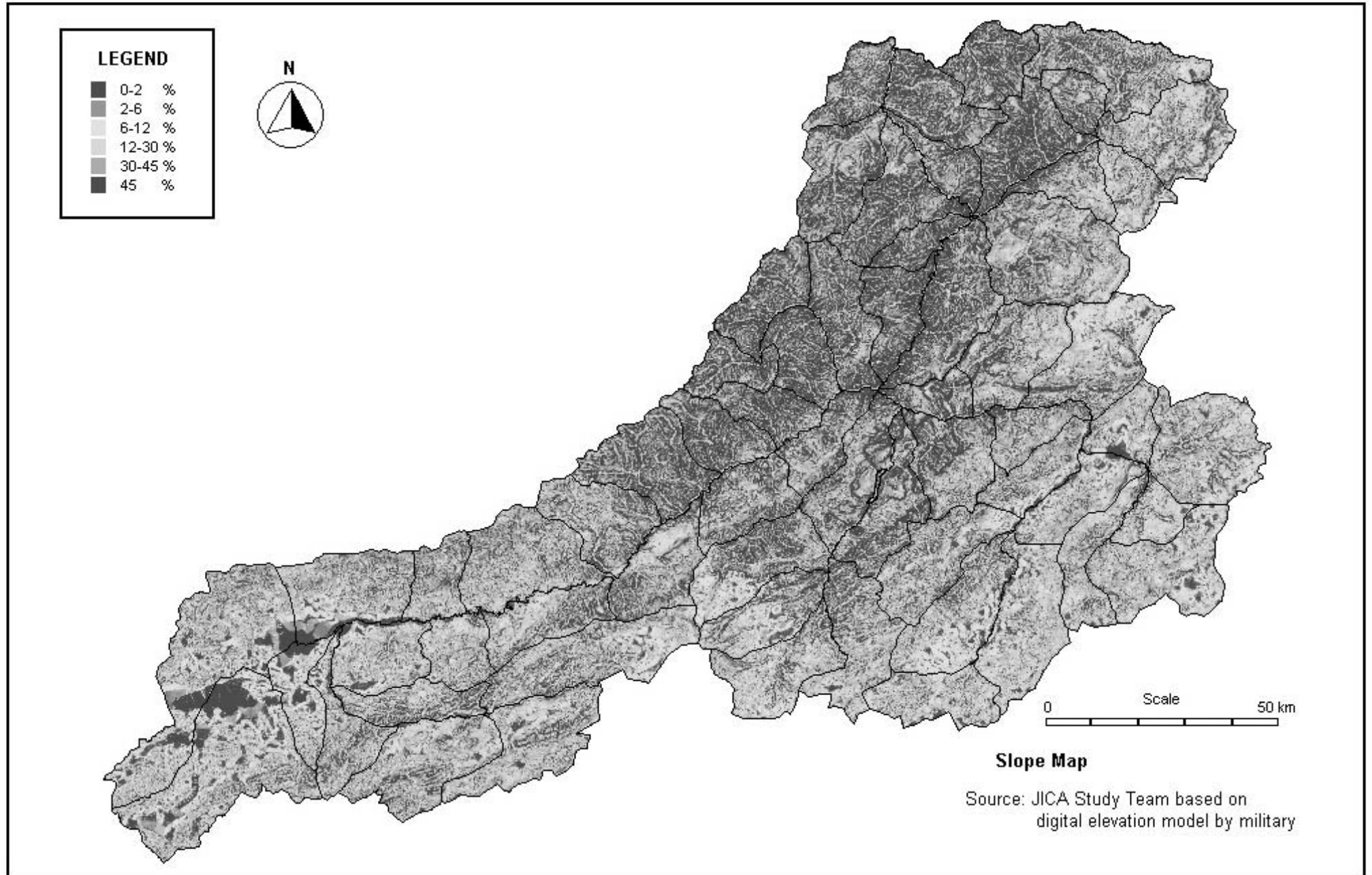


Figure 3.1-1 Slope Map

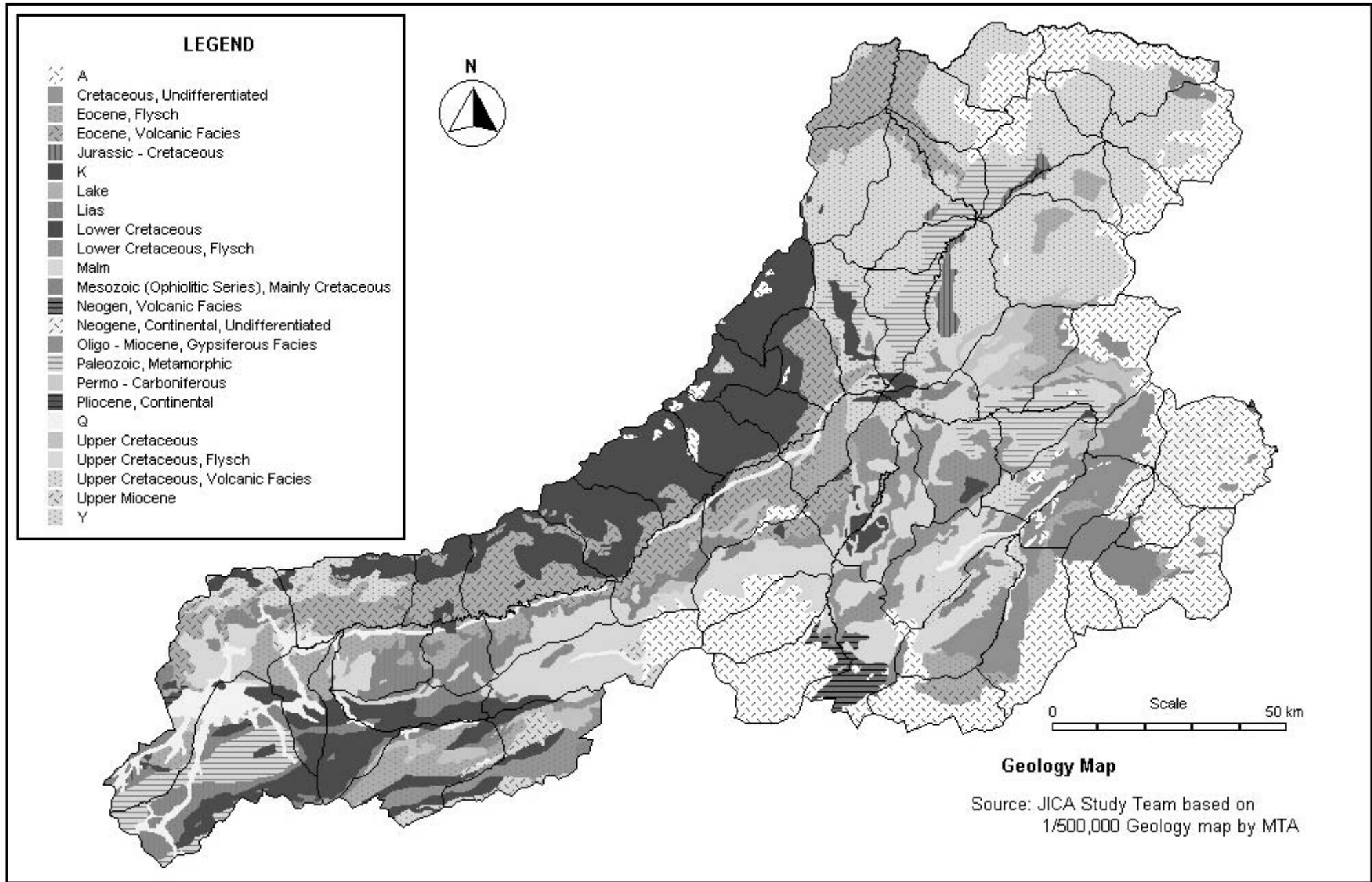


Figure 3.1-2 Geology Map

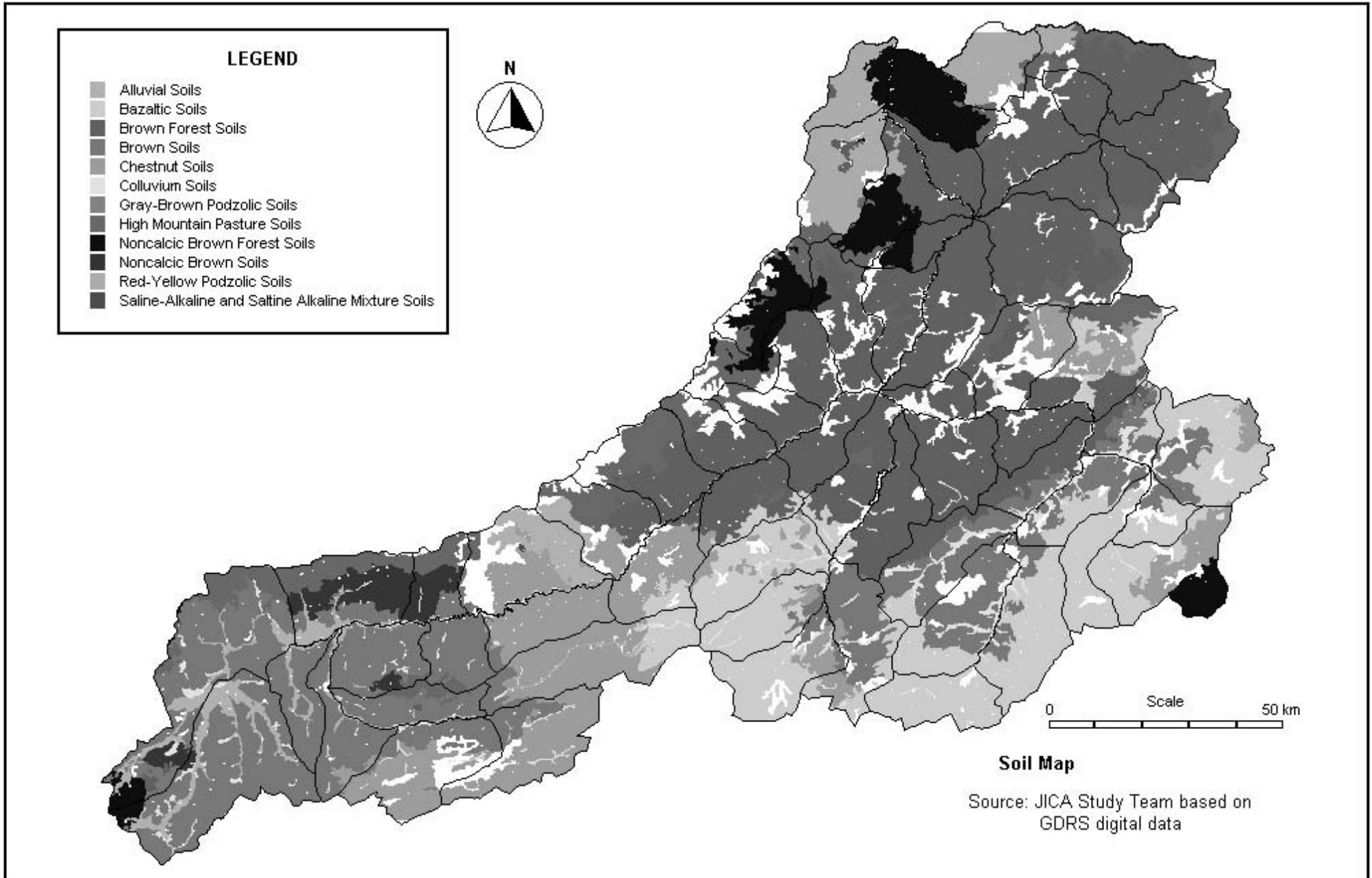


Figure 3.1-3 Soil Map

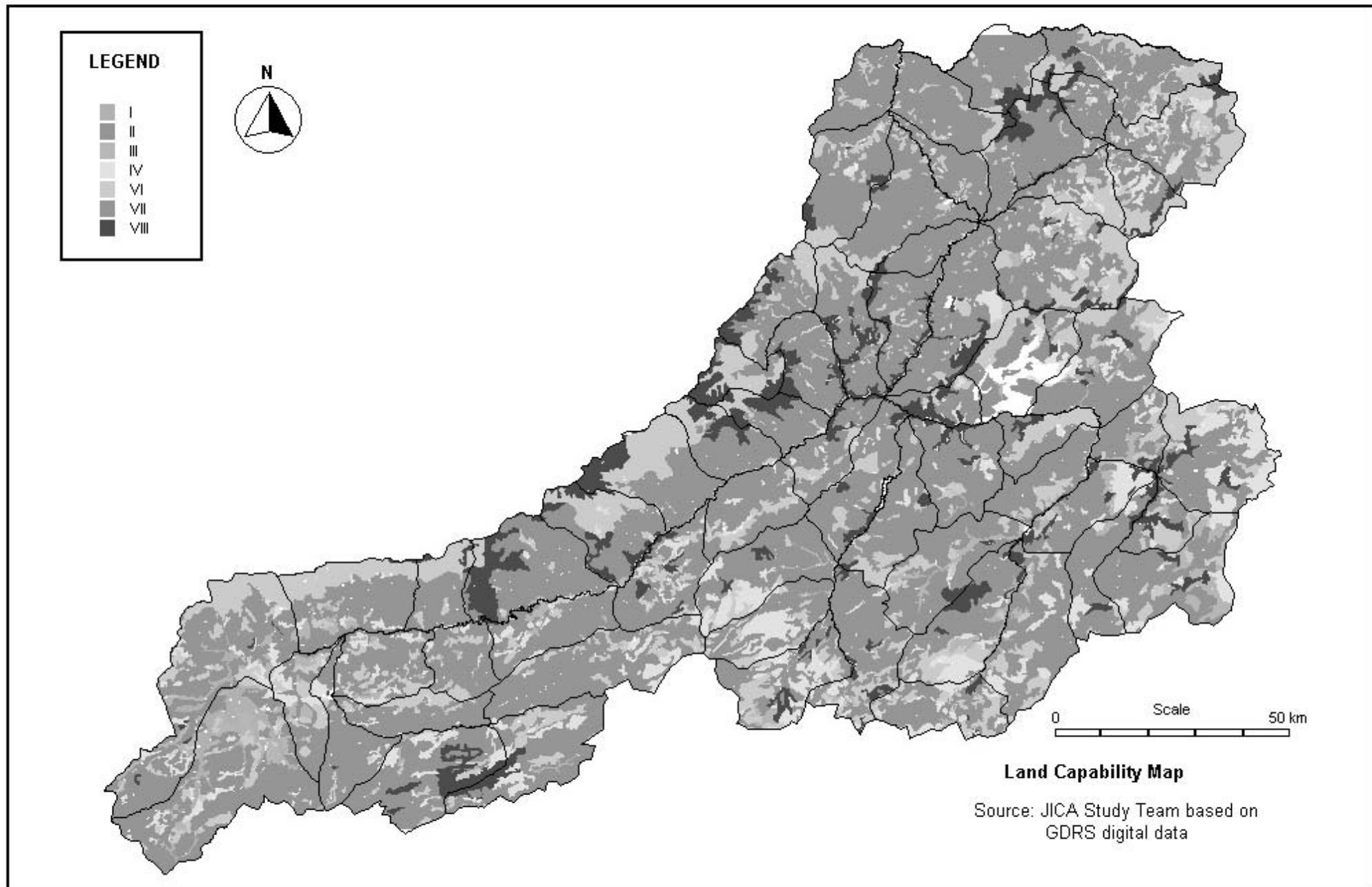


Figure 3.1-4 Land Capability Map

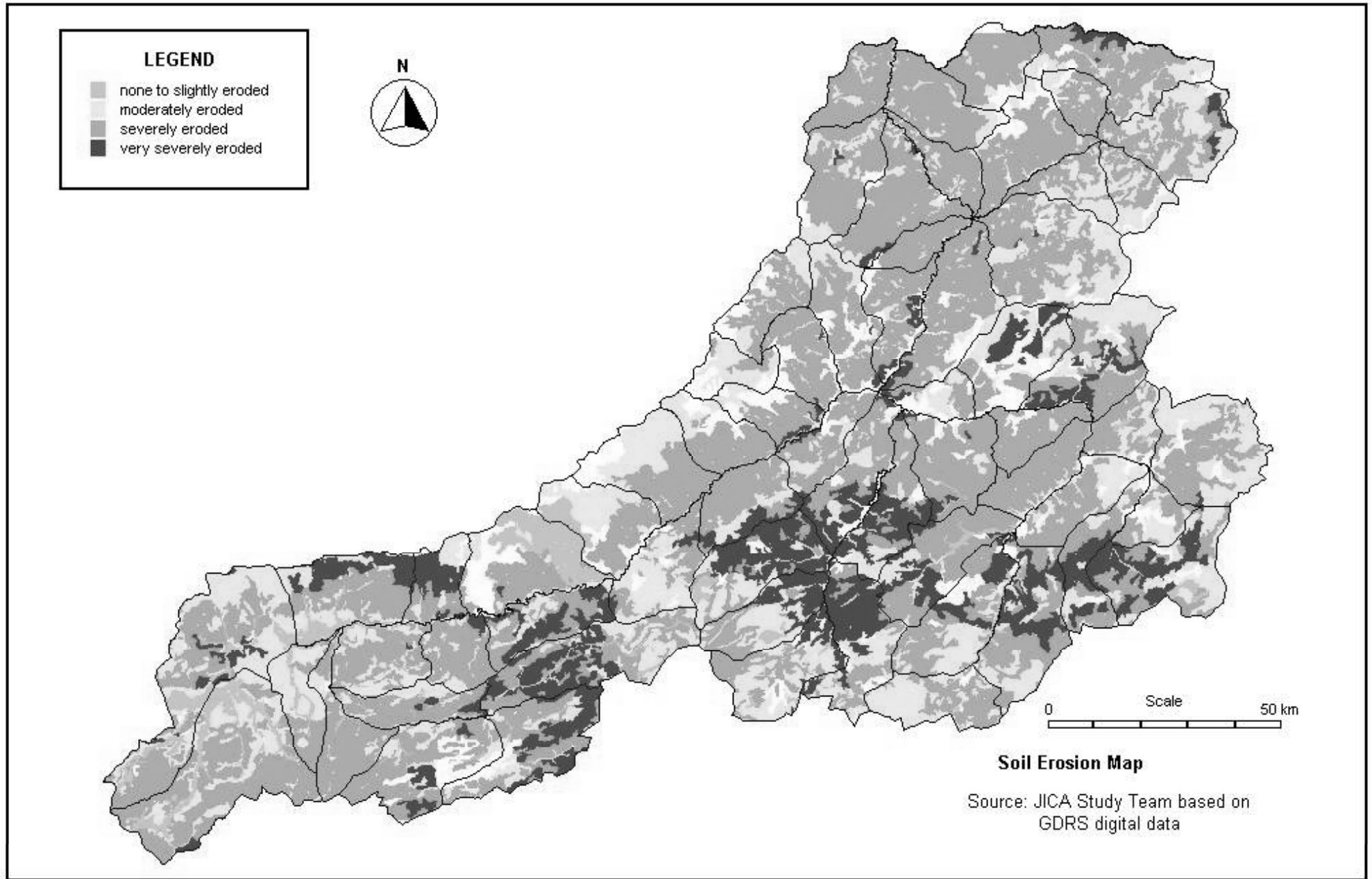


Figure 3.1-5 Soil Erosion Map